

# Economics: Foundations and Models

## Why Does Ford Assemble Cars in Both the United States and Mexico?

Until recently, did most U.S. firms operate only within the United States? Although some people believe so, in fact, many U.S. firms have been producing goods abroad for decades. For example, Henry Ford founded the Ford Motor Company in Dearborn, Michigan, in 1903. By the next year, Ford was assembling cars in Ontario, Canada. Ford began assembling cars in Manchester, England, in 1911, and in Mexico in 1925. Clearly, for many decades, Ford has been a multinational corporation, manufacturing and selling its cars around the world. In 2017, though, Ford's non-U.S. operations, particularly those in Mexico, were the subject of political controversy.

Some of the cars Ford assembles in Mexico are sold there, but Ford also exports cars from Mexico to the United States and other countries. In 2017, in an attempt to increase manufacturing employment in the United States, President Donald Trump considered imposing a 35 percent tariff—in effect, a tax—on cars that Ford and other U.S. companies assembled in Mexico for sale in the United States. If the tariff were enacted, U.S. car companies would have to pay the U.S. government an amount equal to 35 percent of the price of these cars at the border. The tariff would increase the prices consumers would pay for these cars and, therefore, reduce their sales. President Trump argued that the tariffs would give U.S. car companies an *economic incentive* to assemble more cars in the United States, which would increase employment in U.S. manufacturing.

U.S. car companies were assembling some cars in Mexico because in a *market system*, firms respond to economic incentives. In this case, the lower wages the companies can pay Mexican workers and the lower prices for auto parts in Mexico reduced Ford's costs by more than \$1,000 per car. Typically, technological progress creates economic incentives for firms to change how they produce goods and services. For example, robotics can lead automobile manufacturers to automate some jobs, reducing



Jonathan Ernst/Reuters/Alamy Stock Photo

employment in the industry. Firms also respond to changes in consumer tastes, as when more people become interested in buying electric cars. But sometimes firms respond to incentives from changes in government policy. For instance, in 1994, the governments of Canada, Mexico, and the United States agreed to the North American Free Trade Agreement (NAFTA), which made it easier for U.S. firms like Ford to ship products from Mexico to the United States. In 2017, some policymakers in Washington believed that a tariff on imports to the United States from Mexico was needed to reverse the economic incentives in NAFTA.

In this chapter and the remainder of this book, we will see how economics provides us with the tools to analyze how firms, consumers, and workers respond to economic incentives and how government policymakers can attempt to reach their objectives by changing those incentives.

**AN INSIDE LOOK** on page 20 discusses how likely it is that significant numbers of manufacturing jobs will return to the United States from overseas.

**Sources:** Dee-Ann Durbin, "Made in Mexico, Popular on U.S. Highways," Associated Press, February 8, 2017; David Welch and David Merrill, "Why Trump Tariffs on Mexican Cars Probably Won't Stop Job Flight," bloomberg.com, January 4, 2017; and Allan Nevins and Frank Ernest Hill, *Ford: Expansion and Challenge, 1915–1933*, New York: Charles Scribner's Sons, 1957, Ch. 14.

## Chapter Outline & Learning Objectives

### 1.1 Three Key Economic Ideas, page 4

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

### 1.2 The Economic Problem That Every Society Must Solve, page 8

Discuss how an economy answers these questions: What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

### 1.3 Economic Models, page 12

Explain how economists use models to analyze economic events and government policies.

### 1.4 Microeconomics and Macroeconomics, page 16

Distinguish between microeconomics and macroeconomics.

### 1.5 Economic Skills and Economics as a Career, page 16

Describe economics as a career and the key skills you can gain from studying economics.

### 1.6 A Preview of Important Economic Terms, page 17

Define important economic terms.

### Appendix: Using Graphs and Formulas, page 28

Use graphs and formulas to analyze economic situations.

## Economics in Your Life & Career

### Should You Consider a Career in Manufacturing?

In the late 1940s and early 1950s, a third of workers in the United States were employed in manufacturing. Traditionally, many high school graduates viewed working on a manufacturing assembly line as a way to earn a middle-class income. Many college graduates in engineering, accounting, management, and other fields have also found employment in manufacturing. But will manufacturing be a good source of careers in

the future? In December 2016, total employment in U.S. manufacturing was 12.3 million. But the U.S. Bureau of Labor Statistics forecasts that by 2024, this number will decline to 11.4 million. What is the basis for this forecast, and how reliable is it? As you read this chapter, try to answer this question. You can check your answer against the one we provide on **page 19** at the end of this chapter.

In this book, we use economics to answer questions such as the following:

- What determines the prices of goods and services from bottled water to smartphones to automobiles?
- Why have health care costs risen so rapidly?
- Why do firms engage in international trade, and how do government policies, such as tariffs, affect international trade?
- Why does the government control the prices of some goods and services, and what are the effects of those controls?

Economists do not always agree on the answer to every question, and there are lively debates on some issues. Because new economic questions are constantly arising, economists are always developing new methods to analyze them.

All the topics we discuss in this book illustrate a basic fact of life: To attain our goals, we must make choices. We must make choices because we live in a world of **scarcity**, which means that although our wants are *unlimited*, the resources available to fulfill those wants are *limited*. You might want to own a BMW and spend each summer vacationing at five-star European hotels, but unless Bill Gates is a close and generous relative, you probably lack the funds to fulfill these wants. Every day, you make choices as you spend your limited income on the many goods and services available. The finite amount of time you have also limits your ability to attain your goals. If you spend an hour studying for your economics midterm, you have one hour less to study for your history midterm. Firms and the government are in the same situation as you: They must also attain their goals with limited resources.

**Economics** is the study of the choices consumers, business managers, and government officials make to attain their goals, given their scarce resources.

We begin this chapter by discussing three important economic ideas that we will return to many times in the following chapters: *People are rational, people respond to economic 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? and Who will receive the goods and services produced?* Next, we consider the role of *economic models* in analyzing economic issues. **Economic models** are simplified versions of reality used to analyze real-world economic situations. We will explore why economists use models and how they construct them. Finally, we will discuss the difference between microeconomics and macroeconomics, and we will preview some important economic terms.

## 1.1

## Three Key Economic Ideas

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

Whether your goal is to buy a smartphone or find 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. Examples of markets are the markets for smartphones, houses, haircuts, stocks and bonds, and labor. Most of economics involves analyzing how people make choices and interact in markets. Here are the three important ideas about markets that we'll return to frequently:

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

**Scarcity** A situation in which unlimited wants exceed the limited resources available to fulfill those wants.

**Economics** The study of the choices people make to attain their goals, given their scarce resources.

**Economic model** A simplified version of reality used to analyze real-world economic situations.

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

## People Are Rational

Economists generally assume that people are rational. This assumption does *not* mean that economists believe everyone knows everything or always makes the “best” decision. It means that economists assume that consumers and firms use all available information as they act 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 Apple charges a price of \$649 for its new iPhone, economists assume that the managers at Apple have estimated that this price will earn the company the most profit. Even though the managers may be wrong—maybe a price of \$625 or \$675 would be more profitable—economists assume that the managers at Apple have acted rationally, on the basis of the information available to them, in choosing the price of \$649. Although not everyone behaves rationally all the time, the assumption of rational behavior is very useful in explaining most of the choices that people make.

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## People Respond to Economic Incentives

People act from a variety of motives, including envy, compassion, and religious belief. While not ignoring other motives, economists emphasize that consumers and firms consistently respond to *economic incentives*. This point may seem obvious, but it is often overlooked. For example, according to an article in the *Wall Street Journal*, the FBI couldn’t understand why banks were not taking steps to improve security in the face of an increase in robberies: “FBI officials suggest that banks place uniformed, armed guards outside their doors and install bullet-resistant plastic, known as a ‘bandit barrier,’ in front of teller windows.” FBI officials were surprised that few banks took their advice. But the article also reported that installing bullet-resistant plastic costs \$10,000 to \$20,000, and a well-trained security guard receives \$50,000 per year in salary and benefits. The average loss in a bank robbery is only about \$1,200. The economic incentive to banks is clear: It is less costly to put up with bank robberies than to take additional security measures. FBI agents may be surprised by how banks respond to the threat of robberies—but economists are not.

In each chapter, the *Apply the Concept* feature discusses a news story or another application related to the chapter material. Read this *Apply the Concept* for a discussion of whether people respond to economic incentives even when deciding how much to eat and how much to exercise.

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## Apply the Concept

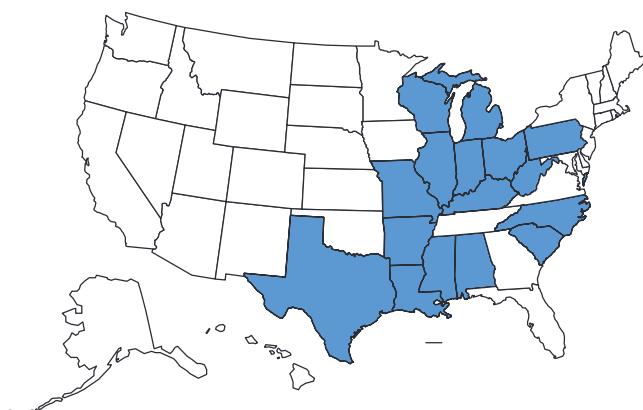
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### Does Health Insurance Give People an Incentive to Become Obese?

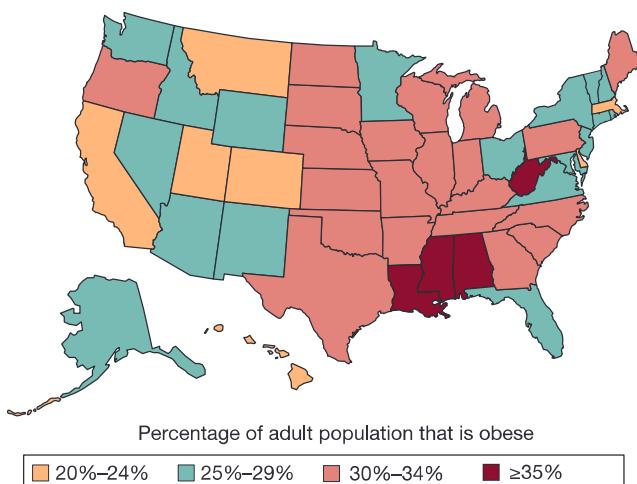
Obesity is a factor in a variety of diseases, including heart disease, stroke, diabetes, and hypertension, making it a significant health problem in the United States. Body mass index (BMI) is a measurement of a person’s weight relative to the person’s height. According to the U.S. Centers for Disease Control and Prevention (CDC), an adult with a body mass index (BMI) of 30 or greater is considered *obese*. For example, a 5'6" adult with a BMI of 30 is 40 pounds overweight.

The following two maps show the dramatic increase in obesity between 1994 and 2015. In 1994, in a majority of states, only between 10 percent and 14 percent of the adult population was obese, and in no state was more than 20 percent of the adult population obese. By 2015, in every state, at least 20 percent of the adult population was obese, and in 44 states, at least 25 percent of the adult population was obese.

Many people who suffer from obesity have underlying medical conditions. For these people, obesity is a medical problem that they cannot control. The fact that obesity has increased, though, indicates that for some people, obesity is the result of diet and lifestyle choices. Potential explanations for the increase in obesity include greater intake of high-calorie fast foods, insufficient exercise, and a decline in the physical



(a) Obesity rates in 1994



(b) Obesity rates in 2015

**Source:** Centers for Disease Control and Prevention, "Prevalence of Self-Reported Obesity among U.S. Adults."

activity associated with many jobs. The CDC recommends that teenagers get a minimum of 60 minutes of aerobic exercise per day, a standard that only 15 percent of high school students meet. In 1960, 50 percent of jobs in the United States required at least moderate physical activity. Today, only 20 percent of jobs do. As a result, a typical worker today who may work at a computer is burning off about 130 fewer calories per workday than a worker in the 1960s who was more likely to have worked in a manufacturing plant.

In addition to eating too much and not exercising enough, could having health insurance be a cause of obesity? Obese people tend to suffer more medical problems and so incur higher medical costs. Obese people with health insurance that will reimburse them for only part of their medical bills, or who have no health insurance, must pay some or all of these higher medical bills themselves. People with health insurance that covers most of their medical bills will not suffer as large a monetary cost from being obese. In other words, by reducing some of the costs of obesity, health insurance may give people an economic incentive to gain weight.

At first glance, this argument may seem implausible. Some people suffer from medical conditions that can make physical activity difficult or that can cause weight gain even with moderate eating, so they may become obese, regardless of which type of health insurance they have. The people who are obese because of poor eating habits or lack of exercise probably don't consider health insurance when deciding whether to have a slice of chocolate cake or to watch Netflix instead of going to the gym. But if economists are correct about the importance of economic incentives, then we would expect that if we hold all other personal characteristics—such as age, gender, and income—constant, people with health insurance will be more likely to be overweight than people without health insurance.

Jay Bhattacharya and Kate Bundorf of Stanford University, Noemi Pace of the University of Venice, and Neeraj Sood of the University of Southern California, have analyzed the effects of health insurance on weight. Using a sample that followed nearly 80,000 people from 1989 to 2004, they found that after controlling for factors including age, gender, income, education, and race, people with health insurance were significantly more likely to be overweight than people without health insurance. Having private health insurance increased BMI by 1.3 points. Having public health insurance, such as Medicaid, which is a program under which the government provides health care to low-income people, increased BMI by 2.3 points. These findings suggest that people respond to economic incentives even when making decisions about what they eat and how much they exercise.

Note: The exact formula for the body mass index is  $BMI = (\text{Weight in pounds}/\text{Height in inches}^2) \times 703$ .

