Principles of Macroeconomics 3e

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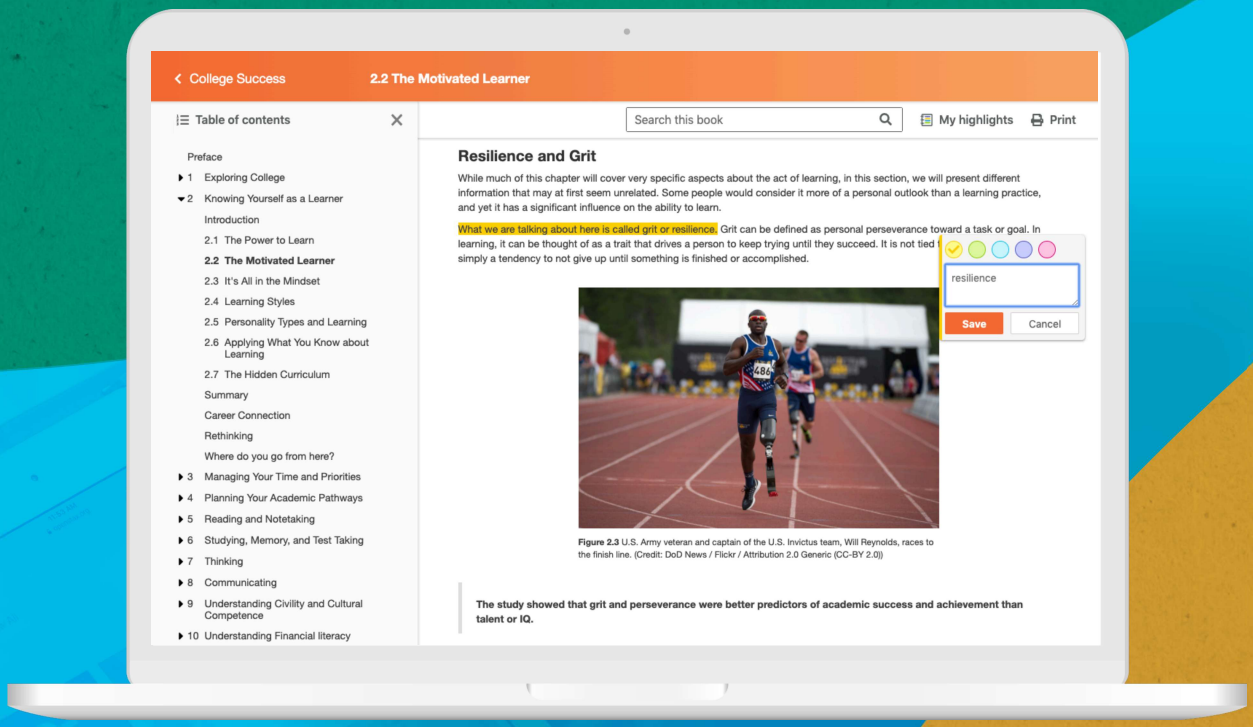

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Preface

Welcome to *Principles of Macroeconomics 3e* (3rd Edition), an OpenStax resource. This textbook was written to increase student access to high-quality learning materials, maintaining highest standards of academic rigor at little to no cost.

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Format

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About *Principles of Macroeconomics 3e*

Principles of Macroeconomics 3e aligns to the topics and objectives of most introductory microeconomics courses. The text uses conversational language and ample illustrations to explore economic theories, and provides a wide array of examples using both fictional and real-world scenarios. The third edition has been carefully and thoroughly updated to reflect current data and understanding, as well as to provide a deeper background in diverse contributors and their impacts on economic thought and analysis.

Coverage and scope

In response to faculty feedback and to ease transition to a new edition, *Principles of Macroeconomics 3e* retains the organization of the previous editions. The book covers the breadth of economics topics and also provides the necessary depth to ensure the course is manageable for instructors and students alike. We strove to balance theory and application, as well as the amount of calculation and mathematical examples.

The book is organized into seven main parts:

- **What is Economics?** The first two chapters introduce students to the study of economics with a focus on making choices in a world of scarce resources.
- **Supply and Demand**, Chapters 3 and 4, introduces and explains the first analytical model in economics: supply, demand, and equilibrium, before showing applications in the markets for labor and finance.
- **Elasticity and Price**, Chapter 5, introduces and explains elasticity and price, two key concepts in economics.
- **The Macroeconomic Perspective and Goals**, Chapters 6 through 10, introduces a number of key concepts in macro: economic growth, unemployment and inflation, and international trade and capital flows.
- **A Framework for Macroeconomic Analysis**, Chapters 11 through 13, introduces the principal analytic model in macro, namely the aggregate demand/aggregate supply Model. The model is then applied to the Keynesian and Neoclassical perspectives. The expenditure-output model is fully explained in a stand-alone appendix.
- **Monetary and Fiscal Policy**, Chapters 14 through 18, explains the role of money and the banking system, as well as monetary policy and financial regulation. Then the discussion switches to government deficits and fiscal policy.
- **International Economics**, Chapters 19 through 21, the final part of the text, introduces the international dimensions of economics, including international trade and protectionism.

Changes to the third edition

The revision process incorporated extensive feedback from faculty who have used the book in their courses. They advised that the third edition changes focus on currency updates, integration of newer perspectives and more diverse contributors, and relevance to students' lives and careers.

Current data and analysis: The authors have updated dozens of explanations, graphs, and tables containing financial, demographic, employment, and related economic data. The corresponding discussions provide context and interpretations of the data, including descriptions of change over time, cause-and-effect relationships, and balanced analysis of policies and opinions.

Diverse perspectives and contributors: The third edition highlights the research and views of a broader group of economists. These include people from across the spectrum of economic thought, with a particular focus on those who take what are often considered non-traditional views of economic policy and government action. Examples include:

- Chapter 1: Esther Duflo, Abhijit Banerjee, and Michael Kremer regarding experimental analysis in development economics.
- Chapter 4: Walter Williams and Thomas Sowell regarding the downsides of minimum wages.
- Chapter 6: Kate Raworth, regarding concepts for expanding economic measures beyond GDP and similar metrics.
- Chapter 19: W. Arthur Lewis and the dual sector economy; Dambisa Moyo regarding the benefits and detriments of foreign aid.

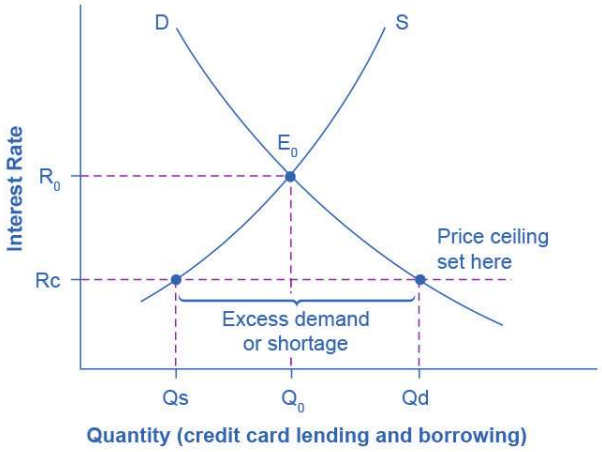
Relevance and engagement: In order to show the importance and application of economics in students' lives and careers, the third edition directly addresses and expands topics likely to connect to various industries, issues, groups, and events. Brief references and deeply explored socio-political examples have been updated

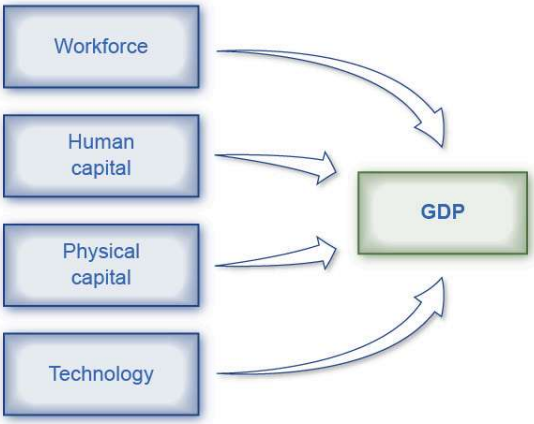
to showcase the critical—and sometimes unnoticed—ties between economic developments and topics relevant to students. Examples include education spending, the value of college degrees, discrimination, environmental policies, immigration policies, entrepreneurship and innovation, healthcare and insurance, and general financial literacy. Finally, the COVID-19 pandemic is referenced frequently to demonstrate its deep and evolving impacts on financial data, employment, and other aspects of the economy.

FRED Data and Graphs: As in previous editions, the authors have included and referenced data from the Federal Reserve Economic Data (FRED). In some cases, interactive FRED graphs are embedded directly in the web view of the book; students may magnify and focus on specific time periods, analyze individual data points, and otherwise manipulate the graphs from within the OpenStax reading experience. In others cases (and in the PDF), links to the direct source of the FRED data are provided, and students are encouraged to explore the information and the overall FRED resources more thoroughly. Note that other data sources, such as the Bureau of Labor Statistics, U.S. Census Bureau, and World Bank, usually include links in the captions or credits; instructors and students can also explore those sites for more detailed investigations of the topics at hand.

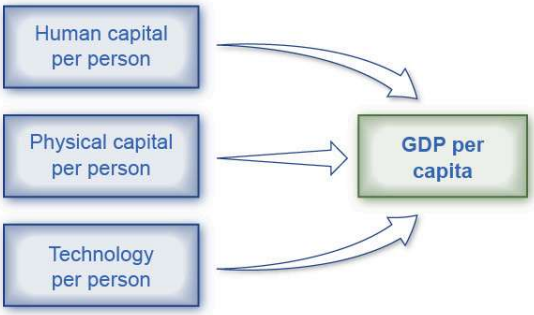
Updated art

Principles of Macroeconomics 3e includes updated and redesigned art to clarify concepts and provide opportunities for graphical interpretation. Many graphs are shown with accompanying data tables and explanations of the drivers and consequences of change.





(a) Aggregate production function with GDP as its output



(b) Aggregate production function with GDP per capita as its output

Pedagogical foundation

The narrative explanations and analysis presented in *Principles of Macroeconomics 3e* have been carefully crafted to provide a solid basis in economic concepts, flexibly approach skills and assess understanding, and deepen students' engagement with the course materials. You will also find features that promote economic inquiry and explorations, including:

- **Bring It Home:** These explorations include a brief case study, specific to each chapter, which connects the chapter's main topic to the real word. It is broken up into two parts: the first at the beginning of the chapter (in the intro module) and the second at chapter's end, when students have learned what's necessary to understand the case and "bring home" the chapter's core concepts.
- **Work It Out:** These worked examples progress through an analytical or computational problem, and guide students step by step to find out how its solution is derived.
- **Clear It Up:** These boxes are deeper explanations of something in the main body of the text. Each CIU starts with a question. The rest of the feature explains the answer.

