AP® EDITION

economics

22nd edition

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AP EDITION

economics

22nd edition

Campbell R. McConnell
University of Nebraska

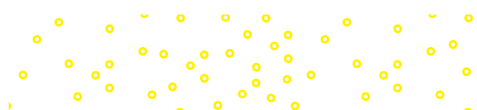## Stanley L. Brue
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BRIEF CONTENTS

CAMPBELL R. MCCONNELL earned his Ph.D. at the University of Iowa after receiving degrees from Cornell College and the University of Illinois. He taught at the University of Nebraska–Lincoln from 1953 until his retirement in 1990. He was also coauthor of *Contemporary Labor Economics* and *Essentials of Economics*. He was a recipient of both the University of Nebraska Distinguished Teaching Award and the James A. Lake Academic Freedom Award and served as president of the Midwest Economics Association. Professor McConnell was awarded an honorary Doctor of Laws degree from Cornell College in 1973 and received its Distinguished Achievement Award in 1994. He was also a jazz expert and aficionado until his passing in 2019.

Campbell R. McConnell

STANLEY L. BRUE did his undergraduate work at Augustana College (South Dakota) and received its Distinguished Achievement Award in 1991. He received his Ph.D. from the University of Nebraska–Lincoln. He is retired from a long career at Pacific Lutheran University, where he was honored as a recipient of the Burlington Northern Faculty Achievement Award. Professor Brue has also received the national Leavey Award for excellence in economics education. He has served as national president and chair of the Board of Trustees of Omicron Delta Epsilon International Economics Honorary. He is coauthor of *Economic Scenes,* fifth edition (Prentice-Hall); *Contemporary Labor Economics,* eleventh edition; *Essentials of Economics,* third edition; and *The Evolution of Economic Thought,* eighth edition (Cengage Learning). For relaxation, he enjoys international travel, attending sporting events, and going on fishing trips.

Stanley L. Brue

SEAN M. FLYNN did his undergraduate work at the University of Southern California before completing his Ph.D. at U.C. Berkeley, where he served as the Head Graduate Student Instructor for the Department of Economics after receiving the Outstanding Graduate Student Instructor Award. He teaches at Scripps College (of the Claremont Colleges) and is the author of *Economics for Dummies,* third edition (Wiley); *Essentials of Economics,* third edition; and *The Cure That Works: How to Have the World's Best Healthcare—at a Quarter of the Price* (Regnery). His research interests include behavioral finance, behavioral economics, and health care economics. An accomplished martial artist, Sean has coached five of his students to national championships and is the author of *Understanding Shodokan Aikido.* Other hobbies include running, traveling, and cooking.

Sean M. Flynn

To Mem, Terri and Craig, and Rupali

For your ease of use, we have color-coded our AP Edition.

Microeconomics chapters are indicated in green.

Macroeconomics chapters are indicated in blue.

Chapters that cover **both** content are indicated with combined green and blue.

economics

22nd edition

McCONNELL | BRUE | FLYNN

Welcome to the 22nd edition of *Economics*, America's most innovative—and popular—economics textbook. This AP® Edition continues to be a market leader, preparing thousands of students each year for the AP Microeconomics and AP Macroeconomics Exams.

McConnell's *Economics* has maintained its position as the world's best-selling economics textbook for nearly fifty years by continually updating its coverage and its pedagogy. From real-life examples to cutting-edge learning resources, *Economics* offers a student-centered learning experience that presents the subject matter in new and engaging ways.

Fundamental Objectives

We have three main goals for *Economics* AP® Edition:

- Help the AP student master the principles essential for understanding the economizing problem, specific economic issues, and policy alternatives.
- Help the AP student understand and apply the economic perspective, and reason accurately and objectively about economic matters.
- Promote a lasting student interest in economics and the economy and support their success in the AP course and on the Exam.

Clear Organization

We have made it simple for teachers and students to find the course content they are looking for:

1. **Microeconomics** chapters are indicated by the green bar.

2. **Macroeconomics** chapters are indicated by the blue bar.

3. Chapters that cover **both** microeconomics and macroeconomics are indicated by the gradient bar.

4. Each chapter has an **AP-specific introduction** to help teachers and students focus on the most important content for AP study.

PART 1

TongRo Image Stock/Alamy Stock Photo

CHAPTER 1

Limits, Alternatives, and Choices

>> LEARNING OBJECTIVES

LO1.1 Define economics and the features of the economic perspective.

LO1.2 Describe the role of economic theory in economics.

LO1.3 Distinguish microeconomics from macroeconomics and positive economics from normative economics.

LO1.4 Explain the individual's economizing problem and illustrate trade-offs, opportunity costs, and attainable combinations with budget lines.

LO1.5 List the categories of scarce resources and explain society's economizing problem.

LO1.6 Apply production possibilities analysis.

LO1.7 Explain how economic growth and international trade increase consumption possibilities.

LO1.8 (Appendix) Understand graphs, curves, and slopes as they relate to economics.

AP CHAPTER FOCUS

(Review understanding graphs in this chapter's appendix.) People's wants are numerous and varied. At a basic level, people need air, water, food, clothing, and shelter. In modern society, however, people also want goods and services that help provide a more comfortable standard of living.

Fortunately, we possess resources like labor, tools, and land to help us produce the goods and services that people want. The blunt reality, however, is that our aggregate economic wants far exceed the productive capacity of our resources. As a result, we are forced to make choices about the goods to produce and the inputs to use. This unyielding reality underlies the fundamentals in **economics.** The essential question is how do and should individuals, institutions, and society make optimal (best) choices under conditions of scarcity.

The study of economics, then, uses the scientific method and mathematical modeling as decision-making tools to help in developing economic policies toward the goal of making critical economic decisions, such as which goods to produce (and in which quantities), and how to produce those goods (which inputs to use).

economics The social science concerned with how individuals, institutions, and society make optimal (best) choices under conditions of scarcity.

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PART 3

CHAPTER 6

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For other products—for example, toothpaste—consumers pay much less attention to price changes. Substantial price changes cause only small changes in the amount purchased. The demand for such products is *relatively inelastic* or simply *inelastic.*

The Price-Elasticity Coefficient and Formula

Economists measure the degree to which demand is price elastic or inelastic with the coefficient E_d, defined as

$$E_d = \frac{\text{percentage change in quantity demanded of product X}}{\text{percentage change in price of product X}}$$

>> **LO6.1** Explain and calculate price elasticity of demand.

price elasticity of demand The ratio of the percentage change in quantity demanded of a product or resource to the percentage change in its price; a measure of the responsiveness of buyers to a change in the price of a product or resource.

117

PART 7

CHAPTER 20

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To understand how economies operate and how to improve their performance, economists collect and analyze economic data, including the amount of new construction taking place each month, how many ships laden with cargo arrive at U.S. ports each year, and how many new inventions have been patented in the last few weeks. That said, macroeconomists tend to focus on three key statistics when assessing an economy's health and development.

Real GDP

Real GDP, or **real gross domestic product,** measures the value of the final goods and services produced within a country's borders during a specific period of time, typically a year. This statistic is

>> **LO20.1** Explain why economists use GDP, inflation, and unemployment to assess the economy's health.

business cycle Recurring increases and decreases in the level of economic activity over periods of years; consists of peak, recession, trough, and expansion phases.

389

Comprehensive Explanations at an Appropriate Level

Economics is comprehensive, analytical, and challenging yet fully accessible to a wide range of students. The narrative's thoroughness and accessibility enable teachers to select topics for special classroom emphasis with confidence that students can read and comprehend other independently assigned material in the book.

AP ..ıl KEY GRAPH

FIGURE 4.5 Negative and positive externalities.

(a) With negative externalities borne by society, the producers' supply curve S is to the right of (below) the total-cost supply curve S_t. Consequently, the equilibrium output Q_e is greater than the optimal output Q_o, and the efficiency loss is *abc*. (b) When positive externalities accrue to society, the market demand curve D is to the left of (below) the total-benefit demand curve D_t. As a result, the equilibrium output Q_e is less than the optimal output Q_o and the efficiency loss is *xyz*.

(a) Negative externalities
(b) Positive externalities

◀ **Detailed Graphs** The most important figures and tables for AP students are clearly marked. Key Graphs have self-contained Quick Quizzes to help students comprehend and apply crucial models.
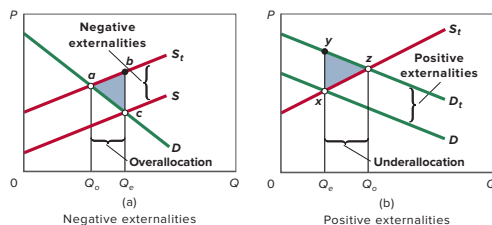
QUICK QUIZ FOR FIGURE 4.5

1. In Figure 4.5a, the supply curve S_t lies to the left of (above) supply curve S because:
   a. marginal costs are rising faster for S_t than S.
   b. S reflects more efficient, lower-cost production methods.
   c. only S_t reflects the costs that fall on people other than buyers and sellers.
   d. only S_t reflects the law of increasing opportunity costs.

2. In Figure 4.5a, the market equilibrium will be located at:
   a. point a.
   b. point b.
   c. point c.
   d. Q_o.

3. In Figure 4.5b, there is an underallocation of resources to the production of this product because:
   a. low prices are depressing the quantity demanded.
   b. the vertical distance from point x to point y fails to reflect net benefits.
   c. demand curve D_t externalizes consumers' opportunity costs.
   d. equilibrium reflects the absence from the market of the consumers who benefit from this product without having to pay for it.

4. In Figure 4.5b, the market equilibrium price will be:
   a. less than the price at point x.

▼ **AP Quick Reviews** help students revisit the most important AP economic content. Concepts are reexamined in a clear and concise manner. AP Quick Reviews are ideal study tools for chapter quizzes and tests and the AP Exam.

▶ Demand is a schedule or curve showing the quantity of a product that buyers are willing and able to buy. The demand curve shows the quantity demanded by consumers at each price per unit.

▶ The law of demand states that, other things equal, the quantity of a good purchased varies inversely with its price. At lower prices, more is purchased; at higher prices, less is purchased.

▶ The demand curve shifts because of changes in (a) consumer tastes, (b) the number of buyers in the market, (c) consumer income, (d) the prices of substitute or complementary goods, (e) consumer expectations, and (f) tastes.

▶ A change in demand is a shift of the entire demand curve. A change in quantity demanded is a movement from one point to another point *along* the demand curve, as the unit price changes.

AP QUICK REVIEW
3.1

AP Review Questions

1. Which of the following help to explain why the aggregate demand curve slopes downward? **LO26.1**
   a. When the domestic price level rises, our goods and services become more expensive to foreigners.
   b. When government spending rises, the price level falls.
   c. There is an inverse relationship between consumer expectations and personal taxes.
   d. When the price level rises, the real value of financial assets (like stocks, bonds, and savings account balances) declines.
   e. An increase in the price level will decrease the demand for money, reduce interest rates, and increase consumption and investment spending.

2. Which of the following will shift the aggregate demand curve to the left? **LO26.2**
   a. The government reduces personal income taxes.
   b. Interest rates rise.
   c. The government raises corporate profit taxes.
   d. There is an economic boom overseas that raises the incomes of foreign households.
   e. Consumers take on more debt to increase spending for many goods and services across the economy.

3. Label each of the following descriptions as being either an immediate-short-run aggregate supply curve, a short-run aggregate supply curve, or a long-run aggregate supply curve. **LO26.3**
   a. A vertical line at full employment real GDP.
   b. The price level is fixed.
   c. Output prices are flexible, but input prices are fixed.
   d. A horizontal line.
   e. An upsloping curve.
   f. Output is fixed with unemployment equaling the natural rate of unemployment.

4. Which of the following will shift the aggregate supply curve to the right? **LO26.4**
   a. A new networking technology increases productivity all over the economy.
   b. The price of oil rises substantially.
   c. Business taxes fall.
   d. The government passes a law doubling all manufacturing wages.
   e. New regulations from the EPA mean higher costs of production.

5. True or False: Decreases in AD always lead to decreases in both output and the price level. **LO26.6**

6. Assume that (*a*) the price level is flexible upward but not downward and (*b*) the economy is currently operating at full-employment. Other things equal, how will each of the following affect the equilibrium price level and equilibrium level of real output in the short run? **LO26.6**
   a. An increase in aggregate demand.
   b. A decrease in short-run aggregate supply, with no change in aggregate demand.
   c. Equal increases in aggregate demand and short-run aggregate supply.
   d. A decrease in aggregate demand.
   e. An increase in aggregate demand that exceeds an increase in aggregate supply.

7. True or False: If the price of oil suddenly increases by a large amount, AS will shift left (or decrease), real GDP will fall, but the price level will not rise thanks to price inflexibility. **LO26.6**

8. For each of the following changes, explain what should happen to real GDP and the price level in the short run (increase, decrease, indeterminate change, no change). Graphically show each of the following, as independent events: **LO26.5**
   a. With the economy at full employment, there is an increase in transfer payments.
   b. With the economy below full employment, there is an increase in the minimum wage.
   c. With the economy below full employment, there is an increase in the population's desire to import goods from foreign nations.
   d. With economy above full employment, there is an increase in the nominal interest rate.
   e. With the economy at full employment there is an equal increase in both government expenditures and in taxes.
   f. With the economy below full employment there is an increase in government expenditure and a decrease in a key input price, like oil.
   g. With the economy below full employment there is an increase in the nominal interest rate and an increase in foreign demand for the exports of this country.