**Sources:** Centers for Disease Control and Prevention, "Prevalence of Self-Reported Obesity among U.S. Adults," [www.cdc.gov](http://www.cdc.gov); Katherine M. Flegal, Margaret D. Carroll, Cynthia L. Ogden, and Lester R. Curtin, "Prevalence and Trends in Obesity among U.S. Adults, 1999–2008," *Journal of the American Medical Association*, Vol. 303, No. 3, January 20, 2010, pp. 235–241; Jay Bhattacharya, Kate Bundorf, Noemi Pace, and Neeraj Sood, "Does Health Insurance Make You Fat?" in Michael Grossman and Naci H. Mocan, eds., *Economic Aspects of Obesity*, Chicago: University of Chicago Press, 2011; and Tara Parker-Pope, "Less Active at Work, Americans Have Packed on Pounds," *New York Times*, May 25, 2011.

**Your Turn:** Test your understanding by doing related problems 1.7 and 1.8 on page 23 at the end of this chapter.

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## Optimal Decisions Are Made at the Margin

Some decisions are "all or nothing." For instance, when an entrepreneur decides whether to open a new restaurant, she starts the new restaurant or she doesn't. When you decide whether to attend graduate school, you either enroll in graduate school or you don't. But rather than being all or nothing, most decisions in life 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 between saving all the money you earn or spending it all. Rather, many small choices are involved, such as whether to buy a caffè mocha at Starbucks every day or just once a week.

Economists use the word *marginal* to mean "extra" or "additional." 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 reduction in your test score 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—that is, to the point 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 you pay by not spending that hour studying without giving the decision 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, you will see the feature *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, test your understanding by doing the related problems that appear at the end of the chapter. You can also complete Solved Problems on [www.pearson.com/mylab/economics](http://www.pearson.com/mylab/economics) and receive tutorial help.

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**Marginal analysis** Analysis that involves comparing marginal benefits and marginal costs.

## Solved Problem 1.1

### The Marginal Benefit and Marginal Cost of Speed Limits

In an opinion column in the *New York Times*, economists Sendhil Mullainathan of Harvard University and Richard Thaler of the University of Chicago noted, "We do not post 10-mile-per-hour speed limits on all highways, even though that would be safer." Why is a 10-mile-per-hour

speed limit unlikely to be optimal? How could a state highway department use marginal analysis to decide whether to increase the speed limit on a highway from 55 to 65 miles per hour?

## Solving the Problem

**Step 1: Review the chapter material.** This problem is about making decisions, so you may want to review the section "Optimal Decisions Are Made at the Margin," which appears on this page.

**Step 2:** Discuss how we can decide what the optimal speed limit is and why it is unlikely to be 10 miles per hour. The faster people drive, the more likely they are to have accidents because the less time they have to react to problems on the highway. In addition, the faster a car or truck is traveling, the more likely it is that an accident will cause damage to the vehicles involved and injuries to the vehicles' occupants. These are the main costs of increasing the speed limit. These costs will increase with each additional mile per hour the speed limit is increased. In other words, the marginal cost from increasing the speed limit is positive.

Increasing the speed limit has benefits as well. The higher the speed limit, the faster people and freight will reach their destinations. These benefits will increase with each additional mile per hour the speed limit is increased, so the marginal benefit from increasing the speed limit is positive. The optimal speed limit will be the one where the marginal cost of decreased safety equals the marginal benefit of faster travel. We know that we have reached the optimal speed limit when increasing the limit further would result in marginal cost being greater than marginal benefit.

A 10-mile-per-hour speed limit would result in very long travel times. So, we can reasonably conclude that a 10-mile-per-hour speed limit isn't optimal because the marginal benefit from increasing it is likely to be much greater than the marginal cost.

**Step 3:** Explain how a state highway department could use marginal analysis to decide whether to increase the speed limit on a highway from 55 to 65 miles per hour. Increasing the speed limit by 10 miles per hour will reduce travel times for people and freight—so there will be a marginal benefit—but will likely also increase the number of accidents and the damage from those accidents. The state highway department should try to estimate the dollar values of the marginal cost and marginal benefit of making the change. If the marginal benefit is greater than the marginal cost, the speed limit should be increased. Although it can be difficult to assign dollar values to the marginal benefit and marginal cost of an action, marginal analysis captures the steps you can follow to make optimal decisions in many situations.

**Extra Credit:** Suppose that the highway department calculates that increasing the speed limit will result in reduced travel time valued at \$100 million. This information would not be enough to decide that the speed limit should be raised because it represents only the marginal benefit from the higher speed limit. If the dollar value of more severe accidents from greater speed turns out to be \$125 million, then the marginal cost of increasing the speed limit would be greater than the marginal benefit, and the speed limit should not be raised. Marginal benefit and marginal cost both have to be considered in arriving at an optimal decision.

**Source:** Sendhil Mullainathan and Richard Thaler, "Waiting in Line for the Illusion of Security," *New York Times*, May 27, 2016.

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**Your Turn:** For more practice, do related problems 1.9 and 1.10 on page 23 at the end of this chapter.

## 1.2

## The Economic Problem That Every Society Must Solve

**LEARNING OBJECTIVE:** Discuss how an economy answers these questions:

What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

Because we live in a world of scarcity, any society faces the *economic problem* that it has only a limited amount of economic resources—such as workers, machines, and raw materials—and so can produce only a limited amount of goods and services. Therefore,

every society faces **trade-offs**: Producing more of one good or service means producing less of another good or service. The best measure of the cost of producing a good or service is the value of what has to be given up to produce it. The **opportunity cost** of any activity—such as producing a good or service—is the highest-valued alternative that must be given up to engage in that activity. The concept of opportunity cost is very important in economics and applies to individuals, firms, and society as a whole. For instance, suppose that you earn a salary of \$100,000 per year working as a manager for Ford. You decide to leave your job and open your own management consulting firm. In this case, the opportunity cost of the labor you supply to your own firm is the \$100,000 you give up by not working for Ford, *even if you do not explicitly pay yourself a salary*. As in this example, opportunity costs often do not involve actual payments of money.

Trade-offs force society to make choices when answering 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 briefly introduce each question.

## What Goods and Services Will Be Produced?

How will society decide whether to produce more economics textbooks or more smartphones? More daycare facilities or more football stadiums? Of course, “society” doesn’t make decisions; only individuals make decisions. The answer to the question of what will be produced is determined by the choices that consumers and people working for firms or the government make. Every day, you help decide which goods and services firms will produce when you choose to buy an iPhone instead of a Samsung Galaxy or a caffè mocha rather than a chai tea. Similarly, managers at Apple must choose whether to devote the company’s scarce resources to making more iPhones or more smartwatches. Members of Congress and the president must choose whether to spend more of the federal government’s limited budget on breast cancer research or on repairing highways. In each case, consumers, managers of firms, and government policymakers face the problem of scarcity by trading off one good or service for another. And each choice made comes with an opportunity cost, measured by the value of the best alternative given up.

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## 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 and using more machines. For example, a local service station has to choose whether to provide car repair services using more diagnostic computers and fewer auto mechanics or fewer diagnostic computers and more auto mechanics. 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 computers. In deciding whether to move production offshore to China, firms may need to choose between a production method in the United States that uses fewer workers and more machines and a production method in China that uses more workers and fewer machines.

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## Who Will Receive the Goods and Services Produced?

In the United States, who receives the goods and services produced depends largely on how income is distributed. The higher a person’s income, the more goods and services he or she can buy. 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. Americans donate more than \$370 billion per year to charity, or an average donation of about \$2,900 for each household in the country. An important policy question, however, is whether the

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

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

government should intervene to make the distribution of income more equal. Such intervention already occurs in the United States 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.

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## Centrally Planned Economies versus Market Economies

**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.

To answer the three questions—what, how, and who—societies organize 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 that of the Soviet Union, which was established when Vladimir Lenin and the Communist Party staged a revolution and took control of the Russian Empire. In the Soviet Union, the government decided what goods to produce, how the goods would be produced, and who would receive the goods. 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 that of the 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 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 high-income democracies, including the United States, Canada, Japan, and the countries of Western Europe, have 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. Because firms in a market economy compete to offer the highest-quality products at the lowest price, they are under pressure to use the lowest-cost methods of production. For example, as we saw in the chapter opener, Ford moved some production to Mexico to lower its production costs in the face of competition from both foreign and domestic car firms.

In a market economy, the income of an individual is determined by the payments he receives for what he or she has to sell. If you become a civil engineer, and firms are willing to pay a salary of \$85,000 per year for someone with your training and skills, you will have this amount of income to purchase goods and services. If you also buy a house that you rent out, your income will be even higher. One of the attractive features of markets is that they reward hard work. Generally, the more extensive the training you have received and the longer the hours you work, the higher your income will be. Of course, luck—both good and bad—also plays a role here. Someone might have a high income because she won the state lottery, while someone else might have a low income because he has severe medical problems. We can conclude that market economies respond to the question “Who receives the goods and services produced?” with the answer “Those who are most willing and able to buy them.”

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## The Modern “Mixed” Economy

In the 1800s and early 1900s, the U.S. government engaged in relatively little regulation of markets for goods and services. Beginning in the mid-1900s, government intervention in the economy dramatically increased in the United States and other market economies. 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 the 1930s, Congress established the *Social Security system*, which provides government payments to retired and disabled workers, and enacted *minimum wage* legislation, which sets a floor on the wages employers can pay workers in many occupations. In more recent years, government intervention in the economy has also expanded to meet goals such as protecting the environment, promoting civil rights, and providing medical care to low-income and elderly people.

Some economists argue that the extent of government intervention makes it no longer accurate to refer to the economies of the United States, Canada, Japan, and Western Europe as pure market economies. Instead, they should be called *mixed economies*. A **mixed economy** is still primarily a market economy because most economic decisions result from the interaction of buyers and sellers in markets. However, 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 mixed economy. The Chinese economy suffered decades of economic stagnation following the takeover of the government in 1949 by Mao Zedong and the Communist Party. Although China remains a political dictatorship, the production of most goods and services is now determined in the market rather than by the government. The result has been rapid economic growth that has lifted more than a billion people in China out of poverty.

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**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.

## Efficiency and Equity

Market economies tend to be more efficient than centrally planned economies. There are two types of efficiency. **Productive efficiency** occurs when a good or service is produced at the lowest possible cost. **Allocative efficiency** occurs when production is in accordance with consumer preferences. Markets tend to be efficient because they promote competition and facilitate voluntary exchange. With **voluntary exchange**, both the buyer and the seller of a product are made better off by the transaction. We know that they are both made better off because, otherwise, the buyer would not have agreed to buy the product or the seller would not have agreed to sell it. Productive efficiency is achieved when competition among firms forces them to produce goods and services at the lowest cost. Allocative efficiency is achieved when the combination of competition among firms and voluntary exchange between firms and consumers results in firms producing the mix of goods and services that consumers prefer the most. Competition will result in firms continuing to produce and sell 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 match consumer preferences.

Although markets promote efficiency, they don't guarantee it. Inefficiency can arise from various sources. For instance, it may take some time for firms to learn how to efficiently produce a good or service. When smartphones were introduced, firms did not instantly achieve productive efficiency because it took time to discover the lowest-cost method of producing this good. As we will discuss in later chapters, inefficiency can also arise if governments interfere 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, a point we discuss further in the *Apply the Concept* on page 15. 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.

**Productive efficiency** A situation in which a good or service is produced at the lowest possible cost.

**Allocative efficiency** A state of the economy in which production is in accordance with consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to society equal to the marginal cost of producing it.

**Voluntary exchange** A situation that occurs in markets when both the buyer and the seller of a product are made better off by the transaction.

**Equity** The fair distribution of economic benefits.

Not everyone will consider a particular outcome to be desirable, even if the outcome is economically efficient. Many people prefer economic outcomes that they consider fair or equitable, even if those outcomes are less efficient. **Equity** is harder to define than efficiency because there isn't an agreed-upon definition of fairness. For some people, equity means a more equal distribution of economic benefits than would result from an emphasis on efficiency alone. For example, some people support raising taxes on people with higher incomes to provide the funds for programs that aid the poor. Although governments may increase equity by reducing the incomes of high-income people and increasing the incomes of the poor, these policies may reduce efficiency. People have less incentive to open new businesses, work hard, and 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*. Government policymakers frequently confront this trade-off.

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### 1.3

## Economic Models

**LEARNING OBJECTIVE:** Explain how economists use models to analyze economic events and government policies.

As mentioned at the start of the chapter, economic models are simplified versions of reality. Many professions rely on models: An engineer may use a computer model of a bridge to help test whether it will withstand high winds, or a biologist may make a physical model of a nucleic acid to better understand its properties. Economists rely on economic models, or theories, to analyze real-world issues ranging from the effects of tariffs on the prices of imported goods to the most efficient policies for reducing pollution. (This book uses the words *model* and *theory* interchangeably.) One purpose of economic models is to make economic ideas sufficiently explicit and concrete so that individuals, firms, or the government can use them to make decisions. 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 among buyers and sellers in markets.

Economists use economic models to answer questions such as "How many people will be employed in manufacturing in 2024?" Economists at the U.S. Bureau of Labor Statistics (BLS) build models that allow them to forecast future employment in different occupations. The BLS models provide estimates of future demand for U.S. manufacturing production and estimates of how many employees manufacturing firms will require to produce that level of output. As mentioned at the beginning of the chapter, the BLS forecasts that employment in manufacturing will decline significantly by 2024.

Sometimes economists use an existing model to analyze a real-world problem or issue, but in other cases, they have to develop a new model. To develop a model, economists generally follow these steps:

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

### The Role of Assumptions in Economic Models

Any model is based on assumptions because models have to be simplified to be useful. Economic models make *behavioral assumptions* about the motives of consumers and firms. Economists assume that consumers will buy the goods and services that will maximize their well-being or their satisfaction. Similarly, economists assume that firms act to maximize their profits. These assumptions are simplifications because they do not describe the motives of every consumer and every firm. How can we know whether the assumptions in a model are too simplified or too limiting? We can determine the usefulness of assumptions by forming hypotheses based on the assumptions and then testing the hypotheses using real-world information.