Questions for each level of learning

Principles of Macroeconomics 3e offers flexibility in practice and assessment, and provides a range of opportunities to check understanding and encourage deeper thinking and application.

- **Self-Checks** are analytical self-assessment questions that appear at the end of each module. They "click to reveal" an answer in the web view so students can check their understanding before moving on to the next module. Self-Check questions are not simple look-up questions. They push the student to think beyond what is said in the text. Self-Check questions are designed for formative (rather than summative)

assessment. The questions and answers are explained so that students feel like they are being walked through the problem.
- **Review Questions** have been retained from Taylor's version, and are simple recall questions from the chapter in open-response format (not multiple choice or true/false). The answers can be looked up in the text.
- **Critical Thinking Questions** are new higher-level, conceptual questions that ask students to demonstrate their understanding by applying what they have learned in different contexts.
- **Problems** are exercises that give students additional practice working with the analytic and computational concepts in the module.

Answers to Questions in the Book

Students can find answers to Self-Checks in the Answer Key. Answers to all Review Questions, Critical Thinking Questions, and Problems are provided only to instructors in the Instructor Answer Guide via the Instructor Resources page.

OpenStax is retiring *Principles of Microeconomics* and *Principles of Macroeconomics* for AP textbooks because they are outdated. We recommend that Advanced Placement instructors and students use the college-level textbooks.

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Additional Resources

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- **Enhanced Lecture PowerPoint Slides:** These lecture slides include selected graphics from the text, key concepts and definitions, examples, and discussion questions.
- **Test Bank:** The test bank contains multiple choice, short answer, and essay questions for each chapter of the textbook. Since many instructors use these questions in graded assignments, we ask that you not post these questions and the answers on any publicly available websites.
- **Instructor Solution Guide:** The instructor solutions guide contains the instructor-facing answers to the problems and exercises within the textbook.
- **Video Guide:** This video guide is a collection of videos recommended by instructors and grouped topically by OpenStax textbook chapters.
- **Polling Questions:** Spark discussion and support in-class learning and engagement using this set of polling questions. Survey students' understanding by a raise of hands or by pairing these questions with your polling technology; 3–4 questions are provided for each chapter.

Academic integrity

Academic integrity builds trust, understanding, equity, and genuine learning. While students may encounter significant challenges in their courses and their lives, doing their own work and maintaining a high degree of authenticity will result in meaningful outcomes that will extend far beyond their college career. Faculty, administrators, resource providers, and students should work together to maintain a fair and positive experience.

We realize that students benefit when academic integrity ground rules are established early in the course. To that end, OpenStax has created an interactive to aid with academic integrity discussions in your course.

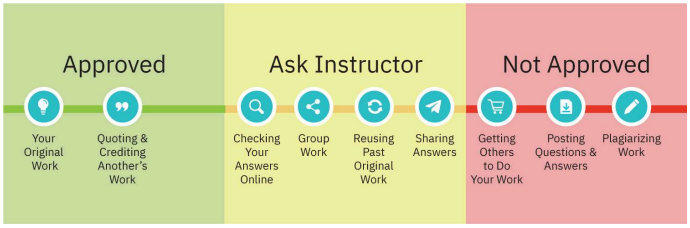

FIGURE 1

Visit our academic integrity slider (https://view.genial.ly/61e08a7af6db870d591078c1/interactive-image-defining-academic-integrity-interactive-slider). Click and drag icons along the continuum to align these practices with your institution and course policies. You may then include the graphic on your syllabus, present it in your first course meeting, or create a handout for students.

At OpenStax we are also developing resources supporting authentic learning experiences and assessment. Please visit this book's page for updates. For an in-depth review of academic integrity strategies, we highly recommend visiting the International Center of Academic Integrity (ICAI) website at https://academicintegrity.org/ (https://academicintegrity.org/).

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Welcome to Economics! 1

FIGURE 1.1 Do You Use Facebook? Economics is greatly impacted by how well information travels through society. Today, social media giants Twitter, Facebook, and Instagram are major forces on the information super highway. (Credit: modification of "Social Media Mixed Icons - Banner" by Blogtrepreneur/Flickr, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- What Is Economics, and Why Is It Important?
- Microeconomics and Macroeconomics
- How Economists Use Theories and Models to Understand Economic Issues
- How Economies Can Be Organized: An Overview of Economic Systems

Introduction

BRING IT HOME

Information Overload in the Information Age

To post or not to post? Every day we are faced with a myriad of decisions, from what to have for breakfast, to which show to stream, to the more complex—"Should I double major and add possibly another semester of study to my education?" Our response to these choices depends on the information we have available at any given moment. Economists call this "imperfect" because we rarely have all the data we need to make perfect decisions. Despite the lack of perfect information, we still make hundreds of decisions a day.

Streams, sponsors, and social media are altering the process by which we make choices, how we spend our time, which movies we see, which products we buy, and more. Whether they read the reviews or just check the ratings, it's unlikely for Americans to make many significant decisions without these information streams.

As you will see in this course, what happens in economics is affected by how well and how fast information disseminates through a society, such as how quickly information travels through Facebook. "Economists love nothing better than when deep and liquid markets operate under conditions of perfect information," says Jessica Irvine, National Economics Editor for News Corp Australia.

This leads us to the topic of this chapter, an introduction to the world of making decisions, processing information,

and understanding behavior in markets —the world of economics. Each chapter in this book will start with a discussion about current (or sometimes past) events and revisit it at chapter's end—to "bring home" the concepts in play.

What is economics and why should you spend your time learning it? After all, there are other disciplines you could be studying, and other ways you could be spending your time. As the Bring it Home feature just mentioned, making choices is at the heart of what economists study, and your decision to take this course is as much as economic decision as anything else.

Economics is probably not what you think. It is not primarily about money or finance. It is not primarily about business. It is not mathematics. What is it then? It is both a subject area and a way of viewing the world.

1.1 What Is Economics, and Why Is It Important?

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Discuss the importance of studying economics
- Explain the relationship between production and division of labor
- Evaluate the significance of scarcity

Economics is the study of how humans make decisions in the face of scarcity. These can be individual decisions, family decisions, business decisions or societal decisions. If you look around carefully, you will see that scarcity is a fact of life. **Scarcity** means that human wants for goods, services and resources exceed what is available. Resources, such as labor, tools, land, and raw materials are necessary to produce the goods and services we want but they exist in limited supply. Of course, the ultimate scarce resource is time- everyone, rich or poor, has just 24 expendable hours in the day to earn income to acquire goods and services, for leisure time, or for sleep. At any point in time, there is only a finite amount of resources available.

Think about it this way: In 2015 the labor force in the United States contained over 158 million workers, according to the U.S. Bureau of Labor Statistics. The total land area was 3,794,101 square miles. While these are certainly large numbers, they are not infinite. Because these resources are limited, so are the numbers of goods and services we produce with them. Combine this with the fact that human wants seem to be virtually infinite, and you can see why scarcity is a problem.

Introduction to FRED

Data is very important in economics because it describes and measures the issues and problems that economics seek to understand. A variety of government agencies publish economic and social data. For this course, we will generally use data from the St. Louis Federal Reserve Bank's FRED database. FRED is very user friendly. It allows you to display data in tables or charts, and you can easily download it into spreadsheet form if you want to use the data for other purposes. The FRED website (https://openstax.org/l/FRED/) includes data on nearly 400,000 domestic and international variables over time, in the following broad categories:

- Money, Banking & Finance
- Population, Employment, & Labor Markets (including Income Distribution)
- National Accounts (Gross Domestic Product & its components), Flow of Funds, and International Accounts
- Production & Business Activity (including Business Cycles)
- Prices & Inflation (including the Consumer Price Index, the Producer Price Index, and the Employment Cost Index)
- International Data from other nations
- U.S. Regional Data
- Academic Data (including Penn World Tables & NBER Macrohistory database)

For more information about how to use FRED, see the variety of videos (https://openstax.org/l/FRED_intro) on

YouTube starting with this introduction.

FIGURE 1.2 Scarcity of Resources People experiencing homelessness are a stark reminder that scarcity of resources is real. (Credit: "Pittsburgh Homeless" by "daveyinn"/Flickr Creative Commons, CC BY 2.0)

If you still do not believe that scarcity is a problem, consider the following: Does everyone require food to eat? Does everyone need a decent place to live? Does everyone have access to healthcare? In every country in the world, there are people who are hungry, homeless (for example, those who call park benches their beds, as Figure 1.2 shows), and in need of healthcare, just to focus on a few critical goods and services. Why is this the case? It is because of scarcity. Let's delve into the concept of scarcity a little deeper, because it is crucial to understanding economics.

The Problem of Scarcity

Think about all the things you consume: food, shelter, clothing, transportation, healthcare, and entertainment. How do you acquire those items? You do not produce them yourself. You buy them. How do you afford the things you buy? You work for pay. If you do not, someone else does on your behalf. Yet most of us never have enough income to buy all the things we want. This is because of scarcity. So how do we solve it?

LINK IT UP

Visit this website (http://openstax.org/l/drought) to read about how the United States is dealing with scarcity in resources.

Every society, at every level, must make choices about how to use its resources. Families must decide whether to spend their money on a new car or a fancy vacation. Towns must choose whether to put more of the budget into police and fire protection or into the school system. Nations must decide whether to devote more funds to national defense or to protecting the environment. In most cases, there just isn't enough money in the budget to do everything. How do we use our limited resources the best way possible, that is, to obtain the most goods and services we can? There are a couple of options. First, we could each produce everything we each consume. Alternatively, we could each produce some of what we want to consume, and "trade" for the rest of what we want. Let's explore these options. Why do we not each just produce all of the things we consume? Think back to pioneer days, when individuals knew how to do so much more than we do today, from building their homes, to growing their crops, to hunting for food, to repairing their equipment. Most of us do not know how to do all—or any—of those things, but it is not because we could not learn. Rather, we do not have to. The reason why is something called *the division and specialization of labor*, a production innovation first put forth by Adam Smith (Figure 1.3) in his book, *The Wealth of Nations*.