◀ **AP Review Questions** at the end of each chapter, and the **AP Microeconomics Practice Exam** and **AP Macroeconomics Practice Exam** at the end of the textbook, provide additional practice for students to answer AP-style multiple choice and free-response questions.

Examples and Illustrations that Resonate with Students

Students absorb economic theory most easily when it directly relates to their experiences and is exemplified with current examples. To that end, the 22nd edition covers many topics and events that have been at the forefront of the news. Topics include soaring tuition costs and congestion pricing. The 22nd edition also features **Consider This..., Last Word**, and **Global Perspective** features that drive home key ideas in an accessible, student-friendly manner. Topics include "Bitcoin and Cheap Electrons," "Hasta La Vista, Venezuela," and "Visible Pollution, Hidden Costs."

CONSIDER THIS . . .

Did Zuckerberg, Seacrest, and Grande Make Bad Choices?

Opportunity costs come into play in decisions well beyond simple buying decisions. Consider the different choices people make with respect to college. The average salaries earned by college graduates are nearly twice as high as those earned by persons with just high school diplomas. For most capable students, "Go to college, stay in college, and earn a degree" is very sound advice.

Yet Facebook founder Mark Zuckerberg and media personality Ryan Seacrest both dropped out of college, while pop singer Ariana Grande never even bothered to start classes. What were they thinking? Unlike most students, Zuckerberg faced enormous opportunity

S Bukley/Shutterstock

costs for staying in college. He had a vision for his company, and dropping out helped to ensure Facebook's success. Similarly, Seacrest landed a professional DJ job at his local radio station when he was in high school before moving to Hollywood and eventually becoming America's top radio and TV personality. Finishing his college degree might have interrupted the string of successes that made his career possible. And Grande knew that staying on top in the world of pop takes unceasing work. So after her first album became a massive hit, it made sense for her to skip college in order to relentlessly pursue continuing success.

So Zuckerberg, Seacrest, and Grande understood opportunity costs and made their choices accordingly. The size of opportunity costs matters greatly in making individual decisions.

LAST WORD

Hasta La Vista, Venezuela

Venezuela, Once Prosperous, Now Starves. What Terminated Its Economy?

How can a modern, industrialized, technologically sophisticated nation in possession of the world's largest oil reserves end up collapsing its economy so badly that there are no medicines in hospitals, sanitary essentials like diapers and toilet paper are unavailable, gasoline has to be rationed, electricity and water run only intermittently, and food is so scarce that its citizens lost an average of 24 pounds of body weight in 2017?

The answer is that 90 percent of Venezuelans now live in poverty because the government of Venezuela has blunderingly enacted an incompetent series of economic policies that have bankrupted or destroyed businesses throughout the country.

The problems began with the election of President Hugo Chavez in 1998. He was elected on a promise to alleviate poverty and ensure that everyone in Venezuela had a chance to participate in the country's prosperity, which included supersonic Concord flights to Paris, South America's best arts and entertainment scene, and a highly profitable oil industry that brought massive tax revenues to the government.

Several of Chavez's initial policy efforts were beneficial, including mass literacy programs, the construction of rural health clinics, and an attempt to build tens of thousands of new housing units for the poor. Unfortunately, Chavez's early anti-poverty programs were just the start of a comprehensive campaign to totally transform Venezuela's

Román Camacho/SOPA Images/LightRocket/Getty Images

economy. Double the money supply and prices will double; triple the money supply and prices will triple; and so on.

Venezuela's inflation rate skyrocketed from 25 percent per year in 2012 to 2,600 percent per year in 2017. But oil production continued to fall and the government's deficit situation grew worse.

Maduro's solution? *Print even faster!* The result? *Inflation accelerated to 1.3 million percent per year in 2018.*

GLOBAL PERSPECTIVE 13.2

THE WORLD'S TOP 10 BRAND NAMES, 2019

Here are the world's top 10 brands, based on four criteria: the brand's market share within its category, the brand's worldwide appeal across age groups and nationalities, the loyalty of customers to the brand, and the ability of the brand to "stretch" to products beyond the original product.

World's Top 10 Brands

- Apple
- Google
- Amazon
- Microsoft
- Coca-Cola
- Samsung
- Toyota
- Mercedes-Benz
- McDonald's
- Disney

Source: "Best Global Brands 2019: Iconic Moves," Interbrand, 2019.

Fundamentals of the Market System Many economies throughout the world are still making difficult transitions to markets while a handful of other countries, such as Venezuela, seem to be trying to reestablish government-controlled, centrally planned economies. Our detailed description of the institutions and operation of the market system in Chapter 2 (The Market System and the Circular Flow) is therefore even more relevant than ever. We pay particular attention to property rights, entrepreneurship, freedom of enterprise and choice, competition, and the role of profits.

Stress on the Theory of the Firm We have given much attention to microeconomics in general and to the theory of the firm in particular, for two reasons. First, the concepts of microeconomics are difficult for most students new to economics; abbreviated expositions usually compound these difficulties by raising more questions than they answer. Second, we wanted to couple analysis of the various market structures with a discussion of the impact of each market arrangement on price, output levels, resource allocation, and the rate of technological advance.

Early and Extensive Treatment of Government The public sector is an integral component of modern capitalism. This book introduces the role of government early. The financial crisis and the subsequent slow recovery increased both student and teacher demand for explaining directly and intuitively why markets and governments fail in delivering optimal social outcomes. To satisfy that demand, our presentation of market failures, government failure, and public choice theory has been significantly restructured in Chapters 4 and 5 to allow students to quickly absorb the key lessons regarding externalities, public goods provision, voting paradoxes, the special interest effect, and other problems that hinder either markets or governments from achieving optimal social outcomes. And Chapter 17 (Public Finance: Expenditures and Taxes) examines taxation and government expenditures in detail. Both the micro and the macro sections of the text include issue- and policy-oriented chapters.

Emphasis on Economic Growth This edition continues to emphasize economic growth. Chapter 1 (Limits, Alternatives, and Choices) uses the production possibilities curve to show the basic ingredients of growth. Chapter 22 (Economic Growth) explains how growth is measured and presents the facts of growth. It also discusses the causes of growth, looks at productivity growth, and addresses some controversies surrounding economic growth.

Monetary policy is challenging for students, so we've completely revised our presentation to focus on the "**dual mandate**" of low inflation and high employment that Congress gave the Federal Reserve. As it turns out, those goals are often contradictory. Chapter 30 explains this in a visual and intuitive way by incorporating the Fed's innovative new "bullseye chart" that allows students to see what the Fed is trying to do and how difficult it can be to achieve it. The new presentation also helps students understand why inflationary expectations matter so much as the Fed navigates between expansionary and contractionary monetary policy.

Extensive Treatment of International Economics We give the principles and institutions of the global economy extensive treatment. Chapter 34 (International Trade) examines key facts of international trade, specialization and comparative advantage, arguments for protectionism, impacts of tariffs and subsidies, and various trade agreements. Chapter 35 (The Balance of Payments, Exchange Rates, and Trade Deficits) discusses the balance of payments, fixed and floating exchange rates, and U.S. trade deficits. International competition, trade flows, and financial flows are integrated throughout the micro and macro sections. "Global Perspective" boxes add to the international flavor of the book.

Organizational Alternatives

Although teachers generally agree on the content of principles of economics courses, they sometimes differ on how to arrange the material. *Economics* includes 11 parts, and thus provides considerable organizational flexibility. We place microeconomics before macroeconomics because this ordering is consistent with how contemporary economists view the direction of linkage between the two components. The introductory material in Parts 1 and 2, however, can be followed immediately by the macro analysis of Parts 7 and 8.

Some teachers will prefer to intersperse the microeconomics of Parts 4 and 5 with the issues chapters of Part 6. Chapter 34 is constructed so that teachers who want to cover international trade in the Microeconomics course can assign it immediately after Chapter 3. Chapter 34 requires only a good understanding of production possibilities analysis and supply and demand analysis to comprehend.

Step-by-Step, Two-Path Macro As in the previous edition, our macro content continues to be distinguished by a systematic step-by-step approach to developing ideas and building models. Explicit assumptions about price and wage stickiness are posited and then systematically peeled away, yielding new models and extensions, all in the broader context of growth, expectations, shocks, and degrees of price and wage stickiness over time. In crafting this step-by-step macro approach, we took care to preserve the "two-path

macro" that many teachers appreciated. Teachers who want to bypass the immediate short-run model (Chapter 25: The Aggregate Expenditures Model) can proceed without loss of continuity directly to the short-run AD-AS model (Chapter 26: Aggregate Demand and Aggregate Supply), fiscal policy, money and banking, monetary policy, and the long-run AD-AS analysis.

Chapter-By-Chapter Changes

Each chapter of *Economics*, 22nd edition, contains data updates, revised Learning Objectives, and new examples. Chapter-specific updates include new features, additional Quick Reviews, and, where appropriate, substantial revisions to the core content.

Chapter 1 Limits, Alternatives, and Choices features a new Last Word about "The Marginal Starbucks," a new Global Perspective comparing investment levels in selected countries, and a new Consider This titled, "Is Facebook Free?".

Chapter 2 The Market System and the Circular Flow contains three new Consider This features—on Bitcoin mining, the Korean peninsula at night, and flood insurance subsidies—as well as a new Last Word about the economic collapse of Venezuela.

Chapter 3 Demand, Supply, and Market Equilibrium includes a new Consider This on market equilibrium as well as a new Global Perspective on the price of a loaf of bread in various countries.

Chapter 4 Market Failures Caused by Externalities and Asymmetric Information is a new chapter that features substantial new content, including a Consider This on congestion pricing, a Global Perspective on pollution abatement, a Key Graph on externalities, and a Last Word on how markets for pollution credits overcome information asymmetries between polluting firms and the government.

Chapter 5 Public Goods, Public Choice, and Government Failure is another new chapter that also features substantial new content, including innovative material on quadratic voting and a Last Word discussing the ineffectiveness of corporate relocation subsidies.

Chapter 6 Elasticity contains a new Consider This on "The Southwest Effect" as well as revised examples, wording improvements, and two new Global Perspectives—the first giving cross-price elasticities between food prices and education spending in various countries, and the second reporting on the income elasticities of the demand for gasoline in selected countries.

Chapter 7 Utility Maximization contains several new examples as well as revisions of existing material for clarity and concision.

Chapter 8 Businesses and the Costs of Production includes a new Global Perspective on international differences in manufacturing costs as well as substantial rewrites for clarity in the opening section on economic costs.

Chapter 9 Pure Competition in the Short Run features new examples plus a new Last Word on the damage that results when corrupt politicians divert fixed-cost depreciation funds into their own pockets.

Chapter 10 Pure Competition in the Long Run contains updated examples as well as a new Last Word discussing whether entrepreneur Elon Musk's profits (at SpaceX, Tesla, etc.) are defensible in the long run.

Chapter 11 Pure Monopoly has a new Consider This about France's long history of government salt monopolies as well as two new Key Graphs on, respectively, the inefficiency of pure monopoly and the different strategies for rate regulation.

Chapter 12 Monopolistic Competition contains new examples, edits for brevity, and a new Global Perspective on restaurants per 100,000 residents in various cities around the world.

Chapter 13 Oligopoly and Strategic Behavior has a more intuitive introduction to the Prisoner's Dilemma, as well as a significantly streamlined presentation made possible by, among other things, the removal of the much praised but rarely assigned material on sequential games.

Chapter 14 The Demand for Resources features a new Global Perspective on the top ten oil importing nations, as well as revised examples and edits for brevity and clarity.

Chapter 15 Wage Determination has a new Quick Review as well as student-friendly rewrites utilizing bullet points and additional section headers.

Chapter 16 Rent, Interest, and Profit incorporates wording improvements, data updates, and a greater focus on core content, made possible by consolidating or discarding the previous edition's coverage of the single tax on land and usury laws.

Chapter 17 Public Finance: Expenditures and Taxes benefits from consolidations and revisions that enhance brevity and clarity as well as a new Key Graph on the deadweight losses caused by excise taxes.

Chapter 18 Antitrust Policy and Regulation features a new Global Perspective on the annual number of corporate mergers taking place in selected countries as well as extensive updates to the chapter's examples of court cases and regulatory actions.

Chapter 19 **Income Inequality, Poverty, and Discrimination** presents a new Last Word on the debate over universal basic income as well clarifying revisions to our discussion of the Lorenz curve and the Gini ratio, including a new Key Graph and Quick Quiz that tests students on their understanding of those concepts.

Chapter 20 **An Introduction to Macroeconomics** has a new Last Word on the behavioral economics of sticky prices as well as a new Key Graph on the effects of demand shocks under fixed and flexible prices.

Chapter 21 **Measuring Domestic Output and National Income** benefits from extensive data updates, a heavily revised introductory section on GDP accounting, and a new Last Word on the difficulties the digital economy has created for national income and product accounting. We also summarize the recent accounting revisions under which the Bureau of Economic Analysis defines private domestic investment to include expenditures on R&D and money spent on the creation of new works of art, music, writing, film, and software.