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## Forming and Testing Hypotheses in Economic Models

An **economic variable** is something measurable that can have different values, such as the number of people employed in manufacturing. In an economic model, a hypothesis is a statement about an economic variable that may be either correct or incorrect. An example of a hypothesis in an economic model is the statement that increased use of industrial robots and information technology in U.S. factories has resulted in a decline in manufacturing employment. The hypothesis may be correct if the main effect of industrial robots has been to replace assembly line workers, thereby reducing employment. Or the hypothesis may be incorrect if the use of robots and other information technology has increased firms' demand for software programmers and other technology workers, thereby increasing employment. An economic hypothesis is usually about a *causal relationship*; in this case, the hypothesis states that increased use of robots and information technology causes, or leads to, lower employment in manufacturing.

Before we can accept a hypothesis, we have to test it by analyzing statistics on the relevant economic variables. In our example, we would gather statistics on how the use of industrial robots and information technology in manufacturing has changed over time, on employment in manufacturing, and perhaps on other variables. Testing a hypothesis can be tricky. For example, showing that employment in manufacturing declined at the same time that use of robots increased would not be enough to demonstrate that the increased use of robots *caused* the decline in employment. Just because two things are correlated—that is, they happen at the same time—does not mean that one caused the other. For example, suppose that at the same time that use of robots in U.S. manufacturing was increasing, U.S. manufacturing firms faced declining sales due to increased competition from foreign firms. In that case, the declining sales, rather than the increased use of robots, may explain the decrease in U.S. manufacturing employment. Over a period of time, many economic variables change, which complicates the testing of 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 “Increasing employment in manufacturing is good” or “Increasing employment in manufacturing is bad” are value judgments rather than hypotheses because it is not possible to disprove them.

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. In fact, economists often refer to a hypothesis having been “not rejected” rather than having been “accepted” by statistical analysis. But what if statistical analysis clearly rejects a hypothesis? For example, what if a model leads to a hypothesis that increased use of industrial robots will cause a decline in manufacturing employment, but the data reject this hypothesis? In this case, the model should be reconsidered. It may be that an assumption used in the model was too simplified or too limiting. For example, perhaps the model ignored the fact that the mix of products being manufactured in the United States was changing. For example, perhaps the assembly of electric cars requires more workers than does the assembly of gasoline-powered cars. Or perhaps the model did not include the effect of tariffs on the demand for U.S. manufactured goods because such tariffs had typically been low. If tariffs sharply increase, the model may not be able to accurately estimate the relationship between changes in the use of industrial robots and changes in employment.

As we saw at the beginning of the chapter, the U.S. Bureau of Labor Statistics (BLS) has forecast that total employment in U.S. manufacturing will decline from 12.3 million in December 2016 to 11.4 million in 2024. The BLS periodically analyzes the accuracy of its projections. It has had difficulty accurately projecting manufacturing employment. For example, in 2000, the BLS projected that in 2010, 19,047,000 people would be employed in manufacturing. In fact, in 2010, only 11,529,000 people were employed in manufacturing. The BLS concluded that this large error was the result of its model

**Economic variable** Something measurable that can have different values, such as the number of people employed in manufacturing.

failing to account for the extent to which U.S. firms would move manufacturing operations overseas, how quickly firms would improve their ability to produce the same output with fewer workers, and the lasting effects of the severe 2007–2009 recession. Analyzing its errors helps the BLS to improve its models and employment projections.

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. This process is often called the *scientific method*. Economics is a *social science* because it applies the scientific method to the study of the interactions among individuals.

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## Positive and Normative Analysis

**Positive analysis** Analysis concerned with what is.

**Normative analysis** Analysis concerned with what ought to be.

Throughout this book, as we build economic models and use them to answer questions, bear in mind the following important distinction: **Positive analysis** is concerned with *what is*, and **normative analysis** is concerned with *what ought to be*. Economics is about positive analysis, which measures the costs and benefits of different courses of action.

We can use the federal government's minimum wage law to compare positive and normative analysis. In 2017, under this law, it was illegal for an employer to hire a worker at a wage less than \$7.25 per hour. (Some states and cities had enacted higher minimum wages.) Without the minimum wage law, some firms and workers would voluntarily agree to a lower wage. Because of the minimum wage law, some workers have difficulty finding jobs, and some firms end up paying more for labor than they otherwise would have. A positive analysis of the federal minimum wage law uses an economic model to estimate how many workers have lost their jobs because of the law, its effect 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 law is a good or a bad idea is a normative one and depends on how people evaluate the trade-off involved. Supporters of the law believe that the losses to employers and workers who are unemployed as a result of the law are more than offset by the gains to workers who receive higher wages than they would without the law. Opponents of the law believe the losses are greater than the gains. The assessment by any individual depends, in part, on that person's values and political views. The positive analysis an economist provides 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 below. These boxes alert you to common pitfalls in thinking about economic ideas. After reading this box, test your understanding by working the related problem or problems at the end of the chapter.

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## Don't Let This Happen to You

### Don't Confuse Positive Analysis with Normative Analysis

"Economic analysis has shown that the minimum wage law is a bad idea because it causes unemployment." Is this statement accurate? As of 2017, the federal minimum wage law prevents employers from hiring workers at a wage of less than \$7.25 per hour. This wage is higher than some employers are willing to pay some workers. If there were no minimum wage law, some workers who currently cannot find any firm willing to hire them at \$7.25 per hour would be able to find employment at a lower wage. Therefore, positive economic analysis indicates that the minimum wage law causes unemployment. (In Chapter 4, we'll explore why economists disagree about *how much* unemployment the minimum wage law causes.) But some workers who

have jobs benefit from the minimum wage law because they are paid a higher wage than they otherwise would be. 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.

Should we value the gains to the winners more than we value the losses to the losers? The answer involves normative analysis. Positive economic analysis can show the consequences of a particular policy, but it cannot tell us whether the policy is "good" or "bad." So, the statement at the beginning of this box is inaccurate.

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**Your Turn:** Test your understanding by doing related problems 3.6 and 3.7 on page 25 at the end of this chapter.

## Economics as a Social Science

Because economics studies the actions of individuals, it is a social science. Economics is therefore similar to other social science disciplines, such as psychology, political science, and sociology. Economics differs from other social sciences because it puts more emphasis on how the decisions of individuals explain outcomes such as the prices firms charge or the policies governments enact. Economics considers individual decision making in every context, not just in the context of business. Economists have studied issues such as why people have difficulty losing weight or attaining other goals, why people sometimes ignore relevant information when making decisions, and how couples decide to divide up household chores. Government policymakers have also increasingly relied on economic analysis when evaluating laws or regulations. As we will see throughout this book, economists have played an important role in influencing government policies in areas such as the environment, health care, and efforts to reduce poverty.

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## Apply the Concept

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### What Can Economics Contribute to the Debate over Tariffs?

What effect would proposed tariffs on imports of goods from Mexico and other countries have on the U.S. economy? Governments typically impose tariffs to raise revenue or to discourage imports by raising the selling prices of imported goods. If imports of goods decline, production and employment at domestic firms that compete with imports may increase. For example, a tariff on imports of cars assembled in Mexico would raise their prices and lead U.S. consumers to buy more cars assembled in the United States. We can create a preliminary list of potential winners and losers in a country that imposes a tariff. The government gains from collecting the tariff revenue, and domestic firms and their workers gain from the higher prices of competing imported goods. Consumers lose because they pay higher prices for goods on which the tariff has been enacted. If some of the imported goods are used as inputs or are sold by domestic firms—for example, Walmart may sell imported tires on which Congress has enacted a tariff—those firms will also lose from the tariff.

Economics can provide valuable information to policymakers and the general public as they consider actions such as implementing tariffs. As we will discuss further in Chapters 2 and 9, economic analysis shows that trade between countries occurs primarily on the basis of comparative advantage. A country has a comparative advantage if it can produce a good at a lower opportunity cost than competitors. For example, due to the climate and soil in Colombia, coffee can be grown there without requiring the transfer of significant resources from producing other goods and services—so the opportunity cost of producing coffee in Colombia is low. The United States is not well suited for producing coffee, so the opportunity cost of producing coffee in the United States is very high. We can conclude that Colombia has a comparative advantage relative to the United States in producing coffee. Imposing a tariff on imports to the United States of Colombian coffee would reduce economic efficiency by shifting production of coffee from Colombia, where it can be grown at a low cost, to the United States, where it can only be grown at a high cost.

Economists can use models to estimate the dollar amounts gained by the winners from the imposition of a tariff, the amount lost by the losers, and the size of the loss of economic efficiency. Economic analysis of tariffs typically shows that the dollar losses from the government imposing a tariff are larger than the dollar gains, so the tariff causes a net loss for the country as a whole.

Although economic analysis can contribute to the debate over policy proposals by measuring their likely effects, it cannot by itself decide whether a proposal should be enacted. Policymakers and a majority of the general public may decide to enact a tariff because they place a higher value on the gains to some groups—workers and firms



Erika Skogg/National Geographic/Getty Images

*Because of its fertile soil and warm climate, Colombia has a comparative advantage in coffee bean production relative to the United States.*

struggling to compete against imported goods—than on the losses to other groups—consumers as a whole. In other words, policymakers and the general public would be making a normative judgment in favor of tariffs. Ultimately policymakers and the general public are responsible for weighing trade-offs and deciding whether a proposal should be enacted.

**Sources:** John D. Stoll, “Donald Trump, GM, Ford and the Made-in-Mexico Car,” *Wall Street Journal*, January 3, 2017; Mary Anastasia O’Grady, “Texas and the Real Forgotten Man,” *Wall Street Journal*, February 12, 2017; and David Welch and David Merrill, “Why Trump Tariffs on Mexican Cars Probably Won’t Stop Job Flight,” *bloomberg.com*, January 4, 2017.

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**Your Turn:** Test your understanding by doing related problem 3.8 on page 25 at the end of this chapter.

## 1.4

# Microeconomics and Macroeconomics

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

**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.

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Economic models can be used to analyze 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.

The division between microeconomics and macroeconomics is not a bright line. Many economic situations have both a microeconomic aspect 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 analyze the incentives individual firms face—which is a microeconomic issue.

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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 obesity</li> <li>• The costs and benefits of approving the sale of a new prescription drug</li> <li>• The most efficient way to reduce air pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Why economies experience periods of recession 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 U.S. dollar in exchange for other currencies</li> <li>• Whether government intervention can reduce the severity of recessions</li> </ul>

## 1.5

# Economic Skills and Economics as a Career

**LEARNING OBJECTIVE:** Describe economics as a career and the key skills you can gain from studying economics.

How do economists do what they do? The following analogy may be helpful: When people are thinking of buying a house, they may hire a structural engineer as a consultant to examine the house and prepare a report. The engineer’s report is likely to both describe any problems with the house—like cracks in the foundation—and advise the potential buyer how to fix the problems and the likely cost.

You have seen that economics is about making choices. Economists spend much of their time describing how individuals, businesses, and governments make choices and analyzing the results of the choices. Then, like a structural engineer advising

a homeowner how to fix a leaky basement, economists advise on how better decisions can be made.

In this book, we will explore economic principles that you will find very useful in understanding what is happening in the world of economics and business and in your everyday life. Individuals can use economic principles to improve how they make important decisions, such as what career to pursue, what financial investment to make, or whether to lease or buy a car. Managers in businesses can also use economic principles to improve how they make important decisions, such as what prices to charge for their products, whether to begin selling their products in a foreign market, or whether to invest in new software. Government policymakers use economic principles to make decisions, such as whether to raise taxes on cigarettes to discourage teenage smoking, whether to raise interest rates to reduce the threat of inflation, or whether to allocate additional funds to research on cancer or to research on heart disease.

Many businesses, government agencies, and nonprofit organizations—including hospitals, museums, and charities—hire economists. Colleges and universities also hire economists to teach and to carry out academic research on business, the economy, and economic policy.

The Bureau of Labor Statistics ([www.bls.gov/ooh/Life-Physical-and-Social-Science/Economists.htm#tab-2](http://www.bls.gov/ooh/Life-Physical-and-Social-Science/Economists.htm#tab-2)) lists activities economists often perform while pursuing careers in these organizations:

- An economist working for Ford Motor Company may forecast the demand for electric cars over the next 10 years.
- An economist working for Goldman Sachs, a Wall Street investment firm, may use economic models to forecast future values of interest rates.
- An economist working for McDonald's may assess whether the firm should open additional restaurants in China.
- An economist working for the U.S. Federal Trade Commission may gather and analyze data relevant to deciding whether two firms should be allowed to reduce competition in a market by merging to form a combined firm, as when chemical companies Dow Chemical and DuPont proposed merging in 2017.
- An economist working for one of the regional Federal Reserve Banks may forecast trends in employment and production in that region.
- A journalist who majored in economics and is working for the *Wall Street Journal* may report on the Federal Reserve, interpreting monetary policy for the paper's readers.
- An economist working for the World Bank, an international economic organization with the mission of reducing poverty and increasing economic growth, might write a report analyzing the effectiveness of a development program in a low-income country.

A first step for many students in deciding whether to pursue a career in economics is to seek a summer internship with a firm or an agency that employs economists.

Many of the choices we discuss in this book will be those that business firms make. Economics has developed a set of tools designed specifically to help business firms make better decisions. It is not too surprising that more chief executive officers of Fortune 500 firms majored in economics than in any other subject. But many students who do not pursue a career in economics can still benefit from the skills they learn by taking economics classes.

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## 1.6

## A Preview of Important Economic Terms

LEARNING OBJECTIVE: Define important economic terms.

In the following chapters, you will encounter certain important terms again and again. Becoming familiar with these terms is a necessary step in learning economics. Here we provide a brief introduction to some of these terms. We will discuss them all in greater depth in later chapters:

- **Firm, company, or business.** A firm is an organization that produces a good or service. Most firms produce goods or services to earn a profit, but there are also

nonprofit firms, such as universities and some hospitals. Economists use the terms *firm*, *company*, and *business* interchangeably.