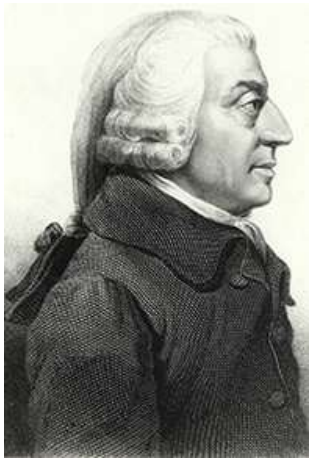

FIGURE 1.3 Adam Smith Adam Smith introduced the idea of dividing labor into discrete tasks. (Credit: "Adam Smith" by Cadell and Davies (1811), John Horsburgh (1828), or R.C. Bell (1872)/Wikimedia Commons, Public Domain)

The Division of and Specialization of Labor

The formal study of economics began when Adam Smith (1723–1790) published his famous book *The Wealth of Nations* in 1776. Many authors had written on economics in the centuries before Smith, but he was the first to address the subject in a comprehensive way. In the first chapter, Smith introduces the concept of **division of labor**, which means that the way one produces a good or service is divided into a number of tasks that different workers perform, instead of all the tasks being done by the same person.

To illustrate division of labor, Smith counted how many tasks went into making a pin: drawing out a piece of wire, cutting it to the right length, straightening it, putting a head on one end and a point on the other, and packaging pins for sale, to name just a few. Smith counted 18 distinct tasks that different people performed—all for a pin, believe it or not!

Modern businesses divide tasks as well. Even a relatively simple business like a restaurant divides the task of serving meals into a range of jobs like top chef, sous chefs, less-skilled kitchen help, servers to wait on the tables, a greeter at the door, janitors to clean up, and a business manager to handle paychecks and bills—not to mention the economic connections a restaurant has with suppliers of food, furniture, kitchen equipment, and the building where it is located. A complex business like a large manufacturing factory, such as the shoe factory (Figure 1.4), or a hospital can have hundreds of job classifications.

FIGURE 1.4 Division of Labor Workers on an assembly line are an example of the divisions of labor. (Credit: "Red Wing Shoe Factory Tour" by Nina Hale/Flickr Creative Commons, CC BY 2.0)

Why the Division of Labor Increases Production

When we divide and subdivide the tasks involved with producing a good or service, workers and businesses can produce a greater quantity of output. In his observations of pin factories, Smith noticed that one worker alone might make 20 pins in a day, but that a small business of 10 workers (some of whom would need to complete two or three of the 18 tasks involved with pin-making), could make 48,000 pins in a day. How can a group of workers, each specializing in certain tasks, produce so much more than the same number of workers who try to produce the entire good or service by themselves? Smith offered three reasons.

First, **specialization** in a particular small job allows workers to focus on the parts of the production process where they have an advantage. (In later chapters, we will develop this idea by discussing comparative advantage.) People have different skills, talents, and interests, so they will be better at some jobs than at others. The particular advantages may be based on educational choices, which are in turn shaped by interests and talents. Only those with medical degrees qualify to become doctors, for instance. For some goods, geography affects specialization. For example, it is easier to be a wheat farmer in North Dakota than in Florida, but easier to run a tourist hotel in Florida than in North Dakota. If you live in or near a big city, it is easier to attract enough customers to operate a successful dry cleaning business or movie theater than if you live in a sparsely populated rural area. Whatever the reason, if people specialize in the production of what they do best, they will be more effective than if they produce a combination of things, some of which they are good at and some of which they are not.

Second, workers who specialize in certain tasks often learn to produce more quickly and with higher quality. This pattern holds true for many workers, including assembly line laborers who build cars, stylists who cut hair, and doctors who perform heart surgery. In fact, specialized workers often know their jobs well enough to suggest innovative ways to do their work faster and better.

A similar pattern often operates within businesses. In many cases, a business that focuses on one or a few products (sometimes called its “core competency”) is more successful than firms that try to make a wide range of products.

Third, specialization allows businesses to take advantage of **economies of scale**, which means that for many goods, as the level of production increases, the average cost of producing each individual unit declines. For example, if a factory produces only 100 cars per year, each car will be quite expensive to make on average. However, if a factory produces 50,000 cars each year, then it can set up an assembly line with huge machines and workers performing specialized tasks, and the average cost of production per car will be lower. The ultimate result of workers who can focus on their preferences and talents, learn to do their specialized jobs better, and work in larger organizations is that society as a whole can produce and consume far more than if each person tried to produce all of their own goods and services. The division and specialization of labor has been a force against the problem of scarcity.

Trade and Markets

Specialization only makes sense, though, if workers can use the pay they receive for doing their jobs to purchase the other goods and services that they need. In short, specialization requires trade.

You do not have to know anything about electronics or sound systems to play music—you just buy an iPod or MP3 player, download the music, and listen. You do not have to know anything about artificial fibers or the construction of sewing machines if you need a jacket—you just buy the jacket and wear it. You do not need to know anything about internal combustion engines to operate a car—you just get in and drive. Instead of trying to acquire all the knowledge and skills involved in producing all of the goods and services that you wish to consume, the market allows you to learn a specialized set of skills and then use the pay you receive to buy the goods and services you need or want. This is how our modern society has evolved into a strong economy.

Why Study Economics?

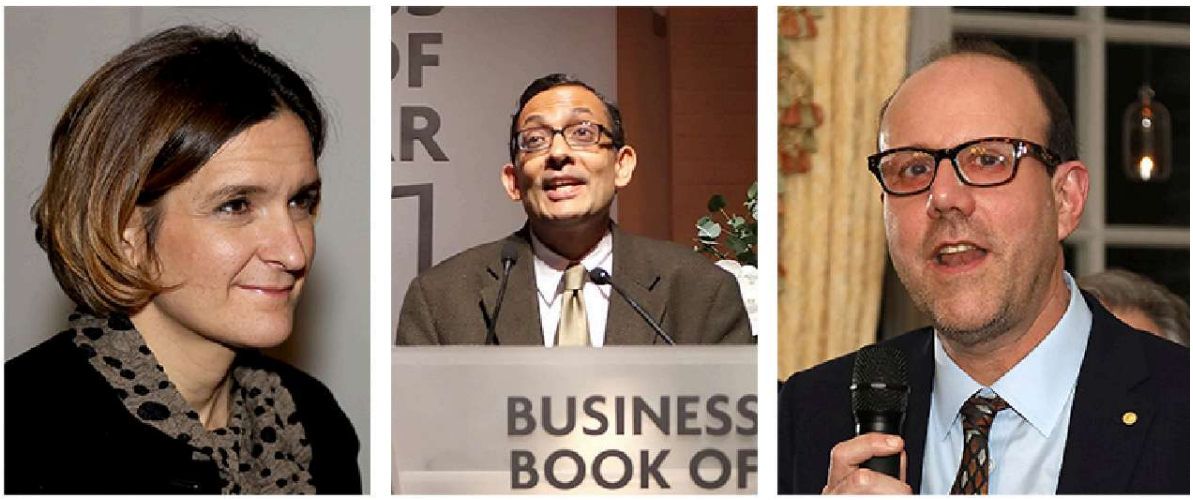

FIGURE 1.5 Esther Duflo, Abhijit Banerjee, and Michael Kremer Esther Duflo, Abhijit Banerjee (both from Massachusetts Institute of Technology), and Michael Kremer (University of Chicago) were awarded the Nobel Prize for groundbreaking work in which they established experimental methods to understand poverty and outcomes of initiatives to address it. (Credit: modification of work by U.S. Embassy Sweden/Wikimedia Commons, CC BY 2.0; Financial Times/Wikimedia Commons, CC BY 2.0; U.S. Embassy Sweden/Flickr Creative Commons, CC BY 2.0)

Now that you have an overview on what economics studies, let's quickly discuss why you are right to study it. Economics is not primarily a collection of facts to memorize, although there are plenty of important concepts to learn. Instead, think of economics as a collection of questions to answer or puzzles to work. Most importantly, economics provides the tools to solve those puzzles.

Consider the complex and critical issue of education barriers on national and regional levels, which affect millions of people and result in widespread poverty and inequality. Governments, aid organizations, and wealthy individuals spend billions of dollars each year trying to address these issues. Nations announce the revitalization of their education programs; tech companies donate devices and infrastructure, and celebrities and charities build schools and sponsor students. Yet the problems remain, sometimes almost as pronounced as they were before the intervention. Why is that the case? In 2019, three economists—Esther Duflo, Abhijit Banerjee, and Michael Kremer—were awarded the Nobel Prize for their work to answer those questions. They worked diligently to break the widespread problems into smaller pieces, and experimented with small interventions to test success. The award citation credited their work with giving the world better tools and information to address poverty and improve education. Esther Duflo, who is the youngest person and second woman to win the Nobel Prize in Economics, said, "We believed that like the war on cancer, the war on poverty was not going to be won in one major battle, but in a series of small triumphs. . . . This work and the culture of learning that it fostered in governments has led to real improvement in the lives of hundreds of millions of poor people."

As you can see, economics affects far more than business. For example:

- Virtually every major problem facing the world today, from global warming, to world poverty, to the conflicts in Syria, Afghanistan, and Somalia, has an economic dimension. If you are going to be part of solving those problems, you need to be able to understand them. Economics is crucial.
- It is hard to overstate the importance of economics to good citizenship. You need to be able to vote intelligently on budgets, regulations, and laws in general. When the U.S. government came close to a standstill at the end of 2012 due to the "fiscal cliff," what were the issues? Did you know?
- A basic understanding of economics makes you a well-rounded thinker. When you read articles about economic issues, you will understand and be able to evaluate the writer's argument. When you hear

classmates, co-workers, or political candidates talking about economics, you will be able to distinguish between common sense and nonsense. You will find new ways of thinking about current events and about personal and business decisions, as well as current events and politics.

The study of economics does not dictate the answers, but it can illuminate the different choices.

1.2 Microeconomics and Macroeconomics

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Describe microeconomics
- Describe macroeconomics
- Contrast monetary policy and fiscal policy

Economics is concerned with the well-being of *all* people, including those with jobs and those without jobs, as well as those with high incomes and those with low incomes. Economics acknowledges that production of useful goods and services can create problems of environmental pollution. It explores the question of how investing in education helps to develop workers' skills. It probes questions like how to tell when big businesses or big labor unions are operating in a way that benefits society as a whole and when they are operating in a way that benefits their owners or members at the expense of others. It looks at how government spending, taxes, and regulations affect decisions about production and consumption.