Chapter 22 **Economic Growth** contains extensive data updates, a more intuitive explanation of network effects, a more concise discussion of catch-up growth, and a new Last Word on the growth-boosting effects of the surges in female labor force participation and educational attainment that have taken place over the last few decades.

Chapter 23 **Business Cycles, Unemployment, and Inflation** benefits from a streamlined presentation, several data updates, a more intuitive presentation of Okun's Law, and a new Last Word on the shortage of skilled workers ten years after the Great Recession ended.

Chapter 24 **Basic Macroeconomic Relationships** features data updates, a new Key Graph on the multiplier process, and a streamlined presentation.

Chapter 25 **The Aggregate Expenditures Model** contains a handful of data updates but is otherwise unchanged save for an additional Quick Review and some minor wording improvements.

Chapter 26 **Aggregate Demand and Aggregate Supply** contains a new Global Perspective on the size of various countries' GDP gaps, a new Key Graph on the effect of a negative demand shock when the price level is inflexible, and a decrease in page count thanks to the elimination of the section on downward price rigidity (which was made redundant by the new Last Word on the behavioral economics of sticky prices).

Chapter 27 **Fiscal Policy, Deficits, and Debt** incorporates several data updates, an additional Quick Review, a new Key Graph on expansionary fiscal policy when the price level is downwardly inflexible, and new information and graph about the crowding out of loanable funds.

Chapter 28 **Money, Banking, and Financial Institutions** is significantly more concise thanks to a shortened discussion of securitization, a streamlined history of the financial crisis, and the elimination of the section on the structure of the post-crisis financial services industry.

Chapter 29 **Money Creation** includes a shorter and more intuitive discussion of the monetary multiplier as well as a new Global Perspective on required reserve ratios and a new discussion on the monetary base.

Chapter 30 **Interest Rates and Monetary Policy** features a more intuitive explanation of repos and reverse repos plus a totally new presentation of monetary policy that utilizes the Chicago Fed's "bullseye chart" to explain the Fed's dual mandate, the usefulness and design of monetary policy rules, and why the Fed should be concerned about its management of inflationary expectations.

Chapter 31 **Financial Economics** contains several new examples, updated data, and edits throughout for simplicity and clarity.

Chapter 32 **Extending the Analysis of Aggregate Supply** delivers a streamlined presentation of supply-side economics as well as significant edits for clarity and concision, especially with regard to the analytical transition from the short-run Phillips Curve to the long-run Phillips Curve.

Chapter 33 **Current Issues in Macro Theory and Policy** includes a clarified explanation of the monetarist view, a heavy rewrite of the rational expectations section, and a new Global Perspective that reports on the target rates of inflation set by various national and regional central banks.

Chapter 34 **International Trade** contains extensive data updates, a streamlined presentation of the arguments in favor of protectionism, a new Key Graph on the economic effects of tariffs and import quotas, and an updated and consolidated discussion of multilateral trade pacts, including the USMCA revisions to NAFTA.

Chapter 35 **The Balance of Payments, Exchange Rates, and Trade Deficits** offers significantly streamlined coverage of fixed exchange rates, extensive data updates, and various edits for concision and clarity.

Teacher Manual

economics
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The new **AP Teacher Manual** for *Economics* 22nd Edition was written by an AP teacher and designed to provide tips, strategies, and lesson ideas to help create an engaging, effective, college-level economics experience that prepares students for success on the AP Exams. The *Teacher Manual* includes an **overview** of the course and AP Exams; **sample syllabi** for both AP Microeconomics and AP Macroeconomics courses based on semester-long, stand-alone classes; and a **guide** that explains how the textbook content correlates to the College Board AP Course and Exam Descriptions.

The *Teacher Manual* is organized by chapter, starting with the foundational economics concepts addressed in both courses. Microeconomics content is next, followed by Macroeconomics content. In each chapter, teachers will find a **pacing guide**, an **analysis** of how the chapter material corresponds to Units 1-6 in the AP Course and Exam Description(s), teaching strategies, and tips to address the stumbling blocks—concepts typically most challenging for AP Economics students.

The **Teaching Strategies** highlight **critical vocabulary** in each chapter, drawing attention to difficult terms, such as *consumer surplus* (which can be confused with a *surplus* of goods), as well as synonyms, such as *efficiency loss* and *deadweight loss*, and words whose economic definitions differ from their everyday use, such as *labor* and *utility*. The Teaching Strategies provide specific examples to use in the classroom, and also call out **key graphs** introduced in each chapter and what students should know and be able to do to demonstrate mastery of each graph on the AP Exams. The **Stumbling Blocks** sections distill years of teachers' experiences with the course, identifying the trickiest concepts and applications for students, such as confusing elasticity with slope (in Microeconomics) or confusing intermediate goods with capital goods (in Macroeconomics). Each chapter includes observations about what content typically appears on the **AP Exams** and what (if any) content can be skipped or postponed until after the test date in May. Each chapter concludes with answers to the questions in the Student Edition.

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Economics **is enriched with resources, including videos illustrating concepts and processes, interactivities, discussion ideas, and adaptive learning tools that provide students with an opportunity to contextualize and apply their understanding.**

Authored by the world's leading subject matter experts and organized by part and chapter levels, the resources provide students with multiple opportunities to contextualize and apply their understanding. Teachers can save time, customize lessons, monitor student progress, and make data-driven decisions in the classroom with the flexible, easy-to-navigate instructional tools.

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Resources are organized at the part and chapter levels. To enhance the core content, teachers can add assignments, activities, and instructional aids to any lesson.

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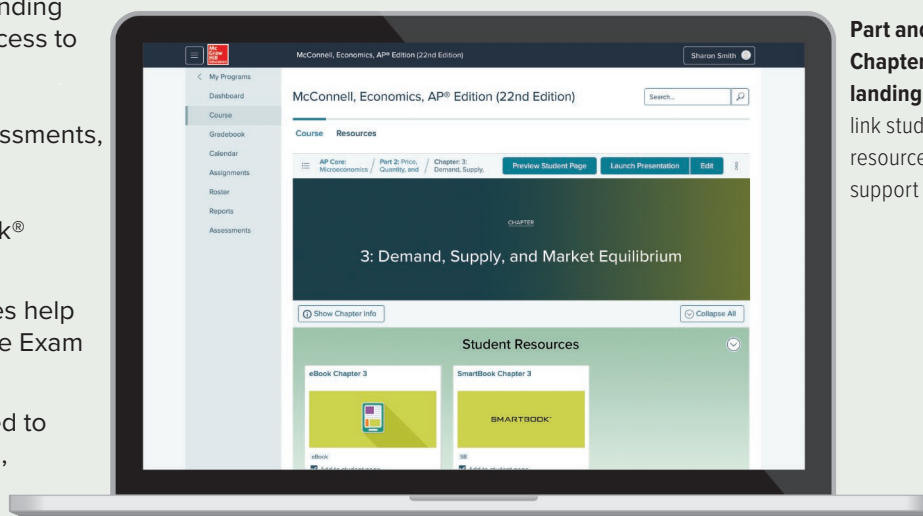
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- provides targeted remediation at the chapter, topic, or concept level.

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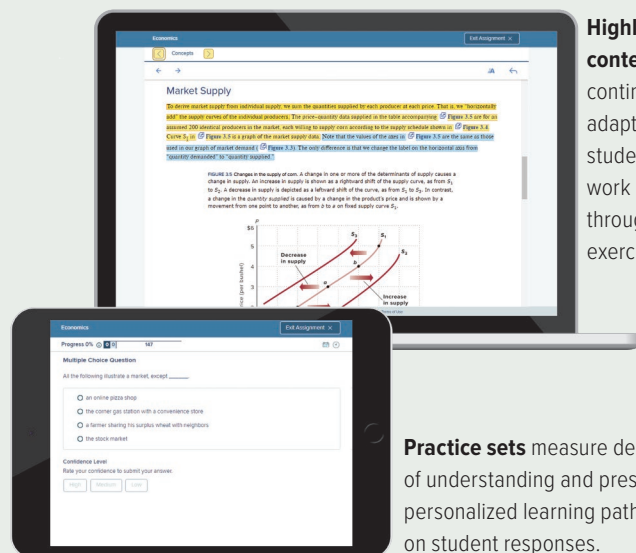
Highlighted content continuously adapts as students work through exercises.

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- Customizable PowerPoint presentations.

- Labeled visual aids and additional ideas for lecture enrichment.
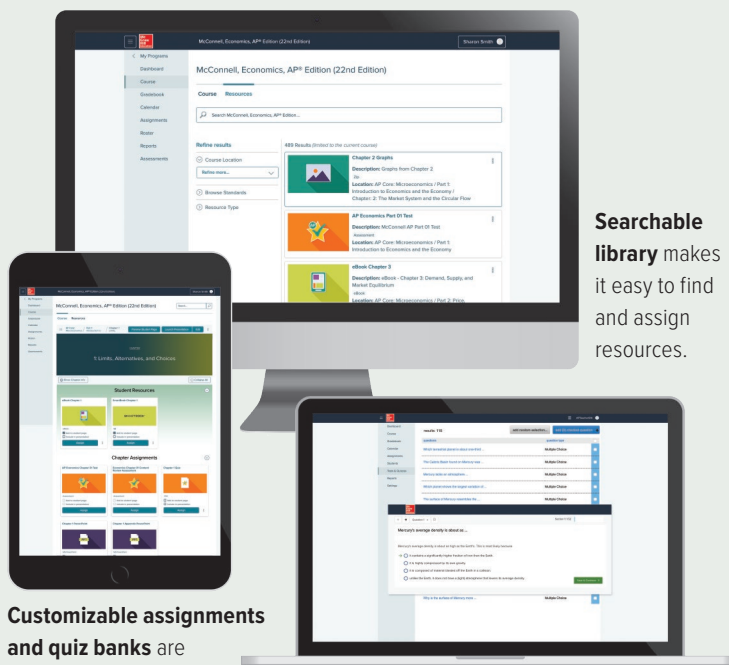
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Course Themes and Structure

The Advanced Placement (AP) program was created by the College Board, which also developed the SAT Exam. The AP Microeconomics and AP Macroeconomics courses each have a separate AP Exam. The exams are written by Test Development Committees, which consist of university Economics professors and high school teachers with experience teaching the AP Economics courses. Test questions are written to measure understanding of the content and skills included in the Course and Exam Descriptions published by the College Board in 2019. The College Board audits high school courses with the AP designation to ensure the high school curriculum meets standards equivalent to introductory college Economics courses.

Microeconomics and Macroeconomics are typically two one-semester courses that explore different aspects of economic reasoning and applications. Microeconomics focuses on economic decisions made by individual households—as consumers and as suppliers of inputs like labor—and by firms—as suppliers of output and demanders of inputs. Macroeconomics considers behavior in the aggregate economy and economic performance. Particular attention is paid to macro economic challenges with unemployment, inflation, and economic growth. International finance is addressed in the Macroeconomics course, while international trade is included in both the Microeconomics and Macroeconomics courses.

Understanding by Design©

The AP Microeconomics and Macroeconomics courses are organized using the *Understanding by Design©* Framework. In each course, the content is designed to spiral Big Ideas about economics—such as "Competitive markets bring together buyers and sellers to exchange goods and services for mutual gain"—throughout the semester. Each course is divided into six units with specific topics, learning objectives, and essential knowledge items. In addition, each course has the same four categories of economics skills:

- *Principles and Models*: Define economic principles and models.
- *Interpretation*: Explain given economic outcomes.
- *Manipulation*: Determine outcomes of specific economic situations.
- *Graphing and Visuals*: Model economic situations using graphs or visual representations.

Each question on the AP Exams will measure one of these skills as well as content knowledge. Graphing skills are assessed only in the free-response section of the exams.

About the AP Micro and Macro Exams

The AP Microeconomics Exam and AP Macroeconomics Exam are entirely separate exams. Students may opt to take either exam or both. Each exam is scheduled for two hours and ten minutes, on separate test days. Students are given 70 minutes to answer 60 multiple-choice questions. Then, after a ten-minute reading period, students have 50 minutes to write answers to three free-response questions, one worth 10 points and two worth 5 points each. The multiple-choice section accounts for two-thirds of the score (66.65 percent), and the free-response section provides the other one-third of the score (33.35 percent). *See pages P-14 and P-15 for a correlation of the chapters in this textbook to the AP units and topics.*

Summary of AP Exam Format		
Section I	**Multiple Choice** 60 questions Time: 70 minutes Weight: 66.65% of Exam	• No calculators are allowed. Use a #2 pencil with a very good eraser for this section.
	10-minute required reading period	
Section II	**Free Response** Question 1: Long (10 points) Question 2: Short (5 points) Question 3: Short (5 points) Time: 50 minutes Weight: 33.35% of Exam	• There is a 10-minute required reading period before writing the answer to the 3 FRQs. This time can also be used to begin outlining answers. • No calculators are allowed. Use blue or black ink for this section. • The long FRQ represents 50% of the FRQ score; each of the two short FRQs represent 25% of the score.