- **Entrepreneur.** An *entrepreneur* is someone who operates a business. In a market system, entrepreneurs decide what goods and services to produce and how to produce them. An entrepreneur starting a new business puts his or her own funds at risk. If an entrepreneur is wrong about what consumers want or about the best way to produce goods and services, his or her funds can be lost. Losing money in a failed business is not unusual: In the United States, about half of new businesses fail within four years. Without entrepreneurs willing to assume the risk of starting and operating businesses, economic progress would be impossible in a market system.
- **Innovation.** There is a distinction between an *invention* and an *innovation*. An *invention* is a new good or a new process for making a good. An *innovation* is the practical application of an invention. (*Innovation* may also be used more broadly to refer to any significant improvement in a good or in the means of producing a good.) Much time often passes between the appearance of a new idea and its development for widespread use. For example, the Wright brothers first achieved self-propelled flight at Kitty Hawk, North Carolina, in 1903, but the Wright brothers' plane was very crude, and it wasn't until the introduction of the DC-3 by Douglas Aircraft in 1936 that regularly scheduled intercity airline flights became common in the United States. Similarly, the first digital electronic computer—the ENIAC—was developed in 1945, but the first IBM personal computer was not introduced until 1981, and widespread use of computers did not have a significant effect on the productivity of U.S. businesses until the 1990s.
- **Technology.** A firm's *technology* is the processes it uses to produce goods and services. 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.
- **Goods.** Goods are tangible merchandise, such as books, computers, or Blu-ray players.
- **Services.** Services are activities performed for others, such as providing haircuts or investment advice.
- **Revenue.** A firm's *revenue* is the total amount received for selling a good or service. We calculate it by multiplying the price per unit by the number of units sold.
- **Profit.** A firm's *profit* is the difference between its revenue and its costs. Economists distinguish between *accounting profit* and *economic profit*. In calculating accounting profit, we exclude the costs of some economic resources that the firm does not pay for explicitly. In calculating economic profit, we include the opportunity costs of all resources used by the firm. When we refer to *profit* in this book, we mean economic profit. It is important not to confuse profit with revenue.
- **Household.** A *household* consists of all persons occupying a home. Households are suppliers of factors of production—particularly labor—used by firms to make goods and services. Households also demand goods and services produced by firms and governments.
- **Factors of production, economic resources, or inputs.** Firms use *factors of production* to produce goods and services. The main factors of production are labor, capital, natural resources—including land—and entrepreneurial ability. Households earn income by supplying the factors of production to firms. Economists use the terms *factors of production*, *economic resources*, and *inputs* interchangeably.
- **Capital.** In everyday speech, the word *capital* can refer to *financial capital* or to *physical capital*. Financial capital includes stocks and bonds issued by firms, bank accounts, and holdings of money. In economics, though, *capital* refers to physical capital, which includes manufactured goods that are used to produce other goods and services. Examples of physical capital are computers, factory buildings, machine tools, warehouses, and trucks. The total amount of physical capital available in a country is called its *capital stock*.

- **Human capital.** Human capital refers to the accumulated training and skills that workers possess. For example, college-educated workers generally have more skills and are more productive than workers who have only high school degrees; therefore, college-educated workers have more human capital.

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Continued from page 3

## Economics in Your Life & Career

### Should You Consider a Career in Manufacturing?

At the beginning of this chapter, we posed the question “What is the basis for the BLS’s forecast that manufacturing employment will decline by 2024, and how reliable is this forecast?” As we saw in this chapter, the BLS uses economic models to forecast future employment in U.S. manufacturing. In recent years, the BLS has had difficulty accurately forecasting manufacturing

employment. For example, in 2000, the BLS forecast that manufacturing employment would increase over the following 10 years, when in fact it declined substantially. The BLS analyzes errors like these in attempting to improve its forecasts. So, it is likely that the BLS’s forecasts will become more accurate over time, but it would be a mistake to expect the forecasts to be exact.

## Conclusion

Economics is a group of useful ideas about how individuals make choices given their scarce resources. Economists have put these ideas into practice by developing economic models. Consumers, business managers, and government policymakers use these models every day to help make choices. In this book, we explore many key economic models and give examples of how to apply them in the real world.

Reading the news is an important part of understanding the current business climate and learning how to apply economic concepts to a variety of real-world events. At the end of each of the first four chapters, you will see a two-page feature titled *An Inside Look*. This feature consists of an excerpt from an article that relates to the company or economic issue introduced at the start of the chapter and also to the concepts discussed in the chapter. A summary and an analysis with a supporting table or graph highlight the key economic points of the article. Read the following *An Inside Look* for a discussion of how likely it is that significant numbers of manufacturing jobs will return to the United States from overseas. Test your understanding by answering the *Thinking Critically* questions.

# Is Manufacturing Returning to the United States?

24/7 WALL ST.

## Manufacturers Bringing the Most Jobs Back to America

The loss of American manufacturing jobs to foreign labor has been a central theme of several presidential candidates' campaigns. However, the trend of offshoring may be slowing, according to one organization.

**a** According to non-profit advocacy group the Reshoring Initiative, offshoring resulted in a net loss of approximately 220,000 manufacturing jobs from 2000 to 2003. However, according to the group, the country added roughly as many jobs due to foreign investment and reshoring as it lost to offshoring last year. Some of the largest U.S.-based companies, likely for both public relations and practical reasons, have begun building factories domestically for operations that would likely have gone overseas a few years ago.

Offshoring, or shifting production from U.S. plants to foreign facilities, is a relatively recent phenomenon that has taken a considerable toll on the U.S. economy. In an interview with 24/7 Wall St., Harry Moser, founder and president of the Reshoring Initiative, explained that recent developments have made the prospect of manufacturing domestically much more feasible. Moser cited economic troubles and rising wages in China as one of the primary drivers of this recent trend.

Indeed, lower labor costs and fewer regulations in countries such as China have created an incentive for

U.S. companies to relocate production there. Consequently, U.S. manufacturing has taken a major hit.

**b** A study by the Economic Policy Institute found that the U.S. lost roughly 2.4 million manufacturing jobs to China alone from 2001 to 2013.

However, the same market forces that have pushed American jobs overseas are now bringing some of those jobs back. Recently, labor costs in places such as China have been rising, and when paired with high international shipping costs, offshore production presents less of a discount than it once did. Recently, General Electric shifted production of a water heater from China to a plant in Louisville, Kentucky. The move brought hundreds of manufacturing and engineering jobs back to the U.S.

While the reshoring phenomenon is primarily a byproduct of expensive labor abroad and high shipping costs, bringing manufacturing jobs back to the United States is often beneficial to a company's image. For example, Walmart contracted General Electric to manufacture high efficiency light bulbs in its plants in Ohio and Illinois as a part of Walmart's brand-boosting Made in USA initiative. Similarly, Farouk Systems, Inc. cites image as a primary reason for reshoring jobs. Along with Walmart and General Electric, Farouk Systems ranks among the companies bringing the most jobs back from overseas.

**c** A variety of other logistical factors are also making reshoring more practical for businesses. In the era of

Amazon, in which consumers expect quick turnaround on products, it can be more practical for companies to manufacture products in-country to have the product ready for customers faster and avoid shipping expenses. Moser further explained that reshoring can often improve the quality of the manufacturing product. "Many have done it because of the consumer preference for made in America products," Moser added.

The extent to which these factory openings are truly a sign of an American manufacturing renaissance or merely a pause from the ongoing departure of the industry from U.S. shores is still unclear. One certainty is that it will take more than a few thousand jobs to reverse the trend of decades of offshoring and heavy reliance on foreign imports.... It is perhaps much easier to make the argument that the service sector is experiencing a true revival. While several years ago it was common practice for American companies to offshore customer support call center jobs, many American companies and customer service contractors are adding or plan to add jobs in the U.S. As of last year, there were roughly five million Americans employed in some 66,000 call centers across the country....

**Source:** Manufacturers Bringing The Most Jobs Back to America by Michael B. Sauter and Samuel Stebbins. Copyright © April 19, 2016. Used with permission from 24/7 Wall St.

## Key Points in the Article

Over the past few decades, many U.S. manufacturing companies relocated production overseas, a practice known as offshoring. The firms were responding to economic incentives such as lower labor costs and limited government regulations. Recently, however, some of these manufacturing jobs have been returning to the United States, a practice known as reshoring. Again, firms have been responding to economic incentives, including rising foreign wages, high international shipping costs, improved product quality in U.S. plants, and faster delivery times. According to the advocacy group the Reshoring Initiative, the United States added about as many jobs due to reshoring and foreign investment as it lost to offshoring in 2015, and some of the largest U.S.-based companies are now building domestic manufacturing facilities that would have likely been built in foreign countries only a few years ago.

## Analyzing the News

**a** The table below lists the eight U.S. companies that returned the most manufacturing jobs to the United States through reshoring from 2011 to 2016. These companies have shifted production from foreign factories to new or expanded factories in the United States for a variety of reasons,

including rising foreign labor costs. One key economic idea is that people are rational, and economists assume that consumers and firms use all available information as they act to achieve their goals. Economists would therefore conclude that managers at these reshoring companies are acting rationally in using all available information in making the decision to move manufacturing back to the United States.

**b** Another key economic idea is that people respond to economic incentives. The Economic Policy Institute conducted a study that showed that approximately 2.4 million U.S. manufacturing jobs were offshore to China from 2001 to 2013, primarily due to lower wages and fewer regulations in that country. These factors created economic incentives for managers at U.S. manufacturing companies to move production to China in order to produce goods at a lower cost than would be possible in the United States. Recently, however, labor costs in China and some other countries have been rising, as has the cost to ship internationally. These cost increases have reduced the economic incentive to produce goods overseas and resulted in some manufacturing jobs returning to the United States.

**C** Other reasons some manufacturing jobs are returning to the United States include a growing expectation by consumers that their orders will be delivered

quickly and an increasing preference by U.S. consumers for products made in the United States. These reasons also reflect the key economic ideas that people are rational and that they respond to economic incentives. When interacting in markets, sellers want to supply the goods that buyers desire. If buyers have increased their preference for domestically produced goods and want their orders to be delivered quickly, firms are acting rationally when they reshore manufacturing jobs to the United States.

## Thinking Critically

1. During the 2016 presidential campaign, President Trump proposed enacting a 45 percent tariff on imports from China. How might a tariff of this magnitude provide an economic incentive for companies like General Electric to return additional manufacturing jobs from China to the United States through reshoring?
2. Evaluate the following statement in terms of positive analysis and normative analysis: “The table shows that General Motors brought back more than 2,300 manufacturing jobs to the United States through reshoring from Canada and Mexico from 2011 to 2016. Reshoring is a good idea because it increases employment in the United States.”

Manufacturers Bringing the Most Jobs Back to the United States, 2011–2016

Company	Total Jobs Reshored (estimate)	Countries from Which Jobs Were Reshored	Industry
Ford	3,200	Mexico, Spain	Transportation equipment
Boeing	2,700	Not available	Transportation equipment
General Electric	2,656	China, Mexico	Electrical equipment and appliances
General Motors	2,345	Mexico, Canada	Transportation equipment
Caterpillar	2,100	Japan, Mexico	Machinery
Flextronics (Apple)	1,700	Not available	Computers
Farouk Systems	1,200	China	Electronic appliances
Mars	1,000	Not available	Food

Source: The Reshoring Initiative



# CHAPTER SUMMARY AND PROBLEMS

## Key Terms

Allocative efficiency, p. 11	Economics, p. 4	Market economy, p. 10	Positive analysis, p. 14
Centrally planned economy, p. 10	Equity, p. 12	Microeconomics, p. 16	Productive efficiency, p. 11
Economic model, p. 4	Macroeconomics, p. 16	Mixed economy, p. 11	Scarcity, p. 4
Economic variable, p. 13	Marginal analysis, p. 7	Normative analysis, p. 14	Trade-off, p. 9
	Market, p. 4	Opportunity cost, p. 9	Voluntary exchange, p. 11

### 1.1 Three Key Economic Ideas, pages 4–8

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

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## Summary

**Economics** is the study of the choices consumers, business managers, and government officials 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 fulfill those wants are limited. A **market** is a group of buyers and sellers who trade a good or service. Economists assume that 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. 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 the meaning of each of the following economic ideas: People are rational, people respond to economic 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 Discuss whether you agree with the following statement: “The problem with economics is that it assumes that consumers and firms always make the correct decisions. But we know that everyone makes mistakes.”
- 1.4 According to the FBI Bank Crime Statistics, there were more than 4,000 bank robberies in the United States in

2015, an increase of 3.9 percent over 2014. The FBI claims that banks have made themselves easy targets by refusing to install clear acrylic partitions, called *bandit barriers*, that separate bank tellers from the public. According to a special agent with the FBI, “Bandit barriers are a great deterrent. We’ve talked to guys who rob banks, and as soon as they see a bandit barrier, they go find another bank.” Despite this finding, many banks have been reluctant to install these barriers. Wouldn’t banks have a strong incentive to install bandit barriers to deter robberies? Why, then, do so many banks not install them?

**Sources:** U.S. Department of Justice, Federal Bureau of Investigation, “Bank Crime Statistics 2015,” and “Bank Crime Statistics 2014”; and Richard Cowen, “FBI Says Banks Are to Blame for Rise in Robberies,” NorthJersey.com, March 10, 2009.

- 1.5 The grading system plays an important role in student learning. In their book *Effective Grading: A Tool for Learning and Assessment in College*, Barbara Walvoord and Virginia Anderson stated that “grading infuses everything that happens in the classroom.” They also argued that grading “needs to be acknowledged and managed from the first moment that an instructor begins planning a class.”
  - a. How could the grading system a teacher uses affect the incentives of students to learn the course material?
  - b. If teachers put too little weight in the grading scale on a certain part of the course, such as readings outside the textbook, how might students respond?
  - c. Teachers often wish that students came to class prepared, having read the upcoming material. How could a teacher design the grading system to motivate students to come to class prepared?