It should be clear by now that economics covers considerable ground. We can divide that ground into two parts: **Microeconomics** focuses on the actions of individual agents within the economy, like households, workers, and businesses. **Macroeconomics** looks at the economy as a whole. It focuses on broad issues such as growth of production, the number of unemployed people, the inflationary increase in prices, government deficits, and levels of exports and imports. Microeconomics and macroeconomics are not separate subjects, but rather complementary perspectives on the overall subject of the economy.

To understand why both microeconomic and macroeconomic perspectives are useful, consider the problem of studying a biological ecosystem like a lake. One person who sets out to study the lake might focus on specific topics: certain kinds of algae or plant life; the characteristics of particular fish or snails; or the trees surrounding the lake. Another person might take an overall view and instead consider the lake's ecosystem from top to bottom; what eats what, how the system stays in a rough balance, and what environmental stresses affect this balance. Both approaches are useful, and both examine the same lake, but the viewpoints are different. In a similar way, both microeconomics and macroeconomics study the same economy, but each has a different viewpoint.

Whether you are scrutinizing lakes or economics, the micro and the macro insights should blend with each other. In studying a lake, the micro insights about particular plants and animals help to understand the overall food chain, while the macro insights about the overall food chain help to explain the environment in which individual plants and animals live.

In economics, the micro decisions of individual businesses are influenced by whether the macroeconomy is healthy. For example, firms will be more likely to hire workers if the overall economy is growing. In turn, macroeconomy's performance ultimately depends on the microeconomic decisions that individual households and businesses make.

Microeconomics

What determines how households and individuals spend their budgets? What combination of goods and services will best fit their needs and wants, given the budget they have to spend? How do people decide whether to work, and if so, whether to work full time or part time? How do people decide how much to save for the future, or whether they should borrow to spend beyond their current means?

What determines the products, and how many of each, a firm will produce and sell? What determines the

prices a firm will charge? What determines how a firm will produce its products? What determines how many workers it will hire? How will a firm finance its business? When will a firm decide to expand, downsize, or even close? In the microeconomics part of this book, we will learn about the theory of consumer behavior, the theory of the firm, how markets for labor and other resources work, and how markets sometimes fail to work properly.

Macroeconomics

What determines the level of economic activity in a society? In other words, what determines how many goods and services a nation actually produces? What determines how many jobs are available in an economy? What determines a nation's standard of living? What causes the economy to speed up or slow down? What causes firms to hire more workers or to lay them off? Finally, what causes the economy to grow over the long term?

We can determine an economy's macroeconomic health by examining a number of goals: growth in the standard of living, low unemployment, and low inflation, to name the most important. How can we use government macroeconomic policy to pursue these goals? A nation's central bank conducts **monetary policy**, which involves policies that affect bank lending, interest rates, and financial capital markets. For the United States, this is the Federal Reserve. A nation's legislative body determines **fiscal policy**, which involves government spending and taxes. For the United States, this is the Congress and the executive branch, which originates the federal budget. These are the government's main tools. Americans tend to expect that government can fix whatever economic problems we encounter, but to what extent is that expectation realistic? These are just some of the issues that we will explore in the macroeconomic chapters of this book.

1.3 How Economists Use Theories and Models to Understand Economic Issues

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Interpret a circular flow diagram
- Explain the importance of economic theories and models
- Describe goods and services markets and labor markets

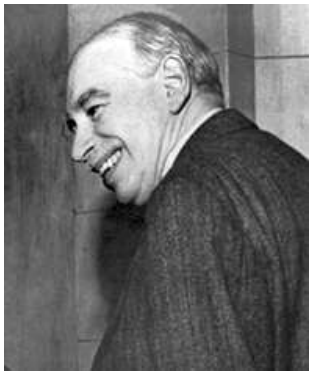

FIGURE 1.6 John Maynard Keynes One of the most influential economists in modern times was John Maynard Keynes. (Credit: "John Maynard Keynes" by IMF/Wikimedia Commons, Public Domain)

John Maynard Keynes (1883–1946), one of the greatest economists of the twentieth century, pointed out that economics is not just a subject area but also a way of thinking. Keynes (Figure 1.6) famously wrote in the introduction to a fellow economist's book: "[Economics] is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions." In other words, economics teaches you how to think, not what to think.

LINK IT UP

Watch this video (http://openstax.org/l/Keynes) about John Maynard Keynes and his influence on economics.

Economists see the world through a different lens than anthropologists, biologists, classicists, or practitioners of any other discipline. They analyze issues and problems using economic theories that are based on particular assumptions about human behavior. These assumptions tend to be different than the assumptions an anthropologist or psychologist might use. A **theory** is a simplified representation of how two or more variables interact with each other. The purpose of a theory is to take a complex, real-world issue and simplify it down to its essentials. If done well, this enables the analyst to understand the issue and any problems around it. A good theory is simple enough to understand, while complex enough to capture the key features of the object or situation you are studying.

Sometimes economists use the term **model** instead of theory. Strictly speaking, a theory is a more abstract representation, while a model is a more applied or empirical representation. We use models to test theories, but for this course we will use the terms interchangeably.

For example, an architect who is planning a major office building will often build a physical model that sits on a tabletop to show how the entire city block will look after the new building is constructed. Companies often build models of their new products, which are more rough and unfinished than the final product, but can still demonstrate how the new product will work.

A good model to start with in economics is the **circular flow diagram** (Figure 1.7). It pictures the economy as consisting of two groups—households and firms—that interact in two markets: the **goods and services market** in which firms sell and households buy and the **labor market** in which households sell labor to business firms or other employees.

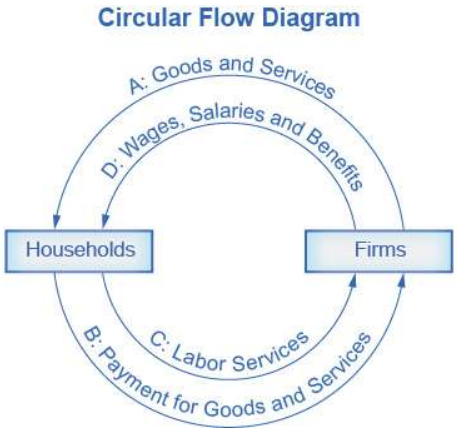

FIGURE 1.7 The Circular Flow Diagram The circular flow diagram shows how households and firms interact in the goods and services market, and in the labor market. The direction of the arrows shows that in the goods and services market, households receive goods and services and pay firms for them. In the labor market, households provide labor and receive payment from firms through wages, salaries, and benefits.

Firms produce and sell goods and services to households in the market for goods and services (or product market). Arrow "A" indicates this. Households pay for goods and services, which becomes the revenues to firms. Arrow "B" indicates this. Arrows A and B represent the two sides of the product market. Where do households obtain the income to buy goods and services? They provide the labor and other resources (e.g., land, capital, raw materials) firms need to produce goods and services in the market for inputs (or factors of production). Arrow "C" indicates this. In return, firms pay for the inputs (or resources) they use in the form of wages and other factor payments. Arrow "D" indicates this. Arrows "C" and "D" represent the two sides of the factor market.

Of course, in the real world, there are many different markets for goods and services and markets for many different types of labor. The circular flow diagram simplifies this to make the picture easier to grasp. In the diagram, firms produce goods and services, which they sell to households in return for revenues. The outer circle shows this, and represents the two sides of the product market (for example, the market for goods and

services) in which households demand and firms supply. Households sell their labor as workers to firms in return for wages, salaries, and benefits. The inner circle shows this and represents the two sides of the labor market in which households supply and firms demand.

This version of the circular flow model is stripped down to the essentials, but it has enough features to explain how the product and labor markets work in the economy. We could easily add details to this basic model if we wanted to introduce more real-world elements, like financial markets, governments, and interactions with the rest of the globe (imports and exports).

Economists carry a set of theories in their heads like a carpenter carries around a toolkit. When they see an economic issue or problem, they go through the theories they know to see if they can find one that fits. Then they use the theory to derive insights about the issue or problem. Economists express theories as diagrams, graphs, or even as mathematical equations. (Do not worry. In this course, we will mostly use graphs.) Economists do not figure out the answer to the problem first and then draw the graph to illustrate. Rather, they use the graph of the theory to help them figure out the answer. Although at the introductory level, you can sometimes figure out the right answer without applying a model, if you keep studying economics, before too long you will run into issues and problems that you will need to graph to solve. We explain both micro and macroeconomics in terms of theories and models. The most well-known theories are probably those of supply and demand, but you will learn a number of others.

1.4 How To Organize Economies: An Overview of Economic Systems

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Contrast traditional economies, command economies, and market economies
- Explain gross domestic product (GDP)
- Assess the importance and effects of globalization

Think about what a complex system a modern economy is. It includes all production of goods and services, all buying and selling, all employment. The economic life of every individual is interrelated, at least to a small extent, with the economic lives of thousands or even millions of other individuals. Who organizes and coordinates this system? Who ensures that, for example, the number of televisions a society provides is the same as the amount it needs and wants? Who ensures that the right number of employees work in the electronics industry? Who ensures that televisions are produced in the best way possible? How does it all get done?

There are at least three ways that societies organize an economy. The first is the **traditional economy**, which is the oldest economic system and is used in parts of Asia, Africa, and South America. Traditional economies organize their economic affairs the way they have always done (i.e., tradition). Occupations stay in the family. Most families are farmers who grow the crops using traditional methods. What you produce is what you consume. Because tradition drives the way of life, there is little economic progress or development.

FIGURE 1.8 A Command Economy Ancient Egypt was an example of a command economy. (Credit: "Pyramids at Giza" by Jay Bergesen/Flickr Creative Commons, CC BY 2.0)

Command economies are very different. In a **command economy**, economic effort is devoted to goals passed down from a ruler or ruling class. Ancient Egypt was a good example: a large part of economic life was devoted to building pyramids, like those in Figure 1.8, for the pharaohs. Medieval manor life is another example: the lord provided the land for growing crops and protection in the event of war. In return, vassals provided labor and soldiers to do the lord's bidding. In the last century, communism emphasized command economies.

In a command economy, the government decides what goods and services will be produced and what prices it will charge for them. The government decides what methods of production to use and sets wages for workers. The government provides many necessities like healthcare and education for free. Currently, Cuba and North Korea have command economies.