Questions by Unit on the AP Microeconomics Exam

Percentage of Questions	Units in AP Microeconomics
12-15%	Basic Economic Concepts
20-25%	Supply and Demand
22-25%	Production, Cost, and the Perfect Competition Model
15-22%	Imperfect Competition
10-13%	Factor Markets
8-13%	Market Failure and the Role of Government

Percentage of Questions	Units in AP Macroeconomics
5-10%	Basic Economic Concepts
12-17%	Economic Indicators and the Business Cycle
17-27%	National Income and Price Determination
18-23%	Financial Sector
20-30%	Long-Run Consequences of Stabilization Policy
10-13%	Open Economy—International Trade and Finance

Grading of the AP Exam

The multiple-choice section of the AP Exam is scored electronically, whereas readers grade the FRQs. The College Board then applies a weighted formula and combines the raw multiple-choice and free-response scores to create a composite score out of 90 points. Finally, a conversion factor is used to award the student one of five final scores, with a 5 being extremely well qualified and a 1 being no recommendation. The score required to achieve a 5, 4, or 3 varies with each test administration, but typically the minimum score for a 5 ranges from 66-74 (out of 90); the minimum score for a 4 ranges from 51-55 (out of 90); and the minimum score for a 3 ranges from 40-45 (out of 90).

A passing score on either exam can provide college credit for institutions that accept AP credit, but colleges and universities differ markedly in requirements and credits offered. Some schools accept a score of 3 for credit, whereas other schools may require a 4 or a 5 in order to receive credit. Some schools require passing scores on both AP Exams to receive credit for either course.

▲ Turn to the end of this textbook for two complete Practice Exams—one for AP Microeconomics and one for AP Macroeconomics.

Answering Multiple-Choice Questions

The multiple-choice questions can include a wide range of information, including definitions and applications of principles, calculations, interpretations of graphs, explanations of the causes or results of an economic action, and choosing an appropriate economic policy to deal with an economic event.

Calculators cannot be used during the AP Economics Exam. Generally, the math involved in multiple-choice questions is simple enough that if you understand the formulas, the answer will be clear. For example, reserve requirement ratios tend to be 5%, 10%, 20%, or 25% to make it easy for you to calculate money multipliers. The opportunity costs involved in calculating comparative advantage will reduce to numbers that are easy to compare.

Answer every question. Each question has five potential answers labeled A-E. Each correct answer is worth one point, while questions left blank earn no points. The College Board will assess no penalty for wrong answers. Although you will earn no credit for a wrong answer, you will not face any additional penalty for guessing. So it is in your best interest to answer every question on the AP Exam. It is also best to answer questions in the order they appear, rather than skipping questions throughout the test. You do not want to risk skipping a line and mismarking subsequent answers. Make a note of answers you want to go back and review after you've finished, but do not skip a question entirely. Carefully erase corrections completely.

Don't second-guess yourself. Be careful not to over-analyze questions. In many cases, the answer may seem to be too obvious when it is correct. The AP Exam questions are designed to test information you should have learned in the course, not reach for the most obscure concepts. Although some questions will test your ability to discern concepts (for example, the difference between a change in demand and a change in quantity demanded), they are not designed to trick you if you understand those concepts.

With that in mind, also remember that several of the test questions will be written at a high level in order to identify students deserving of scores of 4 and 5. You may face test questions about concepts you have not studied or do not remember, but it is still important to answer every question. If you can eliminate a couple of obviously wrong answers, you are that much closer to a correct answer.

Look for clues in key terms. Watch carefully for key terms in a question that can help you rule out incorrect answers. For example, "long run" and "short run" result in different graphs for firms entering and exiting the industry in Microeconomics, and a different slope for aggregate supply and Phillips Curves in Macroeconomics. The terms *nominal* and *real* can help you differentiate the effects of inflation. If you pay careful attention to the terms, you may be able to rule out two or more potential answers.

Sketch graphs. For questions regarding graphical analysis, quickly draw a graph to visualize the answer—even on the multiple-choice section. Do not rely just on your memory; seeing the graph can help you remember or determine, for example, the relative locations of the average total cost and average variable cost curves, or how a change in aggregate demand affects real output and price levels. It is important to use these visual aids to avoid simple mistakes.

Pace yourself. It is important to watch your pace as you move through the questions. You have just over one minute to answer each question. Some questions, such as definitions, can be answered quickly, whereas others may require deeper analysis or time to draw a graph to find the answer. The key is to keep moving and keep an eye on the time. If you finish early, double check that you have answered every question on your answer sheet, and then review the questions you noted to review one last time.

Answering Free-Response Questions

The free-response questions (FRQs) include a wide range of information; however, this section will always include some questions that test graphing skills. You should expect to draw, manipulate, and interpret a variety of graphs. Any questions requiring calculations in the free-response section will require you to show your work. That means starting from the formula or equation and performing the arithmetic required to obtain your answer.

Format of AP Economics FRQs AP Economics responses are quite different from the formal essays written for some other AP subjects requiring thesis statements and five-paragraph development structures. AP Economics FRQs generally consist of a series of questions and sub-questions that can be answered in several sentences, or in some cases simply a word or number. Responses should directly answer the questions asked.

Both AP Economics Exams use the same five task verbs to guide student responses:

- *Identify* (or an interrogatory word like What? Which? or Will?) requires a specific, brief response with no elaboration or explanation.

- *Explain* requires additional information about how or why an outcome occurs using evidence or reasoning. Graphs and symbols are acceptable as part of the explanation.

- *Calculate* requires you to perform mathematical steps to arrive at a response and show your work.

- *Draw a correctly labeled graph* requires a graph to answer the question. Clear, accurate labels are required. Draw a large graph, and then make it easy for a reader to interpret it.

- *Show/Label/Plot/Indicate* requires you to visually represent an economic situation using your correctly labeled graph. Label equilibrium points by extending dotted lines to the axes (not internal labels). Clearly show directional changes when relevant.

Keep in mind the economic concept of efficiency and apply it to your free-response writing. Be complete—but be efficient about it. Directly answer the question asked and explain why that answer is correct. The best answers use the appropriate terms and the clearest language to explain the situation, causes and effects, and reasoning. The readers (scorers) want to see a clear analysis and your understanding. Remember that the readers want to award you points for every correct portion of your responses. To that end, use your best handwriting to make it easy for the reader to find and read your answers, so you can earn all the points you deserve.

Ten-minute Reading Period At the beginning of the free-response portion of the AP Exam, you will have a ten-minute reading period. Use that time to very carefully review each of the three FRQs. Focus on the verbs in the FRQs, explained above. Start to sketch graphs and write notes right on the question page, so you can outline your answers. (Be sure you copy final graphs onto the designated answer pages, or they will not be counted.)

Stay organized. Organization is essential for a good free-response answer. Be sure to answer the questions in the order they are asked, and directly answer the question that was asked. For example, if the question asks you what will happen to employment, do not explain what you think will happen to the unemployment rate; answer about employment.

As with the multiple-choice section, in the free-response section readers give you points for correct answers, rather than subtract points for incorrect answers. If necessary, guess on such questions as: What will happen to the price? What will happen to exports? What will happen to the number of workers hired? The only possible answers are "increase," "decrease," or "no change," so make your best guess even if you are not entirely sure of the answer. However, if the question asks about a specific policy solution such as an open-market operation, and you answer by discussing changes in the discount rate, even if your answer pertaining to the discount rate is correct, you will not earn the point because you did not answer the question that was asked.

Link concepts. In writing your answers, it is critical to make linkages between concepts. This is one issue readers have consistently identified as a weakness in the responses they score. In Microeconomics, for example, why does an increase in the price of strawberries lead to an increase in the demand for grapes? In Macroeconomics, why does an increase in the money supply cause an increase in new home sales? Be sure to explain how a change in one factor affects other factors, and then include the step-by-step mechanisms that cause those changes to happen.

Draw graphs carefully. It is important to look for details in the FRQ that will help you draw your graphs correctly. Be careful to label every axis and curve and show any curve shifts and equilibrium. Look for terms such as *short run* and *long run*. A Micro question may ask you to draw a graph showing a firm making an initial short-run profit. Drawing a graph in long-run equilibrium instead will cost you easy points. In the same way, a Macro question may ask you to draw a graph illustrating an economy in short-run equilibrium at less than full-employment output. In order to illustrate that lower output, you will have to draw a vertical long-run aggregate supply curve to the right of current equilibrium.

Pace yourself. You should try to complete the long FRQ in 25 minutes, leaving 25 minutes to finish the two short FRQs. When you have finished all three FRQs, re-read each question and sub-question to be sure you have answered every single part of the question.

Practice Questions

General information about the course and exam are available at AP Central, as are links to the most recent FRQs and scoring guidelines.

Link to AP Microeconomics Exam:

https://apcentral.collegeboard.org/courses/ap-micro-economics/exam

Link to AP Macroeconomics Exam:

https://apcentral.collegeboard.org/courses/ap-macro-economics/exam

If you scroll down either site, you will find an arrow linking to FRQs from earlier years. A great way to test your knowledge of AP Microeconomics and AP Macroeconomics is to take these past tests. They are excellent preparation for taking the AP Economics Exams. In addition, your teacher can provide access to AP Classroom, which has additional practice multiple-choice questions. Your teacher must select and assign the questions; students are not able to access AP Classroom on their own.

Unit 1 Basic Economic Concepts	Textbook Chapters
1.1 Scarcity	1
1.2 Resource Allocation and Economic Systems	2
1.3 Production Possibilities Curve	1
1.4 Comparative Advantage and Trade	34
1.5 Cost-Benefit Analysis	4
1.6 Marginal Analysis and Consumer Choice	7
Unit 2 Supply and Demand	**Textbook Chapters**
2.1 Demand	3
2.2 Supply	3
2.3 Price Elasticity of Demand	6
2.4 Price Elasticity of Supply	6
2.5 Other Elasticities	6
2.6 Market Equilibrium and Consumer and Producer Surplus	3, 4
2.7 Market Disequilibrium and Changes in Equilibrium	3
2.8 The Effects of Government Intervention in Markets	3, 17
2.9 International Trade and Public Policy	34
Unit 3 Production, Cost, and the Perfect Competition Model	**Textbook Chapters**
3.1 The Production Function	8
3.2 Short-run Production Costs	8
3.3 Long-run Production Costs	8
3.4 Types of Profit	8
3.5 Profit Maximization	9
3.6 Firms' Short-run Decisions to Produce and Long-run Decisions to Enter or Exit a Market	9, 10
3.7 Perfect Competition	9, 10
Unit 4 Imperfect Competition	**Textbook Chapters**
4.1 Introduction to Imperfectly Competitive Markets	11
4.2 Monopoly	11
4.3 Price Discrimination	11
4.4 Monopolistic Competition	12
4.5 Oligopoly and Game Theory	13
Unit 5 Factor Markets	**Textbook Chapters**
5.1 Introduction to Factor Markets	14, 16
5.2 Changes in Factor Demand and Factor Supply	14
5.3 Profit-Maximizing Behavior in Perfectly Competitive Factor Markets	14
5.4 Monopsonistic Markets	15
Unit 6 Market Failure and the Role of Government	**Textbook Chapters**
6.1 Socially Efficient and Inefficient Market Outcomes	4, 5
6.2 Externalities	4
6.3 Public and Private Goods	5
6.4 The Effects of Government Intervention in Different Market Structures	4
6.5 Inequality	19

Unit 1 Basic Economic Concepts	Textbook Chapters
1.1 Scarcity	1
1.2 Opportunity Cost and the Production Possibilities Curve	1
1.3 Comparative Advantage and Gains from Trade	34
1.4 Demand	3
1.5 Supply	3
1.6 Market Equilibrium, Disequilibrium and Changes to Equilibrium	3
Unit 2 Economic Indicators and the Business Cycle	Textbook Chapters
2.1 The Circular Flow and GDP	21, 25
2.2 Limitations of GDP	21
2.3 Unemployment	23
2.4 Price Indices and Inflation	23
2.5 Costs of Inflation	23
2.6 Real v. Nominal GDP	21
2.7 Business Cycles	23
Unit 3 National Income and Price Determination	Textbook Chapters
3.1 Aggregate Demand (AD)	26
3.2 Multipliers	24
3.3 Short-run Aggregate Supply (SRAS)	26
3.4 Long-run Aggregate Supply (LRAS)	26
3.5 Equilibrium in the Aggregate Demand-Aggregate Supply (AD-AS) Model	26
3.6 Changes in the AD-AS Model in the Short Run	26
3.7 Long-Run Self-Adjustment	32
3.8 Fiscal Policy	27
3.9 Automatic Stabilizers	27
Unit 4 Financial Sector	Textbook Chapters
4.1 Financial Assets	31
4.2 Nominal v. Real Interest Rates	23
4.3 Definition, Measurement and Functions of Money	28
4.4 Banking and the Expansion of the Money Supply	29
4.5 The Money Market	30
4.6 Monetary Policy	30
4.7 The Loanable Funds Market	27
Unit 5 Long-Run Consequences of Stabilization Policy	Textbook Chapters
5.1 Fiscal and Monetary Policy Actions in the Short Run	27, 30
5.2 The Phillips Curve	32
5.3 Money Growth and Inflation	33
5.4 Government Deficits and the National Debt	27
5.5 Crowding Out	27
5.6 Economic Growth	22, 32
5.7 Public Policy and Economic Growth	22
Unit 6 Open Economy—International Trade and Finance	Textbook Chapters
6.1 Balance of Payments Accounts	35
6.2 Exchange Rates	35
6.3 The Foreign Exchange Market	35
6.4 Effect of Changes in Policies and Economic Conditions on the Foreign Exchange Market	35
6.5 Changes in the Foreign Exchange Market and Net Exports	35
6.6 Real Interest Rates and International Capital Flows	35

In Memoriam
Campbell R. McConnell (1928–2019)

We have lost a gracious friend, superb mentor, and legendary coauthor. In 2019 Professor Campbell R. "Mac" McConnell passed away at age 90 in Lincoln, Nebraska. Mac was one of the most significant and influential American economic educators of his generation. Through his best-selling principles textbook, he made introductory economics accessible to millions of students. By way of numerous adaptations and translations of his textbook, he influenced students throughout the world.