**Source:** Barbara E. Walvoord and Virginia Johnson Anderson, *Effective Grading: A Tool for Learning and Assessment in College*, 2nd ed., San Francisco: Jossey-Bass, 2010, p. 1.

- 1.6 The federal government subsidizes some loans to college students. Typically, the more students who participate in these programs and the more they borrow, the higher

the cost to the federal government. In 2011, President Barack Obama convinced Congress to pass these changes to the federal student loan programs: (1) Payments were capped at 10 percent of a borrower's discretionary income; (2) any unpaid balances for people working for government or in the nonprofit sector were forgiven after making 120 monthly payments (10 years' worth of payments); and (3) people working in the private sector had their loans forgiven after making 240 monthly payments (20 years of payments).

- a. As a result of these changes in the federal student loan program, would you predict that the total amount that students borrowed under these programs increased or decreased? Briefly explain.
- b. As part of his 2016 federal budget proposal, President Obama recommended significant changes to the federal student loan programs. Given your answer to part (a), do you think President Obama was likely to have recommended changes that would increase or decrease the payments that borrowers would have to make? Briefly explain.
- c. How might President Obama and his advisers have failed to correctly forecast the effects of the 2011 changes to the loan programs?

**Sources:** Allesandra Lanza, "What Obama's 2016 Budget Proposal Means for Student Borrowers," usnews.com, February 11, 2015; and Josh Mitchell, "Student-Debt Forgiveness Plans Skyrocket, Raising Fears over Costs, Higher Tuition," Wall Street Journal, April 22, 2014.

- 1.7 (Related to the Apply the Concept on page 5)** Many universities and corporations offer a health and wellness program that helps their employees improve or maintain their health and get paid (a relatively small amount) for doing so. The programs vary but typically consist of employees completing a health assessment, receiving a program for healthy living, and monitoring their monthly health activities.
- a. Why would universities and corporations pay employees to improve or maintain their health?
  - b. How does health insurance affect the incentive of employees to improve or maintain their health?
  - c. Would a wellness program increase or decrease the health insurance premiums that an insurance company would charge the university or corporation to provide insurance coverage? Briefly explain.

- 1.8 (Related to the Apply the Concept on page 5)** Jay Bhattacharya and Kate Bundorf of Stanford University have found evidence that people who are obese and who work for firms that provide health insurance receive lower wages than workers at those firms who are not obese. At firms that do not provide health insurance, obese workers do not receive lower wages than workers who are not obese.
- a. Why might firms that provide workers with health insurance pay a lower wage to obese workers than to workers who are not obese?
  - b. Is Bhattacharya and Bundorf's finding relevant to the question of whether health insurance provides

people with an incentive to become obese? Briefly explain.

**Source:** Jay Bhattacharya and M. Kate Bundorf, "The Incidence of the Health Care Costs of Obesity," *Journal of Health Economics*, Vol. 28, No. 3, May 2009, pp. 649–658.

- 1.9 (Related to Solved Problem 1.1 on page 7)** For many years, McDonald's used frozen beef patties to make its hamburgers. It recently began market testing how consumers in the United States would respond to hamburgers made of fresh beef that had never been frozen. In early 2017, McDonald's expanded the market test from only 55 restaurants to more than 300. The switch to fresh, never-frozen beef patties would be a huge undertaking involving "how [the beef] is transported to the restaurants, how it is stored when it arrives and how much it affects employees' process of making burgers." If you were a manager at McDonald's, how would you go about analyzing whether to switch to fresh, never-frozen beef patties? In your answer, consider whether your decision would have to be all or nothing—all fresh, never-frozen beef patties in all McDonald's hamburgers—and whether you would have to switch in all McDonald's locations around the world (in 119 countries) or just in certain countries.

**Sources:** Samantha Bomkamp, "McDonald's Expands Fresh Beef Test Again," chicago.tribune.com, March 17, 2017.

- 1.10 (Related to Solved Problem 1.1 on page 7)** Late in the semester, a friend tells you, "I was going to drop my psychology course so I could concentrate on my other courses, but I had already put so much time into the course that I decided not to drop it." What do you think of your friend's reasoning? Would it make a difference to your answer if your friend has to pass the psychology course at some point to graduate? Briefly explain.

- 1.11** In a paper written by Bentley College economists Patricia M. Flynn and Michael A. Quinn, the authors state:

We find evidence that Economics is a good choice of major for those aspiring to become a CEO [chief executive officer]. When adjusting for the size of the pool of graduates, those with undergraduate degrees in Economics are shown to have had a greater likelihood of becoming an S&P 500 CEO than any other major.

A list of famous economics majors published by Marietta College includes business leaders Elon Musk, Warren Buffett, Steve Ballmer, David Rockefeller, Arnold Schwarzenegger, Bill Belichick, Diane von Furstenberg, and Sam Walton, as well as Presidents George H.W. Bush, Gerald Ford, Ronald Reagan, and Donald Trump, and Supreme Court Justice Sandra Day O'Connor. Why might studying economics be particularly good preparation for being the top manager of a corporation or a leader in government?

**Sources:** Patricia M. Flynn and Michael A. Quinn, "Economics: A Good Choice of Major for Future CEOs," *Social Science Research Network*, November 28, 2006; and *Famous Economics Majors*, Marietta College, Marietta, Ohio, November 21, 2014.

1.2

## The Economic Problem That Every Society Must Solve, pages 8–12

**LEARNING OBJECTIVE:** Discuss how an economy answers these questions: What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

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### Summary

Society faces **trade-offs**: Producing more of one good or service means producing less of another good or service. The **opportunity cost** of any activity—such as producing a good or service—is the highest-valued alternative that must be given up to engage in that activity. The choices of consumers, firms, and governments determine what goods and services will be produced. Firms choose how to produce the goods and services they sell. In the United States, who receives the goods and services produced depends largely on how income is distributed in the marketplace. In a **centrally planned economy**, most economic decisions are made by the government. In a **market economy**, most economic decisions are made by consumers and firms. Most economies, including that of the United States, are **mixed economies** in which most economic decisions are made by consumers and firms but in which the government also plays a significant role. There are two types of efficiency: (1) **Productive efficiency**, which occurs when a good or service is produced at the lowest possible cost, and (2) **allocative efficiency**, which occurs when production corresponds with consumer preferences. **Voluntary exchange** is a situation that occurs in markets when both the buyer and the seller of a product are made better off by the transaction. **Equity** usually involves a fair distribution of economic benefits. Government policymakers often face a trade-off between equity and efficiency.

### Review Questions

- 2.1 Why does scarcity imply that every society and every individual face trade-offs?
- 2.2 What are the three economic questions that every society must answer? Briefly discuss the differences in the way centrally planned, market, and mixed economies answer these questions.
- 2.3 What is the difference between productive efficiency and allocative efficiency?
- 2.4 What is the difference between efficiency and equity? Why do government policymakers often face a trade-off between efficiency and equity?

### Problems and Applications

- 2.5 According to Forbes magazine, in 2017, Bill Gates was the world's richest person, with wealth of \$86 billion. Does Bill Gates face scarcity? Does everyone? Are there any exceptions?  
**Source:** "The World's Billionaires," forbes.com, March 20, 2017.
- 2.6 Consider an organization that exists to help the poor. The members of the organization are discussing alternative methods of aiding the poor, when a proponent of one particular method asserts, "If even one poor person is helped

with this method, then all our time and money would have been worth it." If you were a member of the organization, how would you reply to this assertion?

- 2.7 College football attendance, especially student attendance, has been on the decline. In 2016, home attendance at major college football games declined for the sixth consecutive year and was the lowest since 2000. The opportunity cost of engaging in an activity is the value of the best alternative that must be given up to engage in that activity. How does your opportunity cost of attending a game compare with the opportunity cost facing a college student 15 years ago? Can this change account for the decline in college football attendance? Briefly explain.

**Source:** Jon Solomon, "College Football Attendance in 2016: Crowds Decline for Sixth Straight Year," cbssports.com, December 16, 2016.

- 2.8 In a market economy, why does a firm have a strong incentive to be productively efficient and allocatively efficient? What does the firm earn if it is productively and allocatively efficient, and what happens if it is not?
- 2.9 Alberto Chong of Georgia State University and several colleagues conducted an experiment to test the efficiency of government postal services around the world. They mailed letters to nonexistent businesses in 159 countries and kept track of how many of the letters were returned. Was this test most relevant to evaluating the productive efficiency or the allocative efficiency of these postal services? Briefly explain.

**Source:** Alberto Chong, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, "Letter Grading Government Efficiency," *Journal of the European Economic Association*, Vol. 12, No. 2, April 2014, pp. 277–299.

- 2.10 The Food and Drug Administration (FDA) is part of the federal government's Department of Health and Human Services. Among its other functions, the FDA evaluates the safety and effectiveness of drugs and medical devices. FDA approval had to be granted before OraSure was allowed to market its home HIV test. In a centrally planned economy, the government decides how resources will be allocated. In a market economy, the decisions of households and firms interacting in markets allocate resources. Briefly explain which statement is more accurate: (a) The regulation of the production and sale of drugs and medical devices in the United States is an example of how resources are allocated in a centrally planned economy, or (b) the regulation of the production and sale of drugs and medical devices in the United States is an example of how resources are allocated in a market economy.
- 2.11 Would you expect a centrally planned economy to be better at productive efficiency or allocative efficiency? Be sure to define *productive efficiency* and *allocative efficiency* in your answer.
- 2.12 Leonard Fleck, a philosophy professor at Michigan State University, has written:

When it comes to health care in America, we have limited resources for unlimited health care needs. We want everything contemporary

medical technology can offer that will improve the length or quality of our lives as we age. But as presently healthy taxpayers, we want costs controlled.

Why is it necessary for all economic systems to limit services such as health care? How does a market system prevent people from getting as many goods and services as they want?

**Source:** Leonard Fleck, *Just Caring: Health Care Rationing and Democratic Deliberation*, New York: Oxford University Press, 2009.

- 2.13** Suppose that your college decides to give away 1,000 tickets to the football game against your school's biggest rival. The athletic department elects to distribute the tickets by giving them away to the first 1,000 students who

show up at the department's office at 10 A.M. the following Monday.

- Which groups of students will be most likely to try to get the tickets? Think of specific examples and then generalize.
- What is the opportunity cost to students 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? Briefly explain.

### 1.3

## Economic Models, pages 12–16

**LEARNING OBJECTIVE:** Explain how economists use models to analyze economic events and government policies.

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### Summary

An **economic variable** is something measurable that can have different values, such as the number of people employed in manufacturing. Economists rely on economic models when they apply economic ideas to real-world problems. **Economic models** are simplified versions of reality used to analyze 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 among 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. As a social science, economics considers human behavior in every context of decision making, not just in business.

### Review Questions

- Why do economists use models? How are economic data used to test models?
- Describe the five steps economists follow to arrive at a useful economic model.
- What is the difference between normative analysis and positive analysis? Is economics concerned mainly with normative analysis or positive analysis? Briefly explain.

### Problems and Applications

- Suppose an economist develops an economic model and finds that it works great in theory but fails in practice. What should the economist do next?
- 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 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 this theory is useful.

- 3.6** (Related to the *Don't Let This Happen to You* on page 14) Briefly explain which of the following statements represent positive analysis and which represent normative analysis.
- A 50-cent-per-pack tax on cigarettes will lead to a 12 percent reduction in smoking by teenagers.
  - The federal government should spend more on AIDS research.
  - Rising wheat prices will increase bread prices.
  - The price of coffee at Starbucks is too high.
- 3.7** (Related to the *Don't Let This Happen to You* on page 14) Warren Buffett is the chief executive officer of the investment firm Berkshire Hathaway and one of the wealthiest people in the world. In an editorial in the *Wall Street Journal*, Buffett argued that economic policies in the United States should be designed so that people who are willing to work receive enough income to live a "decent lifestyle." He argued that an expansion of the Earned Income Tax Credit (EITC) would be superior to an increase in the minimum wage as a means to reach this goal. The EITC is a program under which the federal government makes payments to low-income workers. Is Buffett correct that it is the role of the federal government to make sure people who work will have enough income to live a "decent lifestyle"?
- Source:** Warren Buffett, "Better Than Raising the Minimum Wage," *Wall Street Journal*, May 21, 2015.

- 3.8** (Related to the *Apply the Concept* on page 15) The *Apply the Concept* feature explains that there are both positive and normative aspects to the debate over whether the federal government should enact tariffs on imports of cars from Mexico. 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** (Related to the *Chapter Opener* on page 2) According to an article on reuters.com, Fiat Chrysler Automobiles, the firm that sells Dodge and Chrysler cars and trucks in the

United States, decided to invest \$1 billion to modernize two of its U.S. production plants. The article described the possible effect of President Trump's trade policies on Fiat Chrysler's decision.

- What trade policies was the article referring to? How would those policies affect Fiat Chrysler's decision about whether to expand production in the United States?
- The article also implied that Fiat Chrysler's decision might have been affected by the possibility that the Trump administration will relax environmental regulations, such as a rule requiring companies to increase their cars' miles per gallon, and attempt to reduce the taxes corporations pay on their profits. Why would these two factors affect Fiat Chrysler's decision?
- Which groups are likely to gain, and which groups are likely to lose as a result of Fiat Chrysler's decision to produce more cars in U.S. plants rather than in overseas plants?

**Source:** Bernie Woodall and David Shepharson, "Fiat Chrysler to Add U.S. Jobs as Trump Puts Spotlight on Industry," reuters.com, January 9, 2017.

- 3.10** Suppose you are building an economic model to forecast the number of people employed in U.S. manufacturing

in 2024. Should your model take into account possible changes in economic policy enacted by the president and Congress? Briefly explain.