FIGURE 1.9 A Market Economy Nothing says "market" more than The New York Stock Exchange. (Credit: work by Erik Drost/Flickr Creative Commons, CC BY 2.0)

Although command economies have a very centralized structure for economic decisions, market economies have a very decentralized structure. A **market** is an institution that brings together buyers and sellers of goods or services, who may be either individuals or businesses. The New York Stock Exchange (Figure 1.9) is a prime example of a market which brings buyers and sellers together. In a **market economy**, decision-making is decentralized. Market economies are based on **private enterprise**: the private individuals or groups of private individuals own and operate the means of production (resources and businesses). Businesses supply goods and services based on demand. (In a command economy, by contrast, the government owns resources and businesses.) Supply of goods and services depends on what the demands are. A person's income is based on their ability to convert resources (especially labor) into something that society values. The more society values the person's output, the higher the income (think Lady Gaga or LeBron James). In this scenario, market forces, not governments, determine economic decisions.

Most economies in the real world are mixed. They combine elements of command and market (and even traditional) systems. The U.S. economy is positioned toward the market-oriented end of the spectrum. Many countries in Europe and Latin America, while primarily market-oriented, have a greater degree of government

involvement in economic decisions than the U.S. economy. China and Russia, while over the past several decades have moved more in the direction of having a market-oriented system, remain closer to the command economy end of the spectrum. The Heritage Foundation provides perspective on countries' economic freedom, as the following Clear It Up feature discusses.

CLEAR IT UP

What countries are considered economically free?

Who is in control of economic decisions? Are people free to do what they want and to work where they want? Are businesses free to produce when they want and what they choose, and to hire and fire as they wish? Are banks free to choose who will receive loans, or does the government control these kinds of choices? Each year, researchers at the Heritage Foundation and the *Wall Street Journal* look at 50 different categories of economic freedom for countries around the world. They give each nation a score based on the extent of economic freedom in each category. Note that while the Heritage Foundation/WSJ index is widely cited by an array of scholars and publications, it should be regarded as only one viewpoint. Some experts indicate that the index's category choices and scores are politically biased. However, the index and others like it provide a useful resource for critical discussion of economic freedom.

The 2016 Heritage Foundation's Index of Economic Freedom report ranked 178 countries around the world: Table 1.1 lists some examples of the most free and the least free countries. Although technically not a separate country, Hong Kong has been granted a degree of autonomy such that, for purposes of measuring economic statistics, it is often treated as a separate country. Several additional countries were not ranked because of extreme instability that made judgments about economic freedom impossible. These countries include Afghanistan, Iraq, Libya, Syria, Somalia, and Yemen.

The assigned rankings are inevitably based on estimates, yet even these rough measures can be useful for discerning trends. In 2015, 101 of the 178 included countries shifted toward greater economic freedom, although 77 of the countries shifted toward less economic freedom. In recent decades, the overall trend has been a *higher level of economic freedom around the world.*

Most Economic Freedom	Least Economic Freedom
1. Hong Kong	167. Timor-Leste
2. Singapore	168. Democratic Republic of Congo
3. New Zealand	169. Argentina
4. Switzerland	170. Equatorial Guinea
5. Australia	171. Iran
6. Canada	172. Republic of Congo
7. Chile	173. Eritrea
8. Ireland	174. Turkmenistan

TABLE 1.1 Economic Freedoms, 2016 (Source: The Heritage Foundation, 2016 Index of Economic Freedom, Country Rankings, http://www.heritage.org/index/ranking)

Most Economic Freedom	Least Economic Freedom
9. Estonia	175. Zimbabwe
10. United Kingdom	176. Venezuela
11. United States	177. Cuba
12. Denmark	178. North Korea

TABLE 1.1 Economic Freedoms, 2016 (Source: The Heritage Foundation, 2016 Index of Economic Freedom, Country Rankings, http://www.heritage.org/index/ranking)

Regulations: The Rules of the Game

Markets and government regulations are always entangled. There is no such thing as an absolutely free market. Regulations always define the "rules of the game" in the economy. Economies that are primarily market-oriented have fewer regulations—ideally just enough to maintain an even playing field for participants. At a minimum, these laws govern matters like safeguarding private property against theft, protecting people from violence, enforcing legal contracts, preventing fraud, and collecting taxes. Conversely, even the most command-oriented economies operate using markets. How else would buying and selling occur? The government heavily regulates decisions of what to produce and prices to charge. Heavily regulated economies often have **underground economies** (or black markets), which are markets where the buyers and sellers make transactions without the government's approval.

The question of how to organize economic institutions is typically not a straightforward choice between all market or all government, but instead involves a balancing act over the appropriate combination of market freedom and government rules.

FIGURE 1.10 Globalization Cargo ships are one mode of transportation for shipping goods in the global economy. (Credit: "Cargo Ship" by Raul Valdez/Flickr Creative Commons, CC BY 2.0)

The Rise of Globalization

Recent decades have seen a trend toward **globalization**, which is the expanding cultural, political, and economic connections between people around the world. One measure of this is the increased buying and selling of goods, services, and assets across national borders—in other words, international trade and financial capital flows.

Globalization has occurred for a number of reasons. Improvements in shipping, as illustrated by the container

ship in Figure 1.10, and air cargo have driven down transportation costs. Innovations in computing and telecommunications have made it easier and cheaper to manage long-distance economic connections of production and sales. Many valuable products and services in the modern economy can take the form of information—for example: computer software; financial advice; travel planning; music, books and movies; and blueprints for designing a building. These products and many others can be transported over telephones and computer networks at ever-lower costs. Finally, international agreements and treaties between countries have encouraged greater trade.

Table 1.2 presents one measure of globalization. It shows the percentage of domestic economic production that was exported for a selection of countries from 2010 to 2015, according to an entity known as The World Bank. **Exports** are the goods and services that one produces domestically and sells abroad. **Imports** are the goods and services that one produces abroad and then sells domestically. **Gross domestic product (GDP)** measures the size of total production in an economy. Thus, the ratio of exports divided by GDP measures what share of a country's total economic production is sold in other countries.

Country	2010	2011	2012	2013	2014	2015
Higher Income Countries						
United States	12.4	13.6	13.6	13.5	13.5	12.6
Belgium	76.2	81.4	82.2	82.8	84.0	84.4
Canada	29.1	30.7	30.0	30.1	31.7	31.5
France	26.0	27.8	28.1	28.3	29.0	30.0
Middle Income Countries						
Brazil	10.9	11.9	12.6	12.6	11.2	13.0
Mexico	29.9	31.2	32.6	31.7	32.3	35.3
South Korea	49.4	55.7	56.3	53.9	50.3	45.9
Lower Income Countries						
Chad	36.8	38.9	36.9	32.2	34.2	29.8
China	29.4	28.5	27.3	26.4	23.9	22.4
India	22.0	23.9	24.0	24.8	22.9	-
Nigeria	25.3	31.3	31.4	18.0	18.4	-

TABLE 1.2 The Extent of Globalization (exports/GDP)
(Source: http://databank.worldbank.org/data/)

In recent decades, the export/GDP ratio has generally risen, both worldwide and for the U.S. economy. Interestingly, the share of U.S. exports in proportion to the U.S. economy is well below the global average, in part because large economies like the United States can contain more of the division of labor inside their national borders. However, smaller economies like Belgium, Korea, and Canada need to trade across their borders with other countries to take full advantage of division of labor, specialization, and economies of scale. In this sense, the enormous U.S. economy is less affected by globalization than most other countries.

Table 1.2 indicates that many medium and low income countries around the world, like Mexico and China, have also experienced a surge of globalization in recent decades. If an astronaut in orbit could put on special glasses that make all economic transactions visible as brightly colored lines and look down at Earth, the astronaut would see the planet covered with connections.

Despite the rise in globalization over the last few decades, in recent years we've seen significant pushback against globalization from people across the world concerned about loss of jobs, loss of political sovereignty, and increased economic inequality. Prominent examples of this pushback include the 2016 vote in Great Britain to exit the European Union (i.e. Brexit), and the election of Donald J. Trump for President of the United States.

Hopefully, you now have an idea about economics. Before you move to any other chapter of study, be sure to read the very important appendix to this chapter called The Use of Mathematics in Principles of Economics. It is essential that you learn more about how to read and use models in economics.

BRING IT HOME

Information Overload in the Information Age

The world provides nearly instant access to a wealth of information. Consider that as recently as the late 1970s, the *Farmer's Almanac*, along with the Weather Bureau of the U.S. Department of Agriculture, were the primary sources American farmers used to determine when to plant and harvest their crops. Today, these decisions are driven by data. Farmers access detailed data streams driven by global positioning systems, historical rainfall patterns, and complex weather monitoring services. They combine this information with crop yield data and soil quality measurements from prior years. Maximizing production efficiently can mean the difference between a farm that remains profitable and one that may need to sell its land, and data helps eliminate guesswork.

Information helps us make decisions as simple as what to wear today to how many reporters the media should send to cover an event. Each of these decisions is an economic decision. After all, resources are scarce. If the media send ten reporters to cover an announcement, they are not available to cover other stories or complete other tasks. Information provides the necessary knowledge to make the best possible decisions on how to utilize scarce resources. Welcome to the world of economics!

Key Terms

circular flow diagram a diagram that views the economy as consisting of households and firms interacting in a goods and services market and a labor market
command economy an economy where economic decisions are passed down from government authority and where the government owns the resources
division of labor the way in which different workers divide required tasks to produce a good or service
economics the study of how humans make choices under conditions of scarcity
economies of scale when the average cost of producing each individual unit declines as total output increases
exports products (goods and services) made domestically and sold abroad
fiscal policy economic policies that involve government spending and taxes
globalization the trend in which buying and selling in markets have increasingly crossed national borders
goods and services market a market in which firms are sellers of what they produce and households are buyers
gross domestic product (GDP) measure of the size of total production in an economy
imports products (goods and services) made abroad and then sold domestically
labor market the market in which households sell their labor as workers to business firms or other employers
macroeconomics the branch of economics that focuses on broad issues such as growth, unemployment, inflation, and trade balance
market interaction between potential buyers and sellers; a combination of demand and supply
market economy an economy where economic decisions are decentralized, private individuals own resources, and businesses supply goods and services based on demand
microeconomics the branch of economics that focuses on actions of particular agents within the economy, like households, workers, and business firms
model see theory
monetary policy policy that involves altering the level of interest rates, the availability of credit in the economy, and the extent of borrowing
private enterprise system where private individuals or groups of private individuals own and operate the means of production (resources and businesses)
scarcity when human wants for goods and services exceed the available supply
specialization when workers or firms focus on particular tasks for which they are well-suited within the overall production process
theory a representation of an object or situation that is simplified while including enough of the key features to help us understand the object or situation
traditional economy typically an agricultural economy where things are done the same as they have always been done
underground economy a market where the buyers and sellers make transactions in violation of one or more government regulations

Key Concepts and Summary

1.1 What Is Economics, and Why Is It Important?

Economics seeks to solve the problem of scarcity, which is when human wants for goods and services exceed the available supply. A modern economy displays a division of labor, in which people earn income by specializing in what they produce and then use that income to purchase the products they need or want. The division of labor allows individuals and firms to specialize and to produce more for several reasons: a) It allows the agents to focus on areas of advantage due to natural factors and skill levels; b) It encourages the agents to learn and invent; c) It allows agents to take advantage of economies of scale. Division and specialization of labor only work when individuals can purchase what they do not produce in markets. Learning about economics helps you understand the major problems facing the world today, prepares you to be a good citizen, and helps you become a well-rounded thinker.