Mac was born in Harvey, Illinois, graduated from Cornell College (Iowa) and obtained his Ph.D. from the University of Iowa. He had a long and successful career as a researcher and teacher at the University of Nebraska, publishing peer-reviewed research articles and serving in leadership positions such as President of the Midwest Economic Association. His gift of explaining complex economics simply and thoroughly led him to explore opportunities to extend his educational reach beyond his own classroom. McGraw-Hill understood the great potential in his textbook proposal and the first edition of *Economics: Principles, Problems, and Policies* made its debut in 1960. It was an instant hit and by the late 1970s it became the leading seller in the United States, supplanting Paul Samuelson's textbook as the market leader. *Economics* remains the top seller today.

In 1986, Mac and his former student, Stanley Brue, coauthored *Contemporary Labor Economics* and two years later Professor Brue joined Mac as a coauthor of *Economics*. Stan, Mac, and McGraw-Hill added Sean Flynn as the third coauthor on the authorship team in 2008. The authorship transitions have been planned in advance, with authors working side-by-side for several editions. These smooth transitions have greatly contributed to the progress of the book and its continuing success.

We (Stan and Sean) are humbled and proud to have worked with Mac and McGraw-Hill over these many years. We pledge to instructors and students that we will continue to stress clarity of presentation—in each new chapter, revised paragraph, rephrased explanation, and edited sentence. We believe that our dedication to preserving and improving the quality of the book is absolutely the best way for us to honor and extend Mac's amazing legacy. Mac liked to say that, "Brevity at the expense of clarity is false economy." We will honor him, and his legacy, by always putting clarity first.

We greatly miss our coauthor and long-time friend Campbell R. McConnell.

Stanley L. Brue
Sean M. Flynn

AP Contributors

We are grateful for the contributions of the following AP experts in the preparation of this AP Student Edition, the AP Teacher Manual, and the AP assessment program that accompanies McConnell *Economics* AP Edition.

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Dr. Ross has been active in AP Economics since the inception of the program in 1988. From 1998 to 2005, he served as chief faculty consultant for AP Economics. He has served as the co-chair of the AP Macroeconomics Test Development Committee and offers frequent workshops for AP Economics teachers.

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Martha Rush has been teaching AP Macroeconomics and Microeconomics since 1997. She has been an AP Reader in both Macroeconomics (2007–2014) and Microeconomics (2015–present), and she has served on the College Board's AP Microeconomics Curriculum Design and Assessment Committee and Economics Instructional Design Committee, as well as serving as a College Board consultant since 2015.

Sally Meek
Retired AP Macroeconomics Teacher, Plano West Senior High School, Plano, Texas

Sally Meek taught AP Macroeconomics for 17 years. She has worked with the College Board since 1998 and has been presenting AP Workshops since 2000. She has served in many roles with the College Board: as a member of the AP Test Development Committee, an Advisor to the AP Macroeconomics Development Committee, a Reader, a Table Leader, and a Question Leader.

Jennifer Raphaels
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A longtime teacher of AP Micro and Macroeconomics, Jennifer Raphaels has served as an AP Economics Reader and as a member of the AP Macroeconomics Instructional Development Committee. She helped develop the new AP Macroeconomics Course and Exam Description, and provides classroom resources and curricular materials for AP Economics Summer Institutes.

Demand, Supply, and Market Equilibrium

>> LEARNING OBJECTIVES

LO3.1 Characterize and give examples of markets.

LO3.2 Describe *demand* and explain how it can change.

LO3.3 Describe *supply* and explain how it can change.

LO3.4 Explain how supply and demand interact to determine market equilibrium.

LO3.5 Explain how changes in supply and demand affect equilibrium prices and quantities.

LO3.6 Define government-set prices and explain how they can cause surpluses and shortages.

LO3.7 (Appendix) Use supply-and-demand analysis to analyze actual-economy situations.

AP▌CHAPTER FOCUS

The model of supply and demand is a powerful model in the study of economics as it explains the operation of the markets, which solve the basic economic problems within a society. Markets are central to the understanding of the price system, explaining the *quantities* of goods and services bought and sold, as well as the *prices* at which they are bought or sold.

Markets

Markets bring together buyers ("demanders") and sellers ("suppliers"). Everyday consumer markets include the corner gas station, Amazon.com, and the local bakery shop. The New York Stock Exchange and the Chicago Board of Trade are markets in which buyers and sellers from all over the world exchange bonds, stocks, and commodities. In labor markets, new college graduates "sell" and employers "buy" specific labor services. Ride sharing apps like Uber and Lyft match people who want to buy rides with people who want to sell rides.

Some markets are local; others are national or international. Some are highly personal, involving face-to-face contact between demander and supplier; others are faceless, with buyer and seller never seeing or knowing each other.

>> **LO3.1** Characterize and give examples of markets.

To keep things simple, we will focus on markets in which large numbers of independently acting buyers and sellers come together to buy and sell standardized products. Markets with these characteristics are the economy's most highly competitive markets. They include the wheat market, the stock market, and the market for foreign currencies. All such markets involve demand, supply, price, and quantity. As you will soon see, the price is "discovered" through the interacting decisions of buyers and sellers.

AP Demand

>> **LO3.2** Describe *demand* and explain how it can change.

demand A schedule or curve that shows the various amounts of a product that consumers are willing and able to purchase at each of a series of possible prices during a specified period of time.

demand schedule A table of numbers showing the amounts of a good or service buyers are willing and able to purchase at various prices over a specified period of time.

law of demand The principle that, other things equal, an increase in a product's price will reduce the quantity of it demanded, and conversely for a decrease in price.

Demand is a schedule or a curve that shows the various amounts of a product that consumers are willing and able to purchase at a series of possible prices during a specified period of time, *other things equal*. The table in Figure 3.1 is a hypothetical **demand schedule** for a *single consumer* purchasing bushels of corn.

The table reveals the relationship between the various prices of corn and the quantity of corn a particular consumer is willing and able to purchase at each price. We say "willing and able" because willingness alone is not effective in the market. You may be willing to buy an ultra high definition 4K television set, but if that willingness is not backed by the necessary dollars, it will not be reflected in the market. In the table in Figure 3.1, if the price of corn is $5 per bushel, our consumer is willing and able to buy 10 bushels per week; if the price is $4, the consumer is willing and able to buy 20 bushels per week; and so forth.

The table does not tell us which of the five possible prices will actually exist in the corn market. The price depends on the interaction between demand and supply. Demand is simply a statement of a buyer's plans, or intentions, with respect to purchasing a product.

To be meaningful, the quantities demanded at each price must relate to a specific period—a day, a week, a month. Saying "A consumer will buy 10 bushels of corn at $5 per bushel" is meaningless. Saying "A consumer will buy 10 bushels of corn per week at $5 per bushel" is meaningful. Unless a specific time period is stated, we do not know whether the demand for a product is large or small.

Law of Demand

Other things equal, as price falls, the quantity demanded rises, and as price rises, the quantity demanded falls. In short, there is a *negative* or inverse relationship between price and quantity demanded. Economists call this inverse relationship the **law of demand.**

AP FIGURE 3.1 **An individual buyer's demand for corn.**

Because price and quantity demanded are inversely related, an individual's demand schedule graphs as a downward sloping curve such as *D*. Other things equal, consumers will buy more of a product as its price declines and less of the product as its price rises. (Here and in later figures, *P* stands for price and *Q* stands for quantity demanded or supplied.)

Demand for Corn	
Price per Bushel	Quantity Demanded per Week
$5	10
4	20
3	35
2	55
1	80
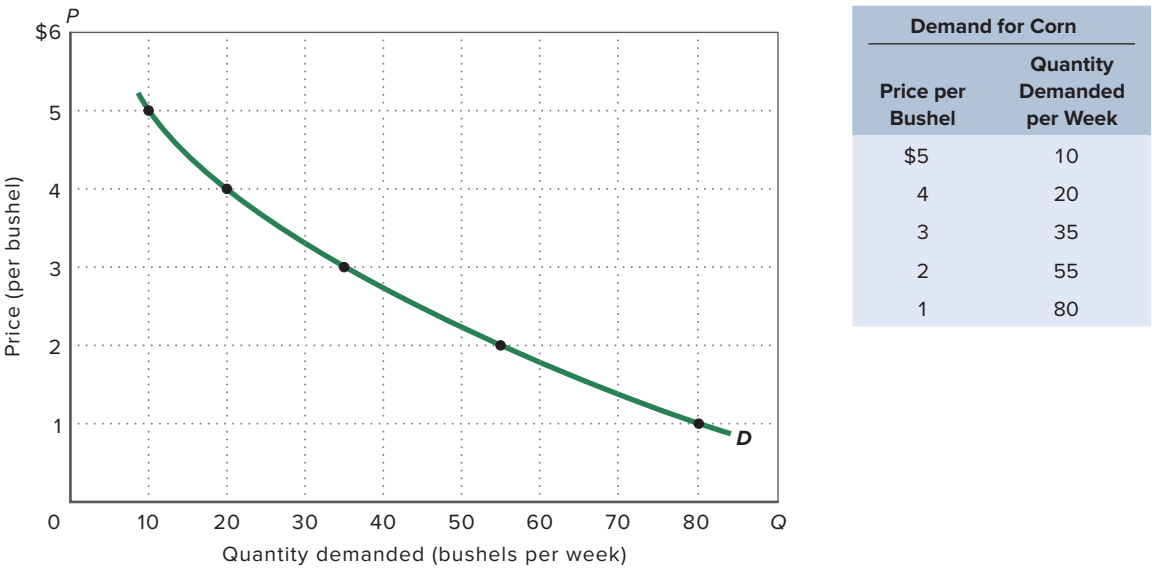
The other-things-equal assumption is critical here. Many factors other than the price of the product being considered affect the amount purchased. For example, the quantity of Nikes purchased will depend not only on the price of Nikes but also on the prices of shoes produced by Adidas, Reebok, and New Balance. The law of demand in this case says that fewer Nikes will be purchased if the price of Nikes rises while the prices of Adidas, Reeboks, and New Balances remain constant. In short, if the *relative price* of Nikes rises, fewer Nikes will be bought. However, if the price of Nikes and the prices of all other competing shoes increase by some amount—say $5—consumers may buy more, fewer, or the same number of Nikes. To isolate the demand for Nikes, you have to hold other things equal.

Why is there an inverse relationship between price and quantity demanded? Let's look at three explanations, beginning with the simplest one:

- The law of demand is consistent with common sense. People ordinarily do buy more of a product at a low price than at a high price. Price is an obstacle that deters consumers. The higher that obstacle, the less of a product they will buy; the lower the price obstacle, the more they will buy. The fact that businesses conduct "clearance sales" to liquidate unsold items firmly supports the law of demand.

- In any specific time period, each buyer of a product will derive less satisfaction (or benefit, or utility) from each successive unit of the product consumed. The second Big Mac will yield less satisfaction than the first, and the third less than the second. That is, consumption is subject to **diminishing marginal utility.** And because successive units of a particular product yield less and less marginal utility, consumers will buy additional units only if the price of those units is progressively reduced.

- We can also explain the law of demand in terms of income and substitution effects. The **income effect** indicates that a lower price increases the purchasing power of a buyer's money income, enabling the buyer to purchase more of a product than before. A higher price has the opposite effect. The **substitution effect** suggests that buyers have an incentive to substitute a product whose price has fallen for other products whose prices have remained the same. The substitution occurs because the product whose price has fallen is now "a better deal" relative to the other products, whose prices remain unchanged.

For example, a decline in the price of chicken will increase the purchasing power of consumer incomes, enabling people to buy more chicken (the income effect). At a lower price, chicken is relatively more attractive and consumers tend to substitute it for pork, beef, and fish (the substitution effect). The income and substitution effects combine to make consumers able and willing to buy more of a product at a lower price than at a higher price.

The Demand Curve

The inverse relationship between price and quantity demanded for any product can be represented on a simple graph with quantity demanded on the horizontal axis and price on the vertical axis. The graph in Figure 3.1 plots the five price-quantity data points listed in the accompanying table and connects the points with a smooth curve, labeled *D*. This curve is called a **demand curve.** Its downward slope reflects the law of demand—people buy more of a product, service, or resource as its price falls.