- 3.11** To receive a medical license in the United States, a doctor must complete a residency program at a hospital. Hospitals are not free to expand their residency programs in a particular medical specialty without approval from a residency review committee (RRC), which is made up of physicians in that specialty. A hospital that does not abide by the rulings of the RRC runs the risk of losing its accreditation from the Accreditation Council for Graduate Medical Education (ACGME). The RRCs and ACGME argue that this system ensures that residency programs do not expand to the point where they are not providing residents with high-quality training.
- How does this system help protect consumers?
  - Is it possible that this system protects the financial interests of doctors more than the well-being of consumers? Briefly explain.
  - Discuss whether you consider this system to be good or bad. Is your conclusion an example of normative economics or of positive economics? Briefly explain.

**Sources:** Brian Palmer, "We Need More Doctors, Stat!" *Slate*, June 27, 2011; and Sean Nicholson, "Barriers to Entering Medical Specialties," Wharton School, September 2003.

## 1.4

## Microeconomics and Macroeconomics, page 16

LEARNING OBJECTIVE: Distinguish between microeconomics and macroeconomics.

**MyLab Economics** Visit [www.pearson.com/mylab/economics](http://www.pearson.com/mylab/economics) to complete these exercises online and get instant feedback.

### 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 Question

- Briefly discuss the difference between microeconomics and macroeconomics.
- Is every economic issue either strictly microeconomic or strictly macroeconomic? Briefly explain.

- The effect of higher income taxes on the total amount of consumer spending
- The reasons 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

- 4.4** 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 the United States would be affected by an increase in the tax on cigarettes.

### Problems and Applications

- 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

## Critical Thinking Exercises

**CT1.1** For this exercise, your instructor may assign you to a group. As you saw in this chapter, an economy must answer three key questions: what to produce, how to produce it, and who receives the goods and services produced. High-income countries like the United States, have capitalist economic systems, which economists call *market economies*. This exercise focuses on the ideas about capitalism that you and other students bring to this class so we can connect what you already know with how economists think about the economic system (and they think a lot about it!). Using the concepts in this chapter, explain common complaints you have about capitalism or that you have heard from others. Be sure to use the following terms or concepts in your analysis: *market*, *market economy*, *equity*, *allocative efficiency*, *centrally planned economy*, *normative analysis*, and *positive analysis*. Each member of the group should describe at least one complaint about capitalism and use at least one of the terms or concepts listed above. Each group should then produce a one-page paper for this analysis to either turn in or to discuss in class.

**CT1.2** Suppose that you're very athletic. For example, you may like to run, swim, play volleyball, or bike. You would like to perform better at your next competition. Perhaps you want to run a 5-kilometer race 1 minute faster or perhaps you want your team to advance further in a team sports competition, like volleyball. What concept can you use from this chapter to design your training program? Hint: This question is not about using concepts like markets, positive or normative analysis, or assuming that people act rationally, but there is one concept introduced in this chapter that is applicable to improving your athletic performance.

# Appendix

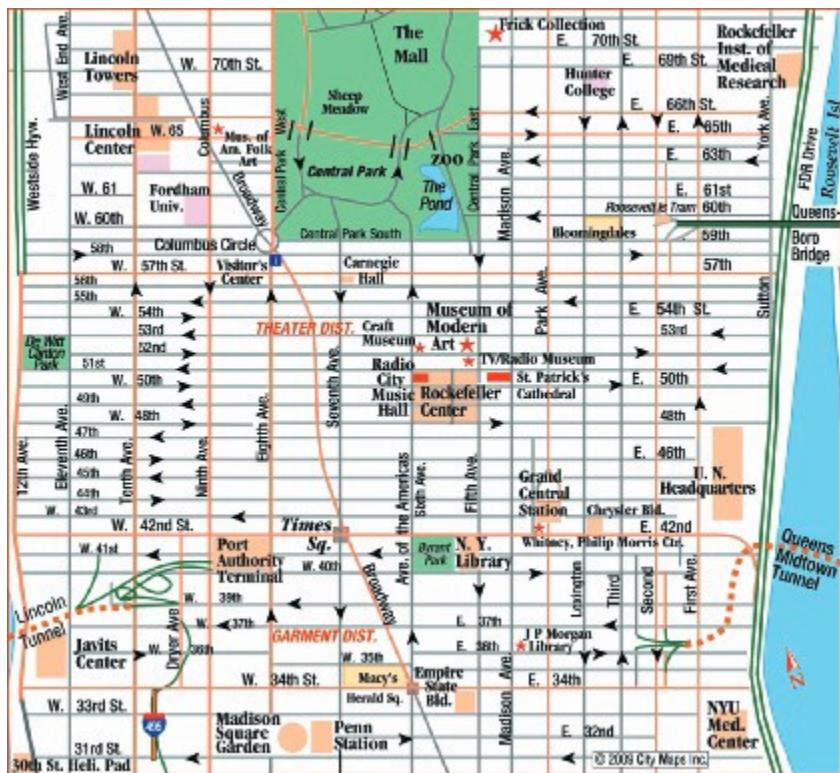
LEARNING OBJECTIVE: Use graphs and formulas to analyze economic situations.

## Using Graphs and Formulas

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

Suppose you take a bus to New York City to see the Empire State Building. After arriving at the Port Authority Bus Terminal, you will probably use Google Maps or a similar app to find your way to the Empire State Building.

Maps are simplified versions of reality. The following map shows the streets in this part of New York City and some of the most important buildings. The map does not show most stores, most buildings, or the names, addresses, and telephone numbers of the people who live and work in the area. In fact, the map shows almost nothing about the messy reality of life in this section of New York City, except how the streets are laid out, which is the essential information you need to get from the Port Authority Bus Terminal to the Empire State Building.



Street map of New York city in City Maps © 2017.

Maps are simplified versions of reality. This map shows only the streets and most important buildings in this area of New York City.

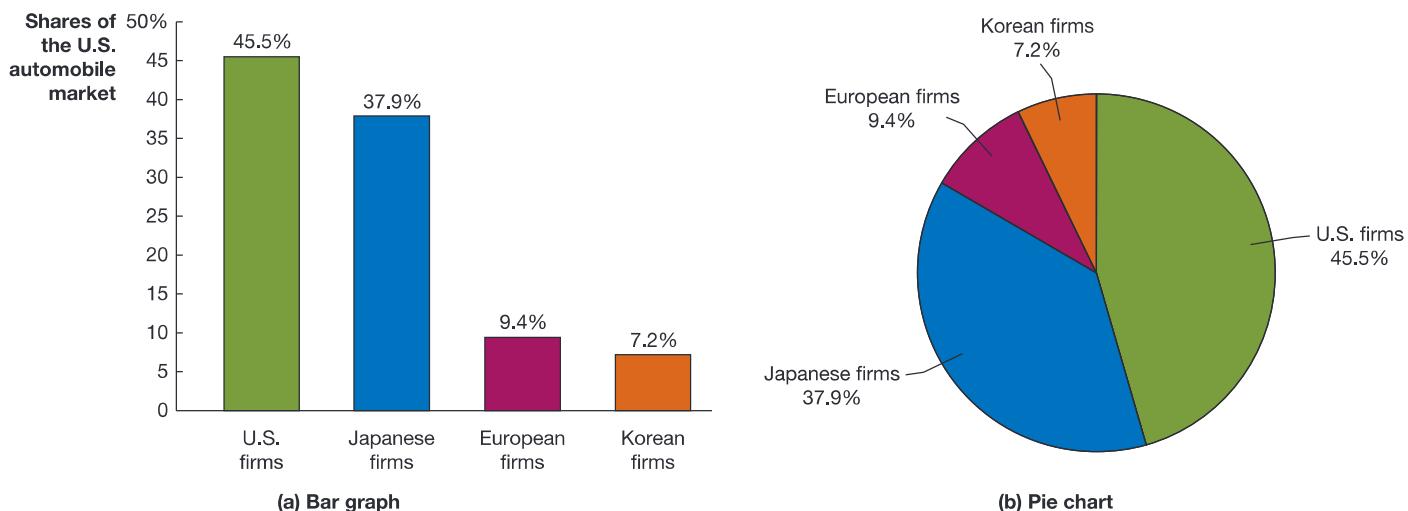
Think about someone who says, “I know how to get around in the city, but I just can’t figure out how to read a map.” It certainly is possible to find your destination in a city without a map, but it’s a lot easier with one. The same is true of using graphs in economics. It is possible to arrive at a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

With practice, you will become familiar with the graphs and formulas in this text, and you will know how to use them to analyze 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 *market shares* in the U.S. automobile market, using two common types of graphs. Market shares show the percentage of industry sales accounted for by different firms. In this case, the information is for firms grouped by where the firm is headquartered: U.S.-based firms,<sup>1</sup> Japanese-based firms, European-based firms, and Korean-based firms. Panel (a) displays the information about market shares as a *bar graph*, with the market share of each group of firms represented by the height of its bar. Panel (b) displays the same information as a *pie chart*, with the market share of each group of firms represented by the size of its slice of the pie.

Information about an economic variable is also often displayed in a *time-series graph*, like Figure 1A.2, which shows on a coordinate grid how the values of a variable change over time. In a coordinate grid, we can measure the value of one variable along the vertical axis (or *y*-axis) and the value of another variable along the horizontal axis (or *x*-axis). The point where the vertical axis intersects the horizontal axis is called the *origin*. At the origin, the value of both variables is zero. The points on a coordinate grid represent values of the two variables.



**MyLab Economics Animation**

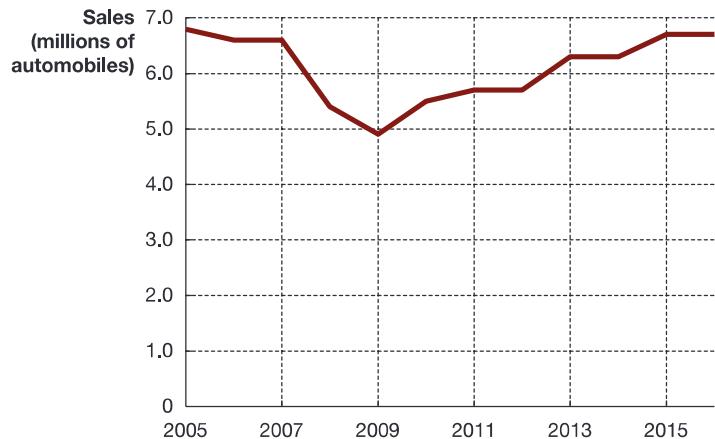
**Figure 1A.1 Bar Graph and Pie Chart**

Values for an economic variable are often displayed as a bar graph or a pie chart. In this case, panel (a) shows market share data for the U.S. automobile industry as a bar graph, with the market share of each group of firms represented by the height of its bar. Panel (b) displays the same information

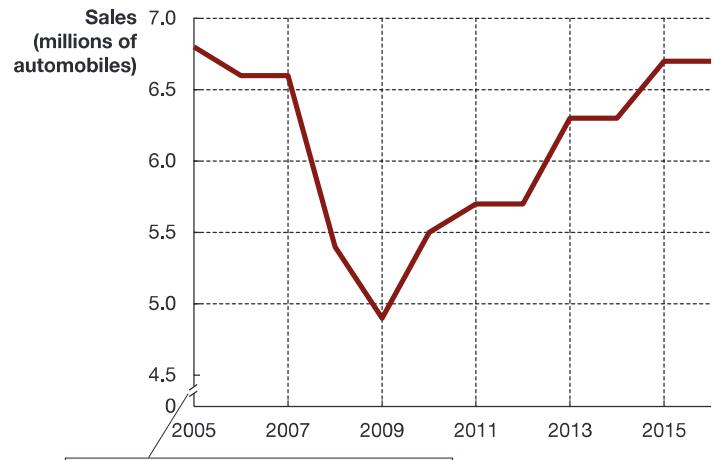
as a pie chart, with the market share of each group of firms represented by the size of its slice of the pie.

**Source:** “Auto Sales,” *Wall Street Journal*, February 1, 2017.

<sup>1</sup> In this case, the category “U.S.-based firms” includes Chrysler, which while a member of the traditional U.S. “Big Three” automobile firms and producing most of its vehicles in North America, has been owned by the Italian-based Fiat Chrysler Automobiles NV since 2009.



(a) Time-series graph where the scale is not truncated



(b) Time-series graph with truncated scale

The slashes (//) indicate that the scale on the vertical axis is truncated, which means that some numbers are omitted. The numbers on the vertical axis jump from 0 to 4.5.

#### MyLab Economics Animation

#### Figure 1A.2 Time-Series Graphs

Both panels present time-series graphs of Ford Motor Company's worldwide sales during each year from 2005 to 2016. In panel (a), the vertical axis starts at 0, and the distance between each pair of values shown is the same. In panel (b), the scale on the vertical axis is truncated, so although it starts

at 0, it then jumps to 4.5 million. As a result, the fluctuations in Ford's sales appear smaller in panel (a) than in panel (b).