1.2 Microeconomics and Macroeconomics

Microeconomics and macroeconomics are two different perspectives on the economy. The microeconomic perspective focuses on parts of the economy: individuals, firms, and industries. The macroeconomic perspective looks at the economy as a whole, focusing on goals like growth in the standard of living, unemployment, and inflation. Macroeconomics has two types of policies for pursuing these goals: monetary policy and fiscal policy.

1.3 How Economists Use Theories and Models to Understand Economic Issues

Economists analyze problems differently than do other disciplinary experts. The main tools economists use are economic theories or models. A theory is not an illustration of the answer to a problem. Rather, a theory is a tool for determining the answer.

1.4 How To Organize Economies: An Overview of Economic Systems

We can organize societies as traditional, command, or market-oriented economies. Most societies are a mix. The last few decades have seen globalization evolve as a result of growth in commercial and financial networks that cross national borders, making businesses and workers from different economies increasingly interdependent.

Self-Check Questions

1. What is scarcity? Can you think of two causes of scarcity?
2. Residents of the town of Smithfield like to consume hams, but each ham requires 10 people to produce it and takes a month. If the town has a total of 100 people, what is the maximum amount of ham the residents can consume in a month?
3. A consultant works for $200 per hour. She likes to eat vegetables, but is not very good at growing them. Why does it make more economic sense for her to spend her time at the consulting job and shop for her vegetables?
4. A computer systems engineer could paint her house, but it makes more sense for her to hire a painter to do it. Explain why.
5. What would be another example of a "system" in the real world that could serve as a metaphor for micro and macroeconomics?
6. Suppose we extend the circular flow model to add imports and exports. Copy the circular flow diagram onto a sheet of paper and then add a foreign country as a third agent. Draw a rough sketch of the flows of imports, exports, and the payments for each on your diagram.
7. What is an example of a problem in the world today, not mentioned in the chapter, that has an economic dimension?
8. The chapter defines *private enterprise* as a characteristic of market-oriented economies. What would *public enterprise* be? *Hint*: It is a characteristic of command economies.
9. Why might Belgium, France, Italy, and Sweden have a higher export to GDP ratio than the United States?

Review Questions

10. Give the three reasons that explain why the division of labor increases an economy's level of production.
11. What are three reasons to study economics?
12. What is the difference between microeconomics and macroeconomics?
13. What are examples of individual economic agents?

14. What are the three main goals of macroeconomics?

15. How did John Maynard Keynes define economics?

16. Are households primarily buyers or sellers in the goods and services market? In the labor market?

17. Are firms primarily buyers or sellers in the goods and services market? In the labor market?

18. What are the three ways that societies can organize themselves economically?

19. What is globalization? How do you think it might have affected the economy over the past decade?

Critical Thinking Questions

20. Suppose you have a team of two workers: one is a baker and one is a chef. Explain why the kitchen can produce more meals in a given period of time if each worker specializes in what they do best than if each worker tries to do everything from appetizer to dessert.

21. Why would division of labor without trade not work?

22. Can you think of any examples of *free* goods, that is, goods or services that are not scarce?

23. A balanced federal budget and a balance of trade are secondary goals of macroeconomics, while growth in the standard of living (for example) is a primary goal. Why do you think that is so?

24. Macroeconomics is an aggregate of what happens at the microeconomic level. Would it be possible for what happens at the macro level to differ from how economic agents would react to some stimulus at the micro level? *Hint:* Think about the behavior of crowds.

25. Why is it unfair or meaningless to criticize a theory as "unrealistic?"

26. Suppose, as an economist, you are asked to analyze an issue unlike anything you have ever done before. Also, suppose you do not have a specific model for analyzing that issue. What should you do? *Hint:* What would a carpenter do in a similar situation?

27. Why do you think that most modern countries' economies are a mix of command and market types?

28. Can you think of ways that globalization has helped you economically? Can you think of ways that it has not?

Choice in a World of Scarcity 2

FIGURE 2.1 Choices and Tradeoffs In general, the higher the degree, the higher the salary, so why aren't more people pursuing higher degrees? The short answer: choices and tradeoffs. (Credit: modification of "College of DuPage Commencement 2018 107" by COD Newsroom/Flickr, CC BY 2.0)

CHAPTER OBJECTIVES

In this chapter, you will learn about:

- How Individuals Make Choices Based on Their Budget Constraint
- The Production Possibilities Frontier and Social Choices
- Confronting Objections to the Economic Approach

Introduction to Choice in a World of Scarcity

BRING IT HOME

Choices ... to What Degree?

Does your level of education impact earning? Let's look at some data from the Bureau of Labor Statistics (BLS). In 2020, among full-time wage and salary workers, median weekly earnings for those with a master's degree were $1,545. Multiply this average by 52 weeks, and you get average annual earnings of $80,340. Compare that to the

median weekly earnings for full-time workers aged 25 and over with just a bachelor's degree: $1,305 weekly and $67,860 a year. What about those with no higher than a high school diploma in 2020? They earn an average of just $781 weekly and $40,612 over 12 months. In other words, data from the BLS indicates that receiving a bachelor's degree boosts earnings by 67% over what workers would have earned if they only obtained a high school diploma, and a master's degree yields average earnings that are nearly double those of workers with a high school diploma.

Given these statistics, we might expect many people to choose to go to college and at least earn a bachelor's degree. Assuming that people want to improve their material well-being, it seems like they would make those choices that provide them with the greatest opportunity to consume goods and services. As it turns out, the analysis is not nearly as simple as this. In fact, in 2019, the BLS reported that while just over 90% of the population aged 25 and over in the United States had a high school diploma, only 36% of those aged 25 and over had a bachelor's or higher degree, and only 13.5% had earned a master's or higher degree.

This brings us to the subject of this chapter: why people make the choices they make and how economists explain those choices.

You will learn quickly when you examine the relationship between economics and scarcity that choices involve tradeoffs. Every choice has a cost.

In 1968, the Rolling Stones recorded "You Can't Always Get What You Want." Economists chuckled, because they had been singing a similar tune for decades. English economist Lionel Robbins (1898–1984), in his *Essay on the Nature and Significance of Economic Science* in 1932, described not always getting what you want in this way:

> The time at our disposal is limited. There are only twenty-four hours in the day. We have to choose between the different uses to which they may be put. ... Everywhere we turn, if we choose one thing we must relinquish others which, in different circumstances, we would wish not to have relinquished. Scarcity of means to satisfy given ends is an almost ubiquitous condition of human nature.

Because people live in a world of scarcity, they cannot have all the time, money, possessions, and experiences they wish. Neither can society.

This chapter will continue our discussion of scarcity and the economic way of thinking by first introducing three critical concepts: opportunity cost, marginal decision making, and diminishing returns. Later, it will consider whether the economic way of thinking accurately describes either how we *make* choices and how we *should* make them.

2.1 How Individuals Make Choices Based on Their Budget Constraint

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Calculate and graph budget constraints
- Explain opportunity sets and opportunity costs
- Evaluate the law of diminishing marginal utility
- Explain how marginal analysis and utility influence choices

Consider the typical consumer's budget problem. Consumers have a limited amount of income to spend on the things they need and want. Suppose Alphonso has $10 in spending money each week that he can allocate between bus tickets for getting to work and the burgers that he eats for lunch. Burgers cost $2 each, and bus tickets are 50 cents each. We can see Alphonso's budget problem in Figure 2.2.

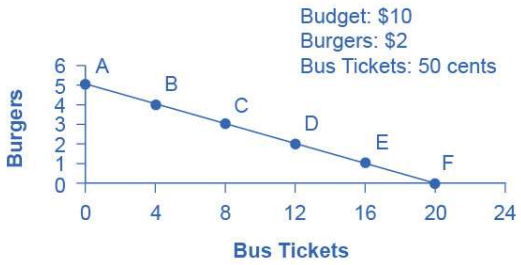

FIGURE 2.2 The Budget Constraint: Alphonso's Consumption Choice Opportunity Frontier Each point on the budget constraint represents a combination of burgers and bus tickets whose total cost adds up to Alphonso's budget of $10. The relative price of burgers and bus tickets determines the slope of the budget constraint. All along the budget set, giving up one burger means gaining four bus tickets.

The vertical axis in the figure shows burger purchases and the horizontal axis shows bus ticket purchases. If Alphonso spends all his money on burgers, he can afford five per week. ($10 per week/$2 per burger = 5 burgers per week.) However, if he does this, he will not be able to afford any bus tickets. Point A in the figure shows the choice (zero bus tickets and five burgers). Alternatively, if Alphonso spends all his money on bus tickets, he can afford 20 per week. ($10 per week/$0.50 per bus ticket = 20 bus tickets per week.) Then, however, he will not be able to afford any burgers. Point F shows this alternative choice (20 bus tickets and zero burgers).

If we connect all the points between A and F, we get Alphonso's **budget constraint**. This indicates all the combination of burgers and bus tickets Alphonso can afford, given the price of the two goods and his budget amount.

If Alphonso is like most people, he will choose some combination that includes both bus tickets and burgers. That is, he will choose some combination on the budget constraint that is between points A and F. Every point on (or inside) the constraint shows a combination of burgers and bus tickets that Alphonso can afford. Any point outside the constraint is not affordable, because it would cost more money than Alphonso has in his budget.

The budget constraint clearly shows the tradeoff Alphonso faces in choosing between burgers and bus tickets. Suppose he is currently at point D, where he can afford 12 bus tickets and two burgers. What would it cost Alphonso for one more burger? It would be natural to answer $2, but that's not the way economists think. Instead they ask, how many bus tickets would Alphonso have to give up to get one more burger, while staying within his budget? Since bus tickets cost 50 cents, Alphonso would have to give up four to afford one more burger. That is the true cost to Alphonso.