Market Demand

So far, we have concentrated on just one consumer. But competition requires more than one buyer in each market. By adding the quantities demanded by all consumers at each possible price, we can get from *individual* demand to *market* demand. If there are just three buyers in the market, as represented in the table in Figure 3.2, it is relatively easy to determine the total quantity demanded at each price. Figure 3.2 shows the graphical summing procedure: At each price we sum horizontally the quantities demanded by Joe, Jen, and Jay to obtain the total quantity demanded at that price. We then plot the price and the total quantity demanded as one point on the market demand curve. At the price of $3, for example, the three individual curves yield a total quantity demanded of 100 bushels (= 35 + 39 + 26).

diminishing marginal utility The principle that as a consumer increases the consumption of a good or service, the marginal utility obtained from each additional unit of the good or service decreases.

income effect A change in the quantity demanded of a product that results from the change in real income (purchasing power) caused by a change in the product's price.

substitution effect (1) A change in the quantity demanded of a consumer good that results from a change in its relative expensiveness caused by a change in the good's own price. (2) The reduction in the quantity demanded of the second of a pair of substitute resources that occurs when the price of the first resource falls and causes firms that employ both resources to switch to using more of the first resource (whose price has fallen) and less of the second resource (whose price has remained the same).

demand curve A curve that illustrates the demand for a product by showing how each possible price (on the vertical axis) is associated with a specific quantity demanded (on the horizontal axis).

AP❙ **FIGURE 3.2** Market demand for corn, three buyers.

The market demand curve D is the horizontal summation of the individual demand curves (D_1, D_2, and D_3) of all the consumers in the market. At the price of \$3, for example, the three individual curves yield a total quantity demanded of 100 bushels (= 35 + 39 + 26).
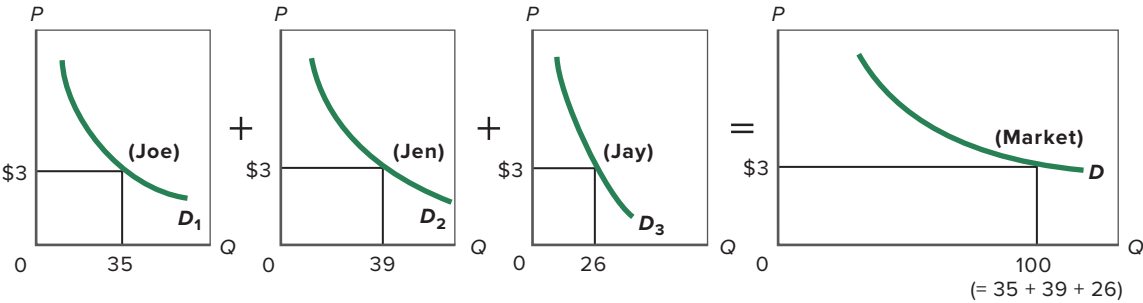
	Market Demand for Corn, Three Buyers			
	Quantity Demanded			**Total Quantity**
Price per Bushel	**Joe**	**Jen**	**Jay**	**Demanded per Week**
\$5	10 +	12 +	8 =	30
4	20 +	23 +	17 =	60
3	35 +	39 +	26 =	100
2	55 +	60 +	39 =	154
1	80 +	87 +	54 =	221

Competition, of course, ordinarily entails many more than three buyers of a product. For simplicity, we suppose that all the buyers in a market are willing and able to buy the same amounts at each possible price. Then we just multiply those amounts by the number of buyers to obtain the market demand. That is how we arrived at the demand schedule and demand curve D_1 in Figure 3.3 for a market of 200 corn buyers, each with the quantity demanded in the table in Figure 3.1.

AP❙ **FIGURE 3.3** Changes in the demand for corn.

A change in one or more of the determinants of demand causes a change in demand. An increase in demand is shown as a shift of the demand curve to the right, as from D_1 to D_2. A decrease in demand is shown as a shift of the demand curve to the left, as from D_1 to D_3. These changes in demand are to be distinguished from a change in quantity demanded, which is caused by a change in the price of the product, as shown by a movement from, say, point a to point b on fixed demand curve D_1.
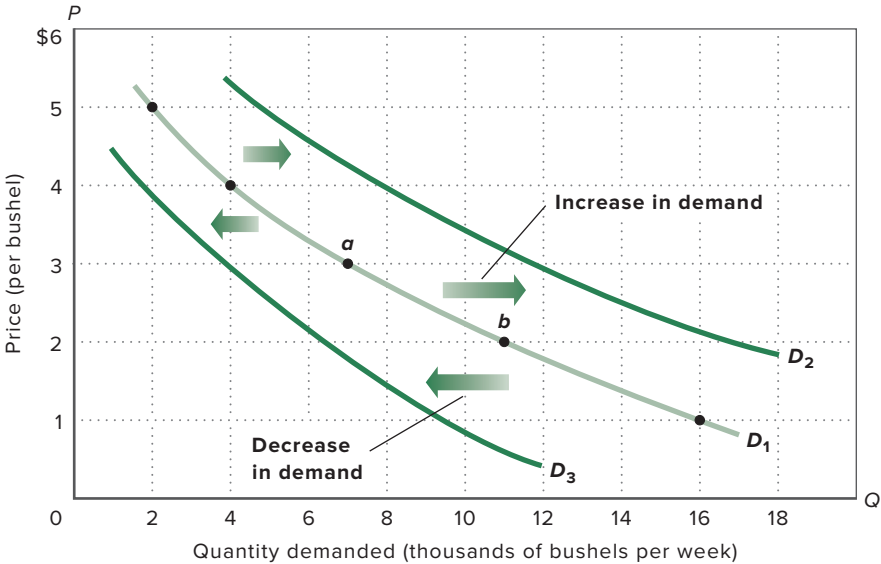
Market Demand for Corn, 200 Buyers, (D_1)	
(1) Price per Bushel	**(2) Total Quantity Demanded per Week**
\$5	2,000
4	4,000
3	7,000
2	11,000
1	16,000

In constructing a demand curve such as D_1 in Figure 3.3, economists assume that price is the most important influence on the amount of any product purchased. But other factors can and do affect purchases. These factors, called **determinants of demand,** are assumed to be constant when a demand curve like D_1 is drawn. When any of these determinants changes, the demand curve will shift to the right or left. For this reason, determinants of demand are sometimes called *demand shifters*.

The basic determinants of demand are (1) consumers' tastes (preferences), (2) the number of buyers in the market, (3) consumers' incomes, (4) the prices of related goods, and (5) consumer expectations.

Changes in Demand

A change in one or more of the determinants of demand will change the demand data (the demand schedule) in the table accompanying Figure 3.3 and therefore the location of the demand curve. A change in the demand schedule or, graphically, a shift in the demand curve, is called a *change in demand*.

If consumers desire to buy more corn at each possible price than is reflected in column 2 in the table in Figure 3.3, that *increase in demand* shifts the demand curve to the right, say, from D_1 to D_2. Conversely, a *decrease in demand* occurs when consumers buy less corn at each possible price than is indicated in column 2. The leftward shift of the demand curve from D_1 to D_3 in Figure 3.3 shows that situation.

Now let's see how changes in each determinant affect demand.

Tastes A favorable change in consumer tastes (preferences) for a product—a change that makes the product more desirable—means that more of it will be demanded at each price. Demand will increase; the demand curve will shift rightward. An unfavorable change in consumer preferences will decrease demand, shifting the demand curve to the left.

New products may affect consumer tastes; for example, the introduction of digital cameras greatly decreased the demand for film cameras. Consumer concerns over obesity have increased the demand for broccoli, low-calorie beverages, and fresh fruit while decreasing the demand for beef, eggs, and whole milk. Over the past twenty years, the demand for organic food and hybrid vehicles has increased rapidly, driven by a change in tastes.

Number of Buyers An increase in the number of buyers in a market is likely to increase demand; a decrease in the number of buyers will probably decrease demand. For example, the rising number of older persons in the United States has increased the demand for motor homes, medical care, and retirement communities. In contrast, out-migration from many small rural communities has reduced their population and thus the demand for housing, home appliances, and auto repair in those towns.

Income For most products, a rise in income causes an increase in demand. Consumers typically buy more steaks, furniture, and electronic equipment as their incomes increase. Conversely, the demand for such products declines as their incomes fall. Products whose demand varies directly with money income are called *superior goods,* or **normal goods.**

Although most products are normal goods, there are some exceptions. As incomes increase beyond some point, the demand for used clothing, retread tires, and third-hand automobiles may decrease because the higher incomes enable consumers to buy new versions of those products. Similarly, rising incomes may cause the demand for charcoal grills to decline as wealthier consumers switch to gas grills. Goods whose demand varies inversely with money income are called **inferior goods.**

Prices of Related Goods A change in the price of a related good may either increase or decrease the demand for a product, depending on whether the related good is a substitute or a complement:

- A **substitute good** is one that can be used in place of another good.
- A **complementary good** is one that is used together with another good.

Substitutes Häagen-Dazs ice cream and Ben & Jerry's ice cream are substitute goods or, simply, *substitutes*. When two products are substitutes, an increase in the price of one will increase the demand for the other. Conversely, a decrease in the price of one will decrease the demand for the

determinants of demand
Factors other than price that determine the quantities demanded of a good or service. Also referred to as "demand shifters" because changes in the determinants of demand will cause the demand curve to shift either right or left.

normal good A good or service whose consumption increases when income increases and falls when income decreases, price remaining constant.

inferior good A good or service whose consumption declines as income rises, prices held constant.

substitute goods Products or services that can be used in place of each other. When the price of one falls, the demand for the other product falls; conversely, when the price of one product rises, the demand for the other product rises.

complementary goods Products and services that are used together. When the price of one falls, the demand for the other increases (and conversely).

other. For example, when the price of Häagen-Dazs ice cream rises, consumers will buy less of it and increase their demand for Ben & Jerry's ice cream. The two brands are *substitutes in consumption*.

Complements Because complementary goods (or, simply, *complements*) are used together, they are typically demanded jointly. Examples include computers and software, smartphones and cellular service, and snowboards and lift tickets. If the price of a complement (for example, lettuce) goes up, the demand for the related good (salad dressing) will decline. Conversely, if the price of a complement (for example, tuition) falls, the demand for a related good (textbooks) will increase.

Unrelated Goods The vast majority of goods are not related to one another and are called *independent goods*. Examples are butter and golf balls, potatoes and automobiles, and bananas and wristwatches. A change in the price of one has little or no effect on the demand for the other.

Consumer Expectations Changes in consumer expectations may shift demand. A newly formed expectation of higher future prices may cause consumers to buy now in order to "beat" the anticipated price hike, thus increasing current demand. That is often what happens in "hot" real-estate markets. Buyers rush in because they think the price of homes will continue to escalate rapidly. Some buyers fear being "priced out of the market" and therefore not obtaining the home they desire. Other buyers—speculators—believe they will be able to sell the houses later at a higher price. Whatever their motivation, these expectation-driven buyers increase the current demand for houses.

Similarly, a change in expectations concerning future income may prompt consumers to change their current spending. For example, first-round NFL draft choices may splurge on new luxury cars in anticipation of lucrative professional football contracts. Or workers who become fearful of losing their jobs may reduce their demand for, say, vacation travel.

In summary, an *increase* in demand—the decision by consumers to buy larger quantities of a product at each possible price—may be caused by:

- A favorable change in consumer tastes.
- An increase in the number of buyers.
- Rising incomes if the product is a normal good.
- Falling incomes if the product is an inferior good.
- An increase in the price of a substitute good.
- A decrease in the price of a complementary good.
- A new consumer expectation that either prices or income will be higher in the future.

change in demand A movement of an entire demand curve or schedule such that the quantity demanded changes at every particular price; caused by a change in one or more of the determinants of demand.

You should "reverse" these generalizations to explain a *decrease* in demand. Table 3.1 provides additional illustrations of the determinants of demand.

Changes in Quantity Demanded

A *change in demand* must not be confused with a *change in quantity demanded.*

Recall that "demand" is a schedule or a curve. So a **change in demand** implies a change in the schedule and a corresponding shift of the curve.

TABLE 3.1
Determinants of Demand: Factors That Shift the Demand Curve

Determinant	Examples
Change in buyer tastes	Physical fitness rises in popularity, increasing the demand for jogging shoes and bicycles; smartphone usages rises, reducing the demand for desktop and laptop computers.
Change in number of buyers	A decline in the birthrate reduces the demand for children's toys.
Change in income	A rise in incomes increases the demand for normal goods such as restaurant meals, sports tickets, and necklaces while reducing the demand for inferior goods such as turnips, bus passes, and inexpensive wine.
Change in the prices of related goods	A reduction in airfares reduces the demand for train transportation (substitute goods); a decline in the price of printers increases the demand for ink cartridges (complementary goods).
Change in consumer expectations	Inclement weather in South America creates an expectation of higher future coffee bean prices, thereby increasing today's demand for coffee beans.

A change in demand occurs when a consumer's state of mind about purchasing a product has changed in response to a change in one or more of the determinants of demand. Graphically, a change in demand is a shift of the demand curve to the right (an increase in demand) or to the left (a decrease in demand).