**Source:** Ford Motor Company, *Annual Report*, various years.

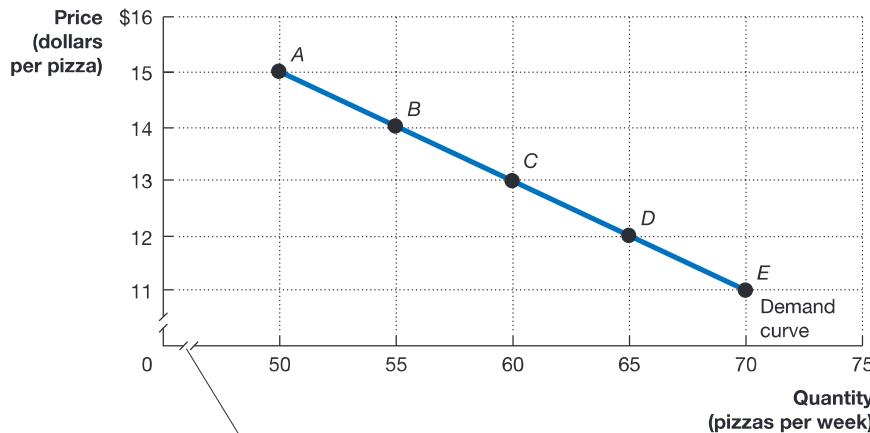
In Figure 1A.2, we measure the number of automobiles and trucks sold worldwide by Ford Motor Company on the vertical axis, and we measure time on the horizontal axis. In time-series graphs, the height of the line at each date shows the value of the variable measured on the vertical axis. Both panels of Figure 1A.2 show Ford's worldwide sales during each year from 2005 to 2016. The difference between panel (a) and panel (b) illustrates the importance of the scale used in a time-series graph. In panel (a), the vertical axis starts at 0, and the distance between each pair of values shown is the same. In this panel, the decline in Ford's sales during 2008 and 2009 appears relatively small. In panel (b), the scale on the vertical axis is truncated, which means that although it starts at zero, it jumps to 4.5 million. As a result, the distance on the vertical axis from 0 to 4.5 million is much smaller than the distance from 4.5 million to 5.0 million. The slashes (//) near the bottom of the axis indicate that the scale is truncated. In panel (b), the decline in Ford's sales during 2008 and 2009 appears much larger than in panel (a). (Technically, the horizontal axis in both panels is also truncated because we start with 2005, not 0.)

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## Graphs of Two Variables

We often use graphs to show the relationship between two variables. Suppose you are interested in the relationship between the price of a cheese pizza and the quantity of pizzas sold per week in the town of Statesboro, Georgia. 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 collected on price and quantity. The figure shows a two-dimensional grid on which we measure the price of

Price (dollars per pizza)	Quantity (pizzas per week)	Point
\$15	50	A
14	55	B
13	60	C
12	65	D
11	70	E



As you learned in Figure 1A.2, the slashes (/) indicate that the scales on the axes are truncated, which means that numbers are omitted: On the horizontal axis numbers jump from 0 to 50, and on the vertical axis numbers jump from 0 to 11.

### MyLab Economics Animation

Figure 1A.3

#### Plotting Price and Quantity Points in a Graph

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

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 in Statesboro, Georgia. 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 can use the Greek letter delta ( $\Delta$ ) to stand for the change in a variable. The slope is sometimes called the rise over the run. So, we have several ways of expressing slope:

$$\text{Slope} = \frac{\text{Change in value on the vertical axis}}{\text{Change in value on the horizontal axis}} = \frac{\Delta y}{\Delta x} = \frac{\text{Rise}}{\text{Run}}.$$

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:

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

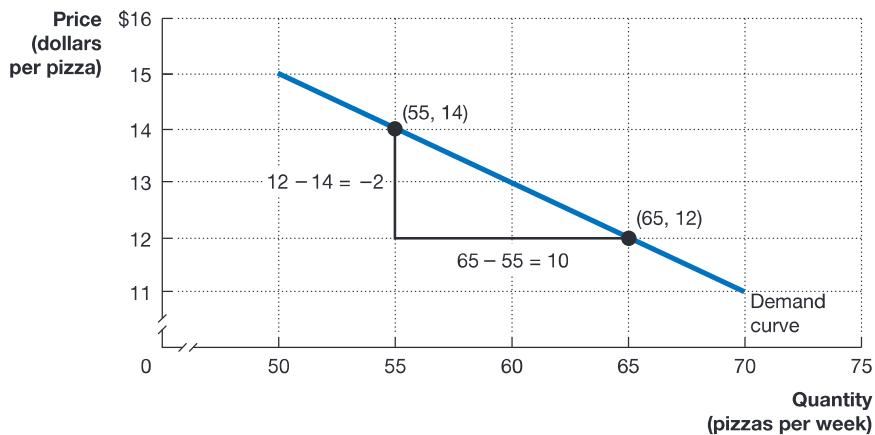
The slope of this line shows us how responsive consumers in Statesboro, Georgia, are to changes in the price of pizza. The larger the value of the slope (ignoring the negative sign), the steeper the line will be, which indicates that not

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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  $-0.2$ .



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.

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## Taking into Account More Than Two Variables on a Graph

The demand curve in Figure 1A.4 shows the relationship between the price of pizza and the quantity of pizza demanded, but we know that the quantity of any good demanded depends on more than just the price of the good. For example, the quantity of pizza demanded in a given week in Statesboro, Georgia, can be affected by other variables—the price of hamburgers, whether an advertising campaign by local pizza parlors 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 that the demand curve in Figure 1A.4 was drawn holding the price of hamburgers constant, at \$1.50. If the price of hamburgers rises to \$2.00, some consumers will switch from buying hamburgers to buying pizza, and more pizzas will be demanded at every price. The result on the graph will be to shift the line representing the demand curve to the right. Similarly, if the price of hamburgers falls from \$1.50 to \$1.00, some consumers will switch from buying pizza to buying hamburgers, and fewer pizzas will be demanded at every price. The result on the graph will be to shift the line representing the demand curve to the left.

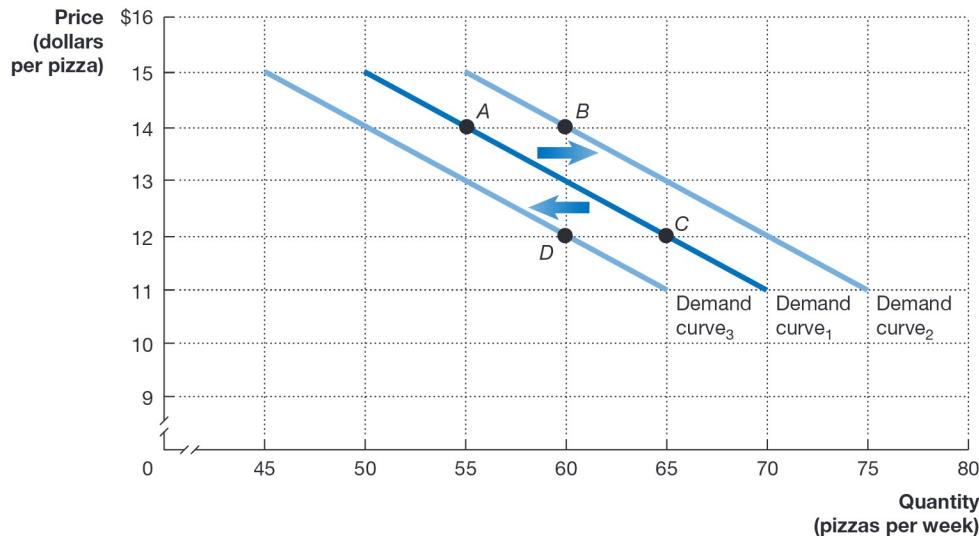
The table in Figure 1A.5 shows the effect of a change in the price of hamburgers on the quantity of pizza demanded. On the graph, suppose that at first we are on the line labeled Demand curve<sub>1</sub>. If the price of pizza is \$14 (point A), an increase in the price of hamburgers from \$1.50 to \$2.00 increases the quantity of pizzas demanded from 55 to 60 per week (point B) and shifting the demand curve to the right 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 hamburgers from \$1.50 to \$1.00 decreases the quantity of pizzas demanded from 65 to 60 per week (point D) and shifts the demand curve to the left 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 hamburgers. We will use this technique of shifting curves to allow for the effects of additional variables many times in this book.

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### Positive and Negative Relationships

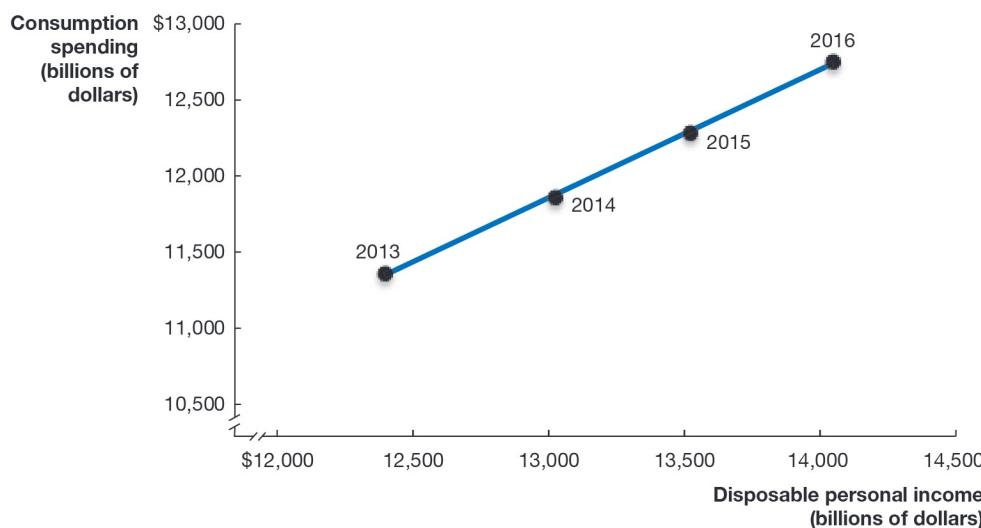
We can use graphs to show the relationships between any two variables. Sometimes the relationship between the variables is *negative*, meaning that as one variable increases in value, the other variable decreases in value. This was the case with the price of pizza and the quantity of pizzas demanded. The relationship between two variables can also be *positive*, meaning that the values of both variables increase or

Quantity (pizzas per week)			
Price (dollars per pizza)	When the Price of Hamburgers = \$1.00	When the Price of Hamburgers = \$1.50	When the Price of Hamburgers = \$2.00
\$15	45	50	55
14	50	55	60
13	55	60	65
12	60	65	70
11	65	70	75



decrease together. For example, when the level of total income—or *disposable personal income*—received by households in the United States increases, the level of total consumption spending, which is spending by households on goods and services, also increases. The table in Figure 1A.6 shows the values (in billions of dollars) for income and consumption spending for 2013–2016. The graph plots the data from the table,

Year	Disposable Personal Income (billions of dollars)	Consumption Spending (billions of dollars)
2013	\$12,396	\$11,361
2014	13,023	11,863
2015	13,520	12,284
2016	14,046	12,753



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#### 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 pizzas 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 hamburgers from \$1.50 to \$2.00 increases the quantity of pizzas demanded from 55 to 60 per week (point B) and shifts the demand curve 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 hamburgers from \$1.50 to \$1.00 decreases the quantity of pizza demanded from 65 to 60 per week (point D) and shifts the demand curve to Demand curve<sub>3</sub>.

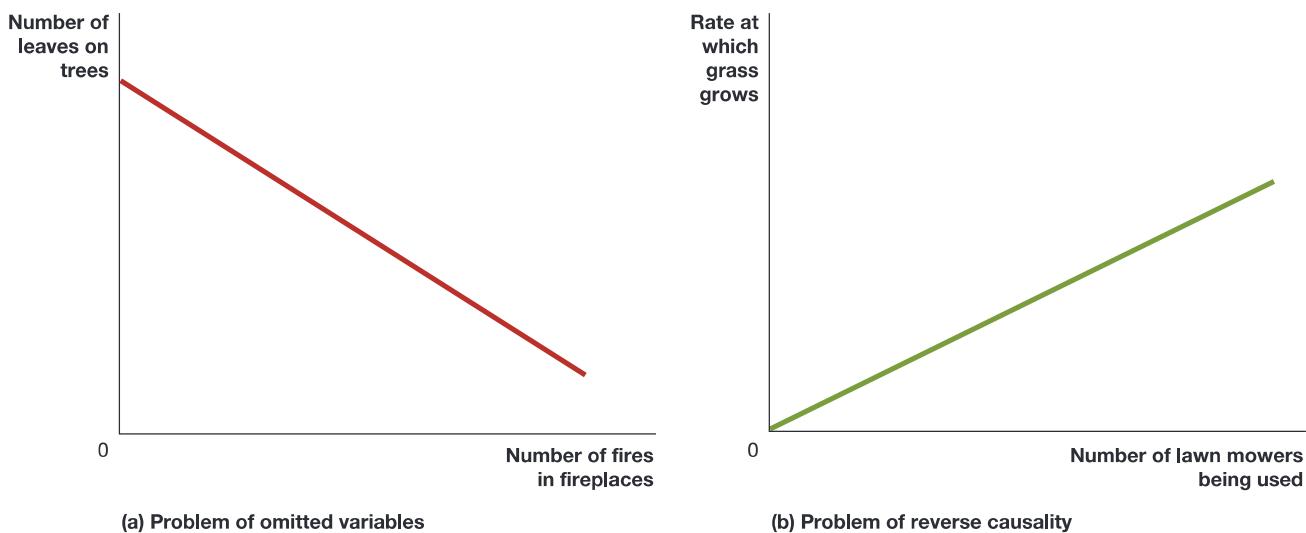
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#### Figure 1A.6

##### Graphing the Positive Relationship between Income and Consumption

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 in the United States has increased, so has consumption spending.

**Source:** U.S. Department of Commerce, Bureau of Economic Analysis.



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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 neighborhood when many homes have fires burning in their fireplaces. We cannot draw the conclusion that using fireplaces 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 neighborhood 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*.

with disposable personal income measured along the horizontal axis and consumption spending measured along the vertical axis.