The Concept of Opportunity Cost

Economists use the term **opportunity cost** to indicate what people must give up to obtain what they desire. The idea behind opportunity cost is that the cost of one item is the lost opportunity to do or consume something else. In short, opportunity cost is the value of the next best alternative. For Alphonso, the opportunity cost of a burger is the four bus tickets he would have to give up. He would decide whether or not to choose the burger depending on whether the value of the burger exceeds the value of the forgone alternative—in this case, bus tickets. Since people must choose, they inevitably face tradeoffs in which they have to give up things they desire to obtain other things they desire more.

LINK IT UP

View this website (http://openstax.org/l/linestanding) for an example of opportunity cost—paying someone else to wait in line for you.

A fundamental principle of economics is that every choice has an opportunity cost. If you sleep through your economics class, the opportunity cost is the learning you miss from not attending class. If you spend your income on video games, you cannot spend it on movies. If you choose to marry one person, you give up the opportunity to marry anyone else. In short, opportunity cost is all around us and part of human existence.

The following Work It Out feature shows a step-by-step analysis of a budget constraint calculation. Read through it to understand another important concept—slope—that we further explain in the appendix The Use of Mathematics in Principles of Economics.

WORK IT OUT

Understanding Budget Constraints

Budget constraints are easy to understand if you apply a little math. The appendix The Use of Mathematics in Principles of Economics explains all the math you are likely to need in this book. Therefore, if math is not your strength, you might want to take a look at the appendix.

Step 1: The equation for any budget constraint is:

$$\text{Budget} = P_1 \times Q_1 + P_2 \times Q_2$$

where P and Q are the price and quantity of items purchased (which we assume here to be two items) and Budget is the amount of income one has to spend.

Step 2. Apply the budget constraint equation to the scenario. In Alphonso's case, this works out to be:

$$\text{Budget} = P_1 \times Q_1 + P_2 \times Q_2$$
$$\$10 \text{ budget} = \$2 \text{ per burger} \times \text{quantity of burgers} + \$0.50 \text{ per bus ticket} \times \text{quantity of bus tickets}$$
$$\$10 = \$2 \times Q_{\text{burgers}} + \$0.50 \times Q_{\text{bus tickets}}$$

Step 3. Using a little algebra, we can turn this into the familiar equation of a line:

$$y = b + mx$$

For Alphonso, this is:

$$\$10 = \$2 \times Q_{\text{burgers}} + \$0.50 \times Q_{\text{bus tickets}}$$

Step 4. Simplify the equation. Begin by multiplying both sides of the equation by 2:

$$2 \times 10 = 2 \times 2 \times Q_{\text{burgers}} + 2 \times 0.5 \times Q_{\text{bus tickets}}$$
$$20 = 4 \times Q_{\text{burgers}} + 1 \times Q_{\text{bus tickets}}$$

Step 5. Subtract one bus ticket from both sides:

$$20 - Q_{\text{bus tickets}} = 4 \times Q_{\text{burgers}}$$

Divide each side by 4 to yield the answer:

$$5 - 0.25 \times Q_{\text{bus tickets}} = Q_{\text{burgers}}$$

or

$$Q_{\text{burgers}} = 5 - 0.25 \times Q_{\text{bus tickets}}$$

Step 6. Notice that this equation fits the budget constraint in Figure 2.2. The vertical intercept is 5 and the slope is –0.25, just as the equation says. If you plug 20 bus tickets into the equation, you get 0 burgers. If you plug other numbers of bus tickets into the equation, you get the results (see Table 2.1), which are the points on Alphonso's budget constraint.

Point	Quantity of Burgers (at $2)	Quantity of Bus Tickets (at 50 cents)
A	5	0
B	4	4
C	3	8
D	2	12
E	1	16
F	0	20

TABLE 2.1

Step 7. Notice that the slope of a budget constraint always shows the opportunity cost of the good which is on the horizontal axis. For Alphonso, the slope is −0.25, indicating that for every bus ticket he buys, he must give up 1/4 burger. To phrase it differently, for every four tickets he buys, Alphonso must give up 1 burger.

There are two important observations here. First, the algebraic sign of the slope is negative, which means that the only way to get more of one good is to give up some of the other. Second, we define the slope as the price of bus tickets (whatever is on the horizontal axis in the graph) divided by the price of burgers (whatever is on the vertical axis), in this case $0.50/$2 = 0.25. If you want to determine the opportunity cost quickly, just divide the two prices.

Identifying Opportunity Cost

In many cases, it is reasonable to refer to the opportunity cost as the price. If your cousin buys a new bicycle for $300, then $300 measures the amount of "other consumption" that he has forsaken. For practical purposes, there may be no special need to identify the specific alternative product or products that he could have bought with that $300, but sometimes the price as measured in dollars may not accurately capture the true opportunity cost. This problem can loom especially large when costs of time are involved.

For example, consider a boss who decides that all employees will attend a two-day retreat to "build team spirit." The out-of-pocket monetary cost of the event may involve hiring an outside consulting firm to run the retreat, as well as room and board for all participants. However, an opportunity cost exists as well: during the two days of the retreat, none of the employees are doing any other work.

Attending college is another case where the opportunity cost exceeds the monetary cost. The out-of-pocket costs of attending college include tuition, books, room and board, and other expenses. However, in addition, during the hours that you are attending class and studying, it is impossible to work at a paying job. Thus, college imposes both an out-of-pocket cost and an opportunity cost of lost earnings.

CLEAR IT UP

What is the opportunity cost associated with increased airport security measures?

After the terrorist plane hijackings on September 11, 2001, many steps were proposed to improve air travel safety. For example, the federal government could provide armed "sky marshals" who would travel inconspicuously with the rest of the passengers. The cost of having a sky marshal on every flight would be roughly $3 billion per year.

Retrofitting all U.S. planes with reinforced cockpit doors to make it harder for terrorists to take over the plane would have a price tag of $450 million. Buying more sophisticated security equipment for airports, like three-dimensional baggage scanners and cameras linked to face recognition software, could cost another $2 billion.

However, the single biggest cost of greater airline security does not involve spending money. It is the opportunity cost of additional waiting time at the airport. According to the United States Department of Transportation (DOT), there were 895.5 million systemwide (domestic and international) scheduled service passengers in 2015. Since the 9/11 hijackings, security screening has become more intensive, and consequently, the procedure takes longer than in the past. Say that, on average, each air passenger spends an extra 30 minutes in the airport per trip. Economists commonly place a value on time to convert an opportunity cost in time into a monetary figure. Because many air travelers are relatively high-paid business people, conservative estimates set the average price of time for air travelers at $20 per hour. By these back-of-the-envelope calculations, the opportunity cost of delays in airports could be as much as 800 million × 0.5 hours × $20/hour, or $8 billion per year. Clearly, the opportunity costs of waiting time can be just as important as costs that involve direct spending.

In some cases, realizing the opportunity cost can alter behavior. Imagine, for example, that you spend $8 on lunch every day at work. You may know perfectly well that bringing a lunch from home would cost only $3 a day, so the opportunity cost of buying lunch at the restaurant is $5 each day (that is, the $8 buying lunch costs minus the $3 your lunch from home would cost). Five dollars each day does not seem to be that much. However, if you project what that adds up to in a year—250 days a year × $5 per day equals $1,250, the cost, perhaps, of a decent vacation. If you describe the opportunity cost as "a nice vacation" instead of "$5 a day," you might make different choices.

Marginal Decision-Making and Diminishing Marginal Utility

The budget constraint framework helps to emphasize that most choices in the real world are not about getting all of one thing or all of another; that is, they are not about choosing either the point at one end of the budget constraint or else the point all the way at the other end. Instead, most choices involve **marginal analysis**, which means examining the benefits and costs of choosing a little more or a little less of a good. People naturally compare costs and benefits, but often we look at total costs and total benefits, when the optimal choice necessitates comparing how costs and benefits change from one option to another. You might think of marginal analysis as "change analysis." Marginal analysis is used throughout economics.

We now turn to the notion of **utility**. People desire goods and services for the satisfaction or utility those goods and services provide. Utility, as we will see in the chapter on Consumer Choices (http://openstax.org/books/principles-economics-3e/pages/6-introduction-to-consumer-choices), is subjective but that does not make it less real. Economists typically assume that the more of some good one consumes (for example, slices of pizza), the more utility one obtains. At the same time, the utility a person receives from consuming the first unit of a good is typically more than the utility received from consuming the fifth or the tenth unit of that same good. When Alphonso chooses between burgers and bus tickets, for example, the first few bus rides that he chooses might provide him with a great deal of utility—perhaps they help him get to a job interview or a doctor's appointment. However, later bus rides might provide much less utility—they may only serve to kill time on a rainy day. Similarly, the first burger that Alphonso chooses to buy may be on a day when he missed breakfast and is ravenously hungry. However, if Alphonso has multiple burgers every day, the last few burgers may taste pretty boring. The general pattern that consumption of the first few units of any good tends to bring a higher level of utility to a person than consumption of later units is a common pattern. Economists refer to this pattern as the **law of diminishing marginal utility**, which means that as a person receives more of a good, the additional (or marginal) utility from each additional unit of the good declines. In other words, the first slice of pizza brings more satisfaction than the sixth.

The law of diminishing marginal utility explains why people and societies rarely make all-or-nothing choices. You would not say, "My favorite food is ice cream, so I will eat nothing but ice cream from now on." Instead,

even if you get a very high level of utility from your favorite food, if you ate it exclusively, the additional or marginal utility from those last few servings would not be very high. Similarly, most workers do not say: "I enjoy leisure, so I'll never work." Instead, workers recognize that even though some leisure is very nice, a combination of all leisure and no income is not so attractive. The budget constraint framework suggests that when people make choices in a world of scarcity, they will use marginal analysis and think about whether they would prefer a little more or a little less.

A rational consumer would only purchase additional units of some product as long as the marginal utility exceeds the opportunity cost. Suppose Alphonso moves down his budget constraint from Point A to Point B to Point C and further. As he consumes more bus tickets, the marginal utility of bus tickets will diminish, while the opportunity cost, that is, the marginal utility of foregone burgers, will increase. Eventually, the opportunity cost will exceed the marginal utility of an additional bus ticket. If Alphonso is rational, he won't purchase more bus tickets once the marginal utility just equals the opportunity cost. While we can't (yet) say exactly how many bus tickets Alphonso will buy, that number is unlikely to be the most he can afford, 20.

Sunk Costs

In the budget constraint framework, all decisions involve what will happen next: that is, what quantities of goods will you consume, how many hours will you work, or how much will you save. These decisions do not look back to past choices. Thus, the budget constraint framework assumes that **sunk costs**, which are costs that were incurred in the past and cannot be recovered, should not affect the current decision.