In contrast, a **change in quantity demanded** is a movement from one point to another point—from one price-quantity combination to another—along a fixed demand curve or schedule. The cause of such a change is an increase or decrease in the price of the product under consideration. In the table in Figure 3.3, for example, a decline in the price of corn from $5 to $4 will increase the quantity demanded from 2,000 to 4,000 bushels. Make sure you can identify the corresponding movement between those two points along fixed demand curve D_1 in Figure 3.3.

Let's review. In Figure 3.3 the shift of the demand curve D_1 to either D_2 or D_3 is a change in demand. But the movement from point a to point b on curve D_1 represents a change in quantity demanded. Demand has not changed; it is the entire curve, which remains fixed in place.

change in quantity demanded
A change in the quantity demanded along a fixed demand curve (or within a fixed demand schedule) as a result of a change in the price of the product.

AP▎ QUICK REVIEW
3.1

▶ Demand is a schedule or curve showing the quantity of a product that buyers are willing and able to buy. The demand curve shows the quantity demanded by consumers at each price per unit.

▶ The law of demand states that, other things equal, the quantity of a good purchased varies inversely with its price. At lower prices, more is purchased; at higher prices, less is purchased.

▶ The demand curve shifts because of changes in (a) consumer tastes, (b) the number of buyers in the market, (c) consumer income, (d) the prices of substitute or complementary goods, (e) consumer expectations, and (f) tastes.

▶ A change in demand is a shift of the entire demand curve. A change in quantity demanded is a movement from one point to another point *along* the demand curve, as the unit price changes.

AP®▎ Supply

Supply is a schedule or curve showing the various amounts of a product that producers are willing and able to make available for sale at each of a series of possible prices during a specific period, other things equal. The table in Figure 3.4 is a hypothetical **supply schedule** for a single producer of corn. It shows the quantities of corn that are supplied at various prices, other things equal.

>> LO3.3 Describe *supply* and explain how it can change.

AP▎ FIGURE 3.4 An individual producer's supply of corn.

Because price and quantity supplied are directly related, the supply curve for an individual producer graphs as an upsloping curve. Other things equal, producers will offer more of a product for sale as its price rises and less of the product for sale as its price falls.

Supply of Corn	
Price per Bushel	Quantity Supplied per Week
$5	60
4	50
3	35
2	20
1	5

Law of Supply

The table in Figure 3.4 shows that a positive or direct relationship prevails between price and quantity supplied. As price rises, the quantity supplied rises; as price falls, the quantity supplied falls. This relationship is called the **law of supply.** Other things equal, firms will produce and offer for sale more of their product at a high price than at a low price.

Price is an obstacle from the standpoint of the consumer, who is on the paying end. The higher the price, the less the consumer will buy. The supplier is on the receiving end of the product's price. To a supplier, price represents *revenue,* which serves as an incentive to produce and sell a product. The higher the price, the greater this incentive and the greater the quantity supplied. This, again, is basically common sense.

Consider a farmer who is deciding how much corn to plant. As corn prices rise, as shown in the table in Figure 3.4, the farmer finds it profitable to plant more corn. And the higher corn prices enable the farmer to cover the increased costs of more intensive cultivation and the use of more seed, fertilizer, and pesticides. The overall result is more corn.

Now consider a manufacturer. Beyond some quantity of production, manufacturers usually encounter increases in *marginal cost*—the added cost of producing one more unit of output. Certain productive resources—in particular, the firm's plant and machinery—cannot be expanded quickly, so the firm uses more of other resources, such as labor, to produce more output. But as labor becomes more abundant relative to the fixed plant and equipment, the additional workers have relatively less space and access to equipment. For example, the added workers may have to wait to gain access to machines. As a result, each added worker produces less added output, and the marginal cost of successive units of output rises accordingly. The firm will not produce the more costly units unless it receives a higher price for them. Again, price and quantity supplied are directly related; they increase together along a supply curve or schedule.

The Supply Curve

As with demand, it is convenient to represent individual supply graphically. In Figure 3.4, curve *S* is the **supply curve** that corresponds with the price–quantity data supplied in the accompanying table. The upward slope of the curve reflects the law of supply—producers offer more of a good, service, or resource for sale as its price rises.

Market Supply

To derive market supply from individual supply, we sum the quantities supplied by each producer at each price. That is, we "horizontally add" the supply curves of the individual producers. The price–quantity data supplied in the table accompanying Figure 3.5 are for an assumed 200 identical producers in the market, each willing to supply corn according to the supply schedule shown in Figure 3.4. Curve S_1 in Figure 3.5 is a graph of the market supply data. Note that the values of the axes in Figure 3.5 are the same as those used in our graph of market demand (Figure 3.3). The only difference is that we change the label on the horizontal axis from "quantity demanded" to "quantity supplied."

Determinants of Supply

In constructing a supply curve, we assume that price is the most significant influence on the quantity supplied of any product. But other factors can and do affect supply. The supply curve is drawn on the assumption that these other factors do not change. If one of them does change, a *change in supply* will occur, and the entire supply curve will shift.

The basic **determinants of supply** are (1) resource prices, (2) technology, (3) taxes and subsidies, (4) prices of other goods, (5) producer expectations, and (6) the number of sellers in the market. A change in any one or more of these determinants of supply, or *supply shifters,* will shift the supply curve for a product either right or left. A shift to the *right,* as from S_1 to S_2 in Figure 3.5, signifies an *increase* in supply: Producers supply larger quantities of the product at each possible price. A shift to the *left,* as from S_1 to S_3, indicates a *decrease* in supply: Producers offer less output at each price.

Changes in Supply

Let's consider how changes in each of the determinants affect supply. The key idea is that costs are a major factor underlying supply curves; anything that affects costs usually shifts the supply curve.

supply A schedule or curve that shows the various amounts of a product that producers are willing and able to make available for sale at each of a series of possible prices during a specified period of time.

supply schedule A table of numbers showing the amounts of a good or service producers are willing and able to make available for sale at each of a series of possible prices during a specified period of time.

law of supply The principle that, other things equal, an increase in the price of a product will increase the quantity of it supplied, and conversely for a price decrease.

supply curve A curve that illustrates the supply for a product by showing how each possible price (on the vertical axis) is associated with a specific quantity supplied (on the horizontal axis).

determinants of supply Factors other than price that determine the quantities supplied of a good or service. Also referred to as "supply shifters" because changes in the determinants of supply will cause the supply curve to shift either right or left.

AP❚ FIGURE 3.5 **Changes in the supply of corn.**

A change in one or more of the determinants of supply causes a change in supply. An increase in supply is shown as a rightward shift of the supply curve, as from S_1 to S_2. A decrease in supply is depicted as a leftward shift of the curve, as from S_1 to S_3. In contrast, a change in the *quantity supplied* is caused by a change in the product's price and is shown by a movement from one point to another, as from *b* to *a* on fixed supply curve S_1.
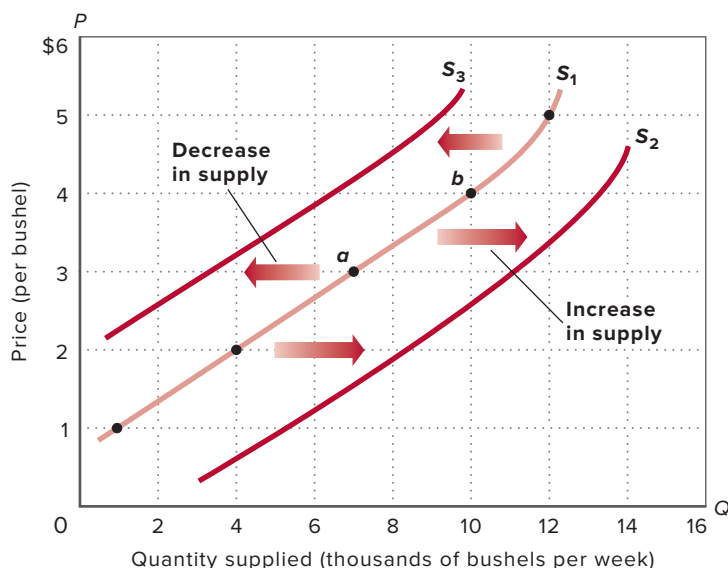
Market Supply of Corn, 200 Producers, (S_1)	
(1) Price per Bushel	(2) Total Quantity Supplied per Week
$5	12,000
4	10,000
3	7,000
2	4,000
1	1,000

Resource Prices The prices of the resources used in the production process help determine a firm's costs of production. Higher *resource* prices raise production costs and, assuming a particular product price, squeeze profits. That reduction in profits reduces firms' incentive to supply output at each product price. For example, an increase in the price of sand, crushed rock, or Portland cement will increase the cost of producing concrete and reduce its supply.

In contrast, lower *resource* prices reduce production costs and increase profits. So when resource prices fall, firms supply greater output at each product price. For example, a decrease in the price of iron ore will decrease the price of steel.

Technology Improvements in technology (techniques of production) enable firms to produce units of output with fewer resources. Because resources are costly, using fewer of them lowers production costs and increases supply. Example: Technological advances in producing computer monitors have greatly reduced their cost. Thus, manufacturers now offer more monitors than previously at the various prices; the supply of monitors has increased.

Taxes and Subsidies Businesses treat most taxes as costs. An increase in sales or property taxes will increase production costs and reduce supply. In contrast, subsidies are "taxes in reverse." If the government subsidizes the production of a good, the subsidy in effect lowers the producers' costs and increases supply.

Prices of Other Goods Firms that produce a particular product, say soccer balls, can sometimes use their plant and equipment to produce alternative goods, say basketballs or volleyballs. If the prices of those other goods increase, soccer ball producers may switch production to those other goods in order to increase profits. This *substitution in production* would decrease the supply of soccer balls. Alternatively, when the prices of basketballs and volleyballs decline relative to the price of soccer balls, producers of those goods may decide to produce more soccer balls instead.

Producer Expectations Changes in expectations about the future price of a product may affect the producer's current willingness to supply that product. Farmers anticipating a higher wheat price in the future might withhold some of their current wheat harvest from the market, thereby causing a decrease in the current supply of wheat. In contrast, in many manufacturing industries, new expectations that the price will increase may induce firms to add another shift of workers or to expand their production facilities, causing current supply to increase.

TABLE 3.2
Determinants of Supply: Factors That Shift the Supply Curve

Determinant	Examples
Change in resource prices	A decrease in the price of microchips increases the supply of computers; an increase in the price of crude oil reduces the supply of gasoline.
Change in technology	The development of more effective wireless technology increases the supply of smartphones.
Changes in taxes and subsidies	An increase in the excise tax on cigarettes reduces the supply of cigarettes; a decline in subsidies to state universities reduces the supply of higher education.
Change in prices of other goods	An increase in the price of cucumbers decreases the supply of watermelons.
Change in producer expectations	An expectation of a substantial rise in future lumber prices decreases the supply of logs today.
Change in number of suppliers	An increase in the number of tattoo parlors increases the supply of tattoos; the formation of women's professional basketball leagues increases the supply of women's professional basketball games.

Number of Sellers Other things equal, the larger the number of suppliers, the greater the market supply. As more firms enter an industry, the supply curve shifts to the right. Conversely, the smaller the number of firms in the industry, the less the market supply. As firms leave an industry, the supply curve shifts to the left. Example: The United States and Canada have imposed restrictions on haddock fishing to replenish dwindling stocks. As part of that policy, the U.S. federal government bought the boats of some of the haddock fishers as a way of putting them out of business and decreasing the catch. The result has been a decline in the market supply of haddock.

Table 3.2 is a checklist of the determinants of supply, along with additional illustrations.

Changes in Quantity Supplied

change in supply A movement of an entire supply curve or schedule such that the quantity supplied changes at every particular price; caused by a change in one or more of the determinants of supply.

The difference between a change in supply and a change in quantity supplied parallels the difference between a change in demand and a change in quantity demanded. Because supply is a schedule or curve, a **change in supply** means a change in the schedule and a shift of the curve. An increase in supply shifts the curve to the right; a decrease in supply shifts it to the left. The cause of a change in supply is a change in one or more of the determinants of supply.

In contrast, a **change in quantity supplied** is a movement from one point to another along a fixed supply curve. The cause of this movement is a change in the price of the specific product being considered.

change in quantity supplied A change in the quantity supplied along a fixed supply curve (or within a fixed supply schedule) as a result of a change in the product's price.

Consider supply curve S_1 in Figure 3.5. A decline in the price of corn from $4 to $3 decreases the quantity of corn supplied per week from 10,000 to 7,000 bushels. This movement from point b to point a along S_1 is a change in quantity supplied, not a change in supply. Supply is the full schedule of prices and quantities shown, and this schedule does not change when the price of corn changes.

AP▮ QUICK REVIEW
3.2

▶ Supply curves show the amount of a product that suppliers will offer for sale at each per-unit price.

▶ Other things being equal, the quantity of a good supplied varies directly with its price. A greater quantity will be supplied at higher prices; a lower quantity supplied at lower prices.

▶ Supply curves shift due to changes in (a) resource prices, (b) technology, (c) taxes or subsidies, (d) future price expectations, and (e) number of suppliers. A change in supply is a shift of the entire supply curve. A change in quantity supplied is a movement from one point to another *along* the supply curve, as the unit price changes.

AP® ▮ Market Equilibrium

>> LO3.4 Explain how supply and demand interact to determine market equilibrium.