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## 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 that over the course of a year, you graph the number of homes in a neighborhood that have a fire burning in the fireplace and the number of leaves on trees in the neighborhood and you get a relationship like that shown in panel (a) of Figure 1A.7: The more fireplaces in use in the neighborhood, the fewer leaves the trees have. Can we draw the conclusion from this graph that using a fireplace causes trees to lose their leaves? We know, of course, that such a conclusion is incorrect. In spring and summer, there are relatively few fireplaces being used, and the trees are full of leaves. In the fall, as trees begin to lose their leaves, fireplaces are used more frequently. And in winter, many fireplaces are being used and many trees have lost all their leaves. The reason that the graph in Figure 1A.7 is misleading in terms of 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 the other variables in the analysis, 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 nonsmokers. For some time, tobacco companies and some scientists argued that there was an omitted variable—perhaps failure to exercise or poor diet—that made some people both 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 neighborhood against the rate at which grass on lawns in the neighborhood 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 in the other direction: Rapidly growing grass during the spring and summer causes the increased use of lawn mowers, and slowly growing grass in the fall or winter or during periods of low rainfall causes the decreased use of lawn mowers.

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.

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## Are Graphs of Economic Relationships Always Straight Lines?

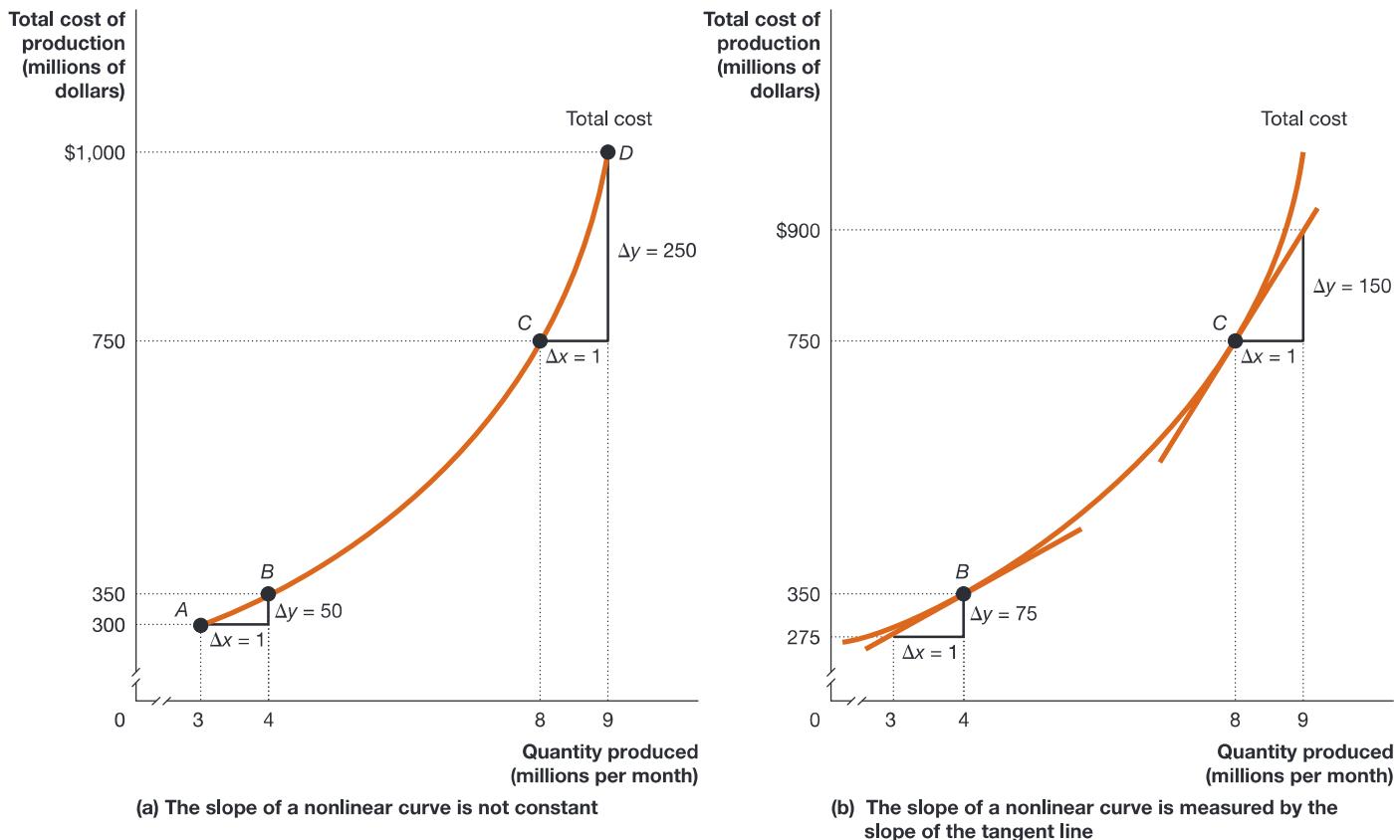
The graphs of relationships between two economic variables that we have drawn so far have been straight lines. The relationship between two variables is *linear* when it can be represented by a straight line. Few economic relationships are actually linear. For example, if we carefully plot data on the 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 *nonlinear*—relationship rather than a linear relationship. In practice, however, it is often useful to approximate a nonlinear 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 text book, we often assume that the relationship between two economic variables is linear, even when we know that this assumption is not precisely correct.

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## Slopes of Nonlinear Curves

In some situations, we need to take into account the nonlinear 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. In other words, as we move up the curve, its slope becomes larger. (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. As we move from point A to point B, the quantity produced increases by 1 million iPhones, while the total cost of production increases by \$50 million. Farther up the curve, as we move from point C to point D, the change in quantity is the same—1 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 nonlinear curve at a particular point, we measure the slope of the line that is tangent to that curve at that point. This tangent line will touch the curve only at that point. We can measure the slope of the tangent line just as we



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**Figure 1A.8 The Slope of a Nonlinear Curve**

The relationship between the quantity of Apple iPhones produced and the total cost of production is curved rather than linear. In panel (a), when we move from point A to point B, the quantity produced increases by 1 million iPhones, while the total cost of production increases by \$50 million. Farther up the curve, as we move from point C to point D, the change in quantity is the same—1 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 calculating the slope of the tangent line at that point. The slope of the tangent line at point B is 75, and the slope of the tangent line at point C is 150.

would measure the slope of any other straight line. In panel (b), 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.

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## 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 summarize data and calculate important relationships.

## Formula for a Percentage Change

The *percentage change* is the change in some economic variable, usually from one period to the next, expressed as a percentage. A key macroeconomic measure is the real gross domestic product (GDP). GDP is the value of all the final goods and services produced in a country during a year. “Real” GDP is corrected for the effects of inflation. When economists say that the U.S. economy grew 1.6 percent during 2016, they mean that real GDP was 1.6 percent higher in 2016 than it was in 2015. The formula for making this calculation is:

$$\left( \frac{\text{GDP}_{2016} - \text{GDP}_{2015}}{\text{GDP}_{2015}} \right) \times 100$$

or, more generally, for any two periods:

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

In this case, real GDP was \$16,397 billion in 2015 and \$16,660 billion in 2016. So, the growth rate of the U.S. economy during 2016 was:

$$\left( \frac{\$16,660 - \$16,397}{\$16,397} \right) \times 100 = 1.6\%.$$

Notice that it doesn’t matter that in using the formula, we ignored the fact that GDP is measured in billions of dollars. In fact, when calculating percentage changes, *the units don’t matter*. The percentage increase from \$16,397 billion to \$16,660 billion is exactly the same as the percentage increase from \$16,397 to \$16,660. MyLab Economics Concept Check

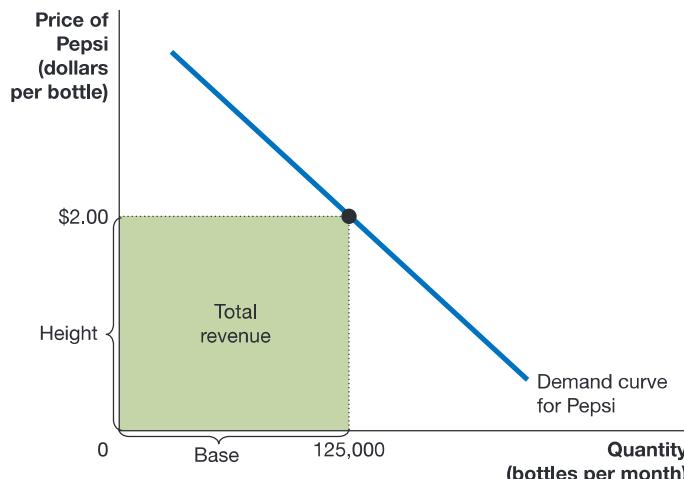
## Formulas for the Areas of a Rectangle and a Triangle

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 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 quantity sold multiplied by the price. In this case, total revenue will equal 125,000 bottles times \$2.00 per bottle, or \$250,000.

The formula for the area of a rectangle is:

$$\text{Area of a rectangle} = \text{Base} \times \text{Height}.$$

In Figure 1A.9, the shaded 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.



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Figure 1A.9

### Showing a Firm’s Total Revenue on a Graph

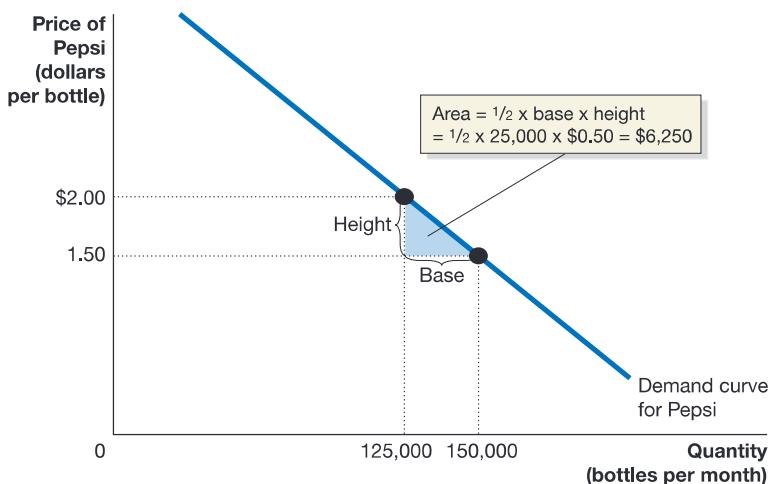
The area of a rectangle is equal to its base multiplied by its height. Total revenue is equal to quantity multiplied by price. Here, total revenue is equal to the quantity of 125,000 bottles times the price of \$2.00 per bottle, or \$250,000. The area of the shaded rectangle shows the firm’s total revenue.

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Figure 1A.10

### The Area of a Triangle

The area of a triangle is equal to  $1/2$  multiplied by its base multiplied by its height. The area of the shaded 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 is equal to  $1/2 \times 25,000 \times \$0.50$ , or \$6,250.



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:

$$\text{Area of a triangle} = \frac{1}{2} \times \text{Base} \times \text{Height}.$$

The 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  $1/2 \times 25,000 \times \$0.50$ , or \$6,250. Notice that the shaded area is a triangle only 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 a good approximation, even if the demand curve is not linear.

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### Summary of Using Formulas

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

1. Make sure you understand the economic concept the formula represents.
2. Make sure you are using the correct formula for the problem you are solving.
3. Make sure 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 made a mistake somewhere.

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1A

## Using Graphs and Formulas, pages 28–38

LEARNING OBJECTIVE: Use graphs and formulas to analyze economic situations.

**MyLab Economics** Visit [www.pearson.com/mylab/economics](http://www.pearson.com/mylab/economics) to complete these exercises online and get instant feedback.

### Problems and Applications

- 1A.1** The table on the right shows the relationship between the price of custard pies and the number of pies Jacob buys per week:

Price (dollars per pie)	Quantity of Pies	Week
\$3.00	6	July 2
2.00	7	July 9
5.00	4	July 16
6.00	3	July 23
1.00	8	July 30
4.00	5	August 6

- Is the relationship between the price of pies and the number of pies Jacob buys a positive relationship or a negative relationship?
- Plot the data from the table on a graph similar to Figure 1A.3 on page 31. Draw a straight line that best fits the points.
- Calculate the slope of the line.

- 1A.2** The following table gives information about the quantity of glasses of lemonade demanded on sunny and 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

Plot the data from the table on a graph similar to Figure 1A.5 on page 33. Draw two straight lines representing the two demand curves—one for sunny days and one for overcast days.

- 1A.3** Using the information in Figure 1A.2 on page 30, calculate the percentage change in Ford's auto sales from one year to the next. During which year did sales fall at the highest rate?



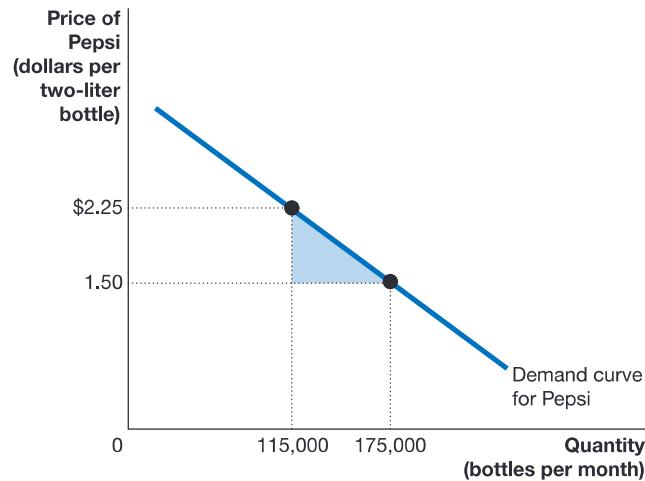
- 1A.4** Real GDP in 2014 was \$15,982 billion. Real GDP in 2015 was \$16,397 billion. What was the percentage change in real GDP from 2014 to 2015? What do economists call the percentage change in real GDP from one year to the next?

- 1A.5** Assume that the demand curve for Pepsi passes through the following two points:

Price per bottle of Pepsi (in dollars)	Quantity (bottles)
\$2.50	100,000
1.25	200,000

- Draw a graph with a linear demand curve that passes through these two points.
- Show on the graph the areas representing total revenue at each price. Give the value for total revenue at each price.

- 1A.6** What is the area of the triangle shown in the following figure?



- 1A.7** Calculate the slope of the total cost curve at point A and at point B in the following figure.