Consider the case of Selena, who pays $8 to see a movie, but after watching the film for 30 minutes, she knows that it is truly terrible. Should she stay and watch the rest of the movie because she paid for the ticket, or should she leave? The money she spent is a sunk cost, and unless the theater manager is sympathetic, Selena will not get a refund. However, staying in the movie still means paying an opportunity cost in time. Her choice is whether to spend the next 90 minutes suffering through a cinematic disaster or to do something—anything—else. The lesson of sunk costs is to forget about the money and time that is irretrievably gone and instead to focus on the marginal costs and benefits of current and future options.

For people and firms alike, dealing with sunk costs can be frustrating. It often means admitting an earlier error in judgment. Many firms, for example, find it hard to give up on a new product that is doing poorly because they spent so much money in creating and launching the product. However, the lesson of sunk costs is to ignore them and make decisions based on what will happen in the future.

From a Model with Two Goods to One of Many Goods

The budget constraint diagram containing just two goods, like most models used in this book, is not realistic. After all, in a modern economy people choose from thousands of goods. However, thinking about a model with many goods is a straightforward extension of what we discussed here. Instead of drawing just one budget constraint, showing the tradeoff between two goods, you can draw multiple budget constraints, showing the possible tradeoffs between many different pairs of goods. In more advanced classes in economics, you would use mathematical equations that include many possible goods and services that can be purchased, together with their quantities and prices, and show how the total spending on all goods and services is limited to the overall budget available. The graph with two goods that we presented here clearly illustrates that every choice has an opportunity cost, which is the point that does carry over to the real world.

2.2 The Production Possibilities Frontier and Social Choices

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Interpret production possibilities frontier graphs
- Contrast a budget constraint and a production possibilities frontier
- Explain the relationship between a production possibilities frontier and the law of diminishing returns
- Contrast productive efficiency and allocative efficiency
- Define comparative advantage

Just as individuals cannot have everything they want and must instead make choices, society as a whole cannot have everything it might want, either. This section of the chapter will explain the constraints society faces, using a model called the **production possibilities frontier (PPF)**. There are more similarities than differences between individual choice and social choice. As you read this section, focus on the similarities.

Because society has limited resources (e.g., labor, land, capital, raw materials) at any point in time, there is a limit to the quantities of goods and services it can produce. Suppose a society desires two products, healthcare and education. The production possibilities frontier in Figure 2.3 illustrates this situation.

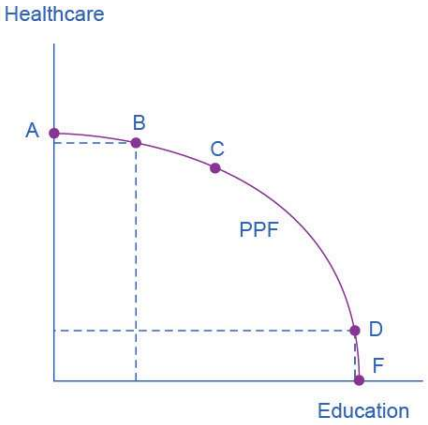

FIGURE 2.3 A Healthcare vs. Education Production Possibilities Frontier This production possibilities frontier shows a tradeoff between devoting social resources to healthcare and devoting them to education. At A all resources go to healthcare and at B, most go to healthcare. At D most resources go to education, and at F, all go to education.

Figure 2.3 shows healthcare on the vertical axis and education on the horizontal axis. If the society were to allocate all of its resources to healthcare, it could produce at point A. However, it would not have any resources to produce education. If it were to allocate all of its resources to education, it could produce at point F. Alternatively, the society could choose to produce any combination of healthcare and education on the production possibilities frontier. In effect, the production possibilities frontier plays the same role for society as the budget constraint plays for Alphonso. Society can choose any combination of the two goods on or inside the PPF. However, it does not have enough resources to produce outside the PPF.

Most importantly, the production possibilities frontier clearly shows the tradeoff between healthcare and education. Suppose society has chosen to operate at point B, and it is considering producing more education. Because the PPF is downward sloping from left to right, the only way society can obtain more education is by giving up some healthcare. That is the tradeoff society faces. Suppose it considers moving from point B to point C. What would the opportunity cost be for the additional education? The opportunity cost would be the healthcare society has to forgo. Just as with Alphonso's budget constraint, the **slope** of the production possibilities frontier shows the opportunity cost. By now you might be saying, "Hey, this PPF is sounding like the budget constraint." If so, read the following Clear It Up feature.

CLEAR IT UP

What's the difference between a budget constraint and a PPF?

There are two major differences between a budget constraint and a production possibilities frontier. The first is the fact that the budget constraint is a straight line. This is because its slope is given by the relative prices of the two goods, which from the point of view of an individual consumer, are fixed, so the slope doesn't change. In contrast, the PPF has a curved shape because of the law of the diminishing returns. Thus, the slope is different at various points on the PPF. The second major difference is the absence of specific numbers on the axes of the PPF. There are no specific numbers because we do not know the exact amount of resources this imaginary economy has, nor do we know how many resources it takes to produce healthcare and how many resources it takes to produce education. If this were a real world example, that data would be available.

Whether or not we have specific numbers, conceptually we can measure the opportunity cost of additional education as society moves from point B to point C on the PPF. We measure the additional education by the horizontal distance between B and C. The foregone healthcare is given by the vertical distance between B and C. The slope of the PPF between B and C is (approximately) the vertical distance (the "rise") over the horizontal distance (the "run"). This is the opportunity cost of the additional education.

The PPF and the Law of Increasing Opportunity Cost

The budget constraints that we presented earlier in this chapter, showing individual choices about what quantities of goods to consume, were all straight lines. The reason for these straight lines was that the relative prices of the two goods in the **consumption budget constraint** determined the slope of the budget constraint. However, we drew the production possibilities frontier for healthcare and education as a curved line. Why does the PPF have a different shape?

To understand why the PPF is curved, start by considering point A at the top left-hand side of the PPF. At point A, all available resources are devoted to healthcare and none are left for education. This situation would be extreme and even ridiculous. For example, children are seeing a doctor every day, whether they are sick or not, but not attending school. People are having cosmetic surgery on every part of their bodies, but no high school or college education exists. Now imagine that some of these resources are diverted from healthcare to education, so that the economy is at point B instead of point A. Diverting some resources away from A to B causes relatively little reduction in health because the last few marginal dollars going into healthcare services are not producing much additional gain in health. However, putting those marginal dollars into education, which is completely without resources at point A, can produce relatively large gains. For this reason, the shape of the PPF from A to B is relatively flat, representing a relatively small drop-off in health and a relatively large gain in education.

Now consider the other end, at the lower right, of the production possibilities frontier. Imagine that society starts at choice D, which is devoting nearly all resources to education and very few to healthcare, and moves to point F, which is devoting *all* spending to education and none to healthcare. For the sake of concreteness, you can imagine that in the movement from D to F, the last few doctors must become high school science teachers, the last few nurses must become school librarians rather than dispensers of vaccinations, and the last few emergency rooms are turned into kindergartens. The gains to education from adding these last few resources to education are very small. However, the opportunity cost lost to health will be fairly large, and thus the slope of the PPF between D and F is steep, showing a large drop in health for only a small gain in education.

The lesson is not that society is likely to make an extreme choice like devoting no resources to education at point A or no resources to health at point F. Instead, the lesson is that the gains from committing additional marginal resources to education depend on how much is already being spent. If on the one hand, very few resources are currently committed to education, then an increase in resources used for education can bring

relatively large gains. On the other hand, if a large number of resources are already committed to education, then committing additional resources will bring relatively smaller gains.

This pattern is common enough that economists have given it a name: **the law of increasing opportunity cost**, which holds that as production of a good or service increases, the marginal opportunity cost of producing it increases as well. This happens because some resources are better suited for producing certain goods and services instead of others. When government spends a certain amount more on reducing crime, for example, the original increase in opportunity cost of reducing crime could be relatively small. However, additional increases typically cause relatively larger increases in the opportunity cost of reducing crime, and paying for enough police and security to reduce crime to nothing at all would be a tremendously high opportunity cost.

The curvature of the production possibilities frontier shows that as we add more resources to education, moving from left to right along the horizontal axis, the original increase in opportunity cost is fairly small, but gradually increases. Thus, the slope of the PPF is relatively flat near the vertical-axis intercept. Conversely, as we add more resources to healthcare, moving from bottom to top on the vertical axis, the original declines in opportunity cost are fairly large, but again gradually diminish. Thus, the slope of the PPF is relatively steep near the horizontal-axis intercept. In this way, the law of increasing opportunity cost produces the outward-bending shape of the production possibilities frontier.

Productive Efficiency and Allocative Efficiency

The study of economics does not presume to tell a society what choice it should make along its production possibilities frontier. In a market-oriented economy with a democratic government, the choice will involve a mixture of decisions by individuals, firms, and government. However, economics can point out that some choices are unambiguously better than others. This observation is based on the concept of efficiency. In everyday usage, efficiency refers to lack of waste. An inefficient machine operates at high cost, while an efficient machine operates at lower cost, because it is not wasting energy or materials. An inefficient organization operates with long delays and high costs, while an efficient organization meets schedules, is focused, and performs within budget.

The production possibilities frontier can illustrate two kinds of efficiency: productive efficiency and allocative efficiency. Figure 2.4 illustrates these ideas using a production possibilities frontier between healthcare and education.

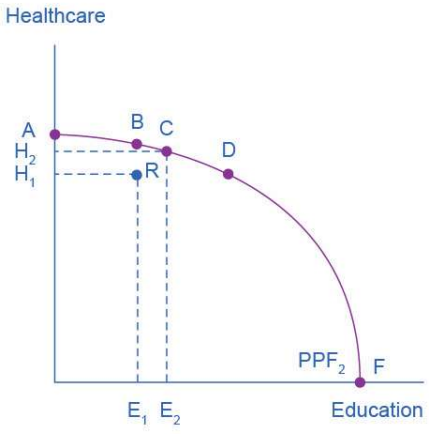

FIGURE 2.4 Productive and Allocative Efficiency Productive efficiency means it is impossible to produce more of one good without decreasing the quantity that is produced of another good. Thus, all choices along a given PPF like B, C, and D display productive efficiency, but R does not. Allocative efficiency means that the particular mix of goods being produced—that is, the specific choice along the production possibilities frontier—represents the allocation that society most desires.