With our understanding of demand and supply, we can now show how the decisions of buyers of corn and sellers of corn interact to determine the equilibrium price and quantity of corn. In the table in Figure 3.6, columns 1 and 2 repeat the market supply of corn (from the table in Figure 3.5), and columns 2 and 3 repeat the market demand for corn (from the table in Figure 3.3). We assume this is a competitive market so that neither buyers nor sellers can set the price.

AP| .ıll KEY GRAPH

FIGURE 3.6 **Equilibrium price and quantity.**

The intersection of the downsloping demand curve *D* and the upsloping supply curve *S* indicates the equilibrium price and quantity, here $3 and 7,000 bushels of corn. The shortages of corn at below-equilibrium prices (for example, 7,000 bushels at $2) drive up price. The higher prices increase the quantity supplied and reduce the quantity demanded until equilibrium is achieved. The surpluses caused by above-equilibrium prices (for example, 6,000 bushels at $4) push price down. As price drops, the quantity demanded rises and the quantity supplied falls until equilibrium is established. At the equilibrium price and quantity, there are neither shortages nor surpluses of corn.
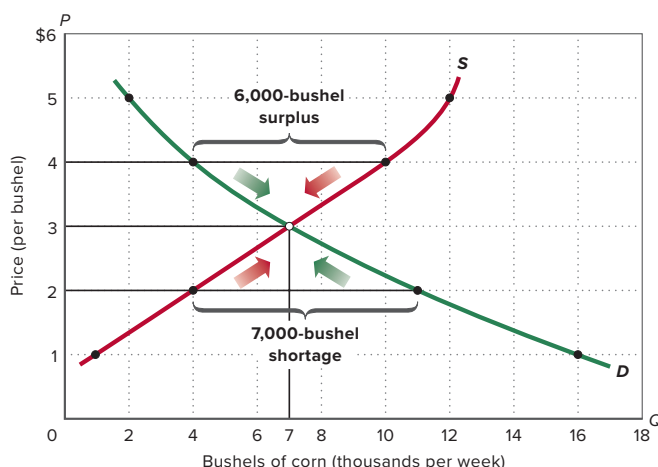
Market Supply of and Demand for Corn			
(1) Total Quantity Supplied per Week	(2) Price per Bushel	(3) Total Quantity Demanded per Week	(4) Surplus (+) or Shortage (−)*
12,000	$5	2,000	+10,000 ↓
10,000	4	4,000	+6,000 ↓
7,000	**3**	**7,000**	**0**
4,000	2	11,000	−7,000 ↑
1,000	1	16,000	−15,000 ↑

*Arrows indicate the effect on price.

QUICK QUIZ FOR FIGURE 3.6

1. **Demand curve *D* is downsloping because:**
    a. producers offer less of a product for sale as the price of the product falls.
    b. lower prices of a product create income and substitution effects that lead consumers to purchase more of it.
    c. the larger the number of buyers in a market, the lower the product price.
    d. price and quantity demanded are directly (positively) related.

2. **Supply curve *S*:**
    a. reflects an inverse (negative) relationship between price and quantity supplied.
    b. reflects a direct (positive) relationship between price and quantity supplied.

    c. depicts the collective behavior of buyers in this market.
    d. shows that producers will offer more of a product for sale at a low product price than at a high product price.

3. **At the $3 price:**
    a. quantity supplied exceeds quantity demanded.
    b. quantity demanded exceeds quantity supplied.
    c. the product is abundant and a surplus exists.
    d. there is no pressure on price to rise or fall.

4. **At price $5 in this market:**
    a. there will be a shortage of 10,000 units.
    b. there will be a surplus of 10,000 units.
    c. quantity demanded will be 12,000 units.
    d. quantity demanded will equal quantity supplied.

Answers: 1. b; 2. b; 3. d; 4. b.

Equilibrium Price and Quantity

The **equilibrium price** (or *market-clearing price*) is the price where the intentions of buyers and sellers match. It is the price where quantity demanded equals quantity supplied. The table in Figure 3.6 reveals that at $3, *and only at that price,* the number of bushels of corn that sellers wish to sell (7,000) is identical to the number consumers want to buy (also 7,000). At $3 and 7,000 bushels of corn, there is neither a shortage nor a surplus of corn. So 7,000 bushels of corn is the **equilibrium quantity:** the quantity at which the intentions of buyers and sellers match, so that the quantity demanded equals quantity supplied.

Graphically, the equilibrium price is indicated by the intersection of the supply curve and the demand curve in **Figure 3.6 (Key Graph).** (The horizontal axis now measures both quantity demanded and quantity supplied.) With neither a shortage nor a surplus at $3 per bushel, the market is *in equilibrium,* meaning "in balance" or "at rest."

equilibrium price The price in a competitive market at which the quantity demanded and the quantity supplied are equal, there is neither a shortage nor a surplus, and there is no tendency for price to rise or fall.

Emergent Equilibria

Market equilibrium is a surprising phenomenon. Buyers' demand curves show a *negative* relationship between price and quantity, while sellers' supply curves show a *positive* relationship. Given that contradiction, you would never expect the interaction of demand and supply to lead to the perfectly synchronized outcome of quantity supplied exactly equaling quantity demanded.

But that is precisely what happens billions of times per day in markets all over the world. Market equilibrium and market rationing emerge spontaneously from the interactions of buyers and sellers who are simply pursuing their own interests and who are not in any way attempting to coordinate.

Lee Prince/Shutterstock

Adam Smith tried to explain this miraculous result as the work of an "invisible hand" that guided people's interactions toward a coordinated, socially beneficial outcome.

Nowadays, some economists classify market equilibrium as an "emergent property," or a behavior demonstrated by an entire system that is not found in any of its constituent parts. In the same way that a human brain as a whole is capable of consciousness but its individual neurons are not, so too markets synchronize the actions of individual buyers and sellers without any of them intending to harmonize their activities. Market equilibrium emerges, magically, from a stew of uncoordinated individual actions.

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equilibrium quantity (1) The quantity at which the intentions of buyers and sellers in a particular market match at a particular price such that the quantity demanded and the quantity supplied are equal; (2) the profit-maximizing output of a firm.

surplus The amount by which the quantity supplied of a product exceeds the quantity demanded at a specific (above-equilibrium) price.

shortage The amount by which the quantity demanded of a product exceeds the quantity supplied at a particular (below-equilibrium) price.

Competition among buyers and among sellers drives the price to the equilibrium price; once there, it will remain there unless it is subsequently disturbed by changes in demand or supply (shifts of the curves). To better understand the equilibrium price, let's consider other prices. At any above-equilibrium price, quantity supplied exceeds quantity demanded. For example, at $4, sellers will offer 10,000 bushels of corn, but buyers will purchase only 4,000. The $4 price encourages sellers to offer lots of corn but discourages many consumers from buying it. The result is a **surplus** (or *excess supply*) of 6,000 bushels that will go unsold.

Surpluses drive prices down. Even if the $4 price existed temporarily, it could not persist. The large surplus would prompt competing sellers to lower the price to encourage buyers to take the surplus off their hands. As the price fell, farmers' incentive to produce corn would decline and consumers' incentive to buy corn would increase. As Figure 3.6 shows, the market will move to its equilibrium at $3.

At any price below the $3 equilibrium price, quantity demanded would exceed quantity supplied. Consider a $2 price, for example. We see both from column 2 of the table and from the demand curve in Figure 3.6 that quantity demanded exceeds quantity supplied at that price. The result is a **shortage** (or *excess demand*) of 7,000 bushels of corn. The $2 price discourages sellers from devoting resources to corn and encourages consumers to desire more bushels than are available. The $2 price cannot persist as the equilibrium price. Many consumers who want to buy corn at this price will not obtain it. They will express a willingness to pay more than $2 to get a bushel of corn. Competition among these buyers will drive up the price, eventually to the $3 equilibrium level. Unless disrupted by changes of supply or demand, this $3 price of corn will continue to prevail.

Rationing Function of Prices

The *rationing function of prices* refers to the ability of the forces of supply and demand to establish a price at which selling and buying decisions are consistent. In our example, the equilibrium price of $3 clears the market, leaving no burdensome surplus for sellers and no inconvenient shortage for buyers. And it is the combination of freely made individual decisions that sets this market-clearing price. In effect, the market outcome says that all buyers who are willing and able to pay $3 for a bushel of corn will obtain it; all buyers who cannot or will not pay $3 will go without corn. Similarly, all producers who are willing and able to offer corn for sale at $3 a bushel will sell it; all producers who cannot or will not sell for $3 per bushel will not sell their product.

Efficient Allocation

A competitive market not only rations goods to consumers but also allocates society's resources efficiently to the particular product. Competition among corn producers forces them to use the best technology and right mix of productive resources. If they didn't, their costs would be too high relative to the market price, and they would be unprofitable. The result is **productive efficiency:** the production of any particular good in the least costly way.

When society produces corn at the lowest achievable per-unit cost, it is expending the least-valued combination of resources to produce that product and therefore is making available more-valued resources to produce other desired goods. Suppose society has only $100 worth of resources available. If it can produce a bushel of corn for $3, then it will have $97 remaining to produce other goods. This situation is clearly better than producing the corn for $5 and having only $95 available for the alternative uses.

Competitive markets also produce **allocative efficiency:** the *particular mix* of goods and services most highly valued by society (minimum-cost production assumed). For example, society wants land suitable for growing corn used for that purpose, not for growing dandelions. It wants diamonds to be used for jewelry, not crushed up and used as an additive to give concrete more sparkle. It wants streaming online music, not cassette players and tapes. Moreover, society does not want to devote all its resources to corn, diamonds, and streaming music. It wants to assign some resources to wheat, gasoline, and smartphones. Competitive markets make those allocatively efficient assignments.

In competitive markets, the equilibrium price and quantity usually produce an assignment of resources that is "right" from an economic perspective. Demand essentially reflects the marginal benefit (MB) of the good, based on the utility received. Supply reflects the marginal cost (MC) of producing the good. At the market equilibrium, firms produce all units for which MB exceeds MC and no units for which MC exceeds MB. At the intersection of the demand and supply curves, MB equals MC and allocative efficiency results. As economists say, there is neither an "underallocation of resources" nor an "overallocation of resources" to the product.

productive efficiency The production of a good in the least costly way; occurs when production takes place at the output at which average total cost is a minimum and marginal product per dollar's worth of input is the same for all inputs.

allocative efficiency The apportionment of resources among firms and industries to obtain the production of the products most wanted by society (consumers); the output of each product at which its marginal cost and price or marginal benefit are equal, and at which the sum of consumer surplus and producer surplus is maximized.

▶ In competitive markets, prices adjust to the equilibrium level at which quantity demanded equals quantity supplied. In a competitive market, the equilibrium price performs a rationing function, ensuring that the quantity produced equals the quantity demanded.

▶ The equilibrium price and quantity are indicated by the intersection of the supply and demand curves for any product or resource. Price is read from the vertical axis, and quantity is read from the horizontal axis.

▶ Both productive and allocative efficiency occur at market equilibrium, where products are produced in the least costly way (productive efficiency) and the mix of goods and services are optimal given consumer tastes and production costs (allocative efficiency).

AP®▌ Changes in Supply, Demand, and Equilibrium

What effects do changes in supply and demand have on equilibrium price and quantity?

>> **LO3.5** Explain how changes in supply and demand affect equilibrium prices and quantities.

Changes in Demand

Suppose that the supply of some good (for example, health care) is constant and demand increases, as shown in Figure 3.7a. As a result, the new intersection of the supply and demand curves is at higher values on both the price and the quantity axes. Clearly, an increase in demand raises both equilibrium price and equilibrium quantity. Conversely, a decrease in demand such as that shown in Figure 3.7b reduces both equilibrium price and equilibrium quantity. (The value of graphical analysis is now apparent: We need not fumble with columns of figures to determine the outcomes; we need only compare the new and the old points of intersection on the graph.)

Changes in Supply

What happens if the demand for some good (for example, automobiles) is constant but supply increases, as in Figure 3.7c? The new intersection of supply and demand is located at a lower equilibrium price but at a higher equilibrium quantity. An increase in supply reduces equilibrium price but increases equilibrium quantity. In contrast, if supply decreases, as in Figure 3.7d, equilibrium price rises while equilibrium quantity declines.

AP❙ FIGURE 3.7 Changes in demand and supply and the effects on price and quantity.

The increase in demand from D_1 to D_2 in (a) increases both equilibrium price and equilibrium quantity. The decrease in demand from D_3 to D_4 in (b) decreases both equilibrium price and equilibrium quantity. The increase in supply from S_1 to S_2 in (c) decreases equilibrium price and increases equilibrium quantity. The decline in supply from S_3 to S_4 in (d) increases equilibrium price and decreases equilibrium quantity. The boxes in the top right corners summarize the respective changes and outcomes. The upward arrows in the boxes signify increases in equilibrium price (P) and equilibrium quantity (Q); the downward arrows signify decreases in these items.

(a)
Increase in demand

D increase:
P↑, *Q*↑

(b)
Decrease in demand

D decrease:
P↓, *Q*↓

(c)
Increase in supply

S increase:
P↓, *Q*↑

(d)
Decrease in supply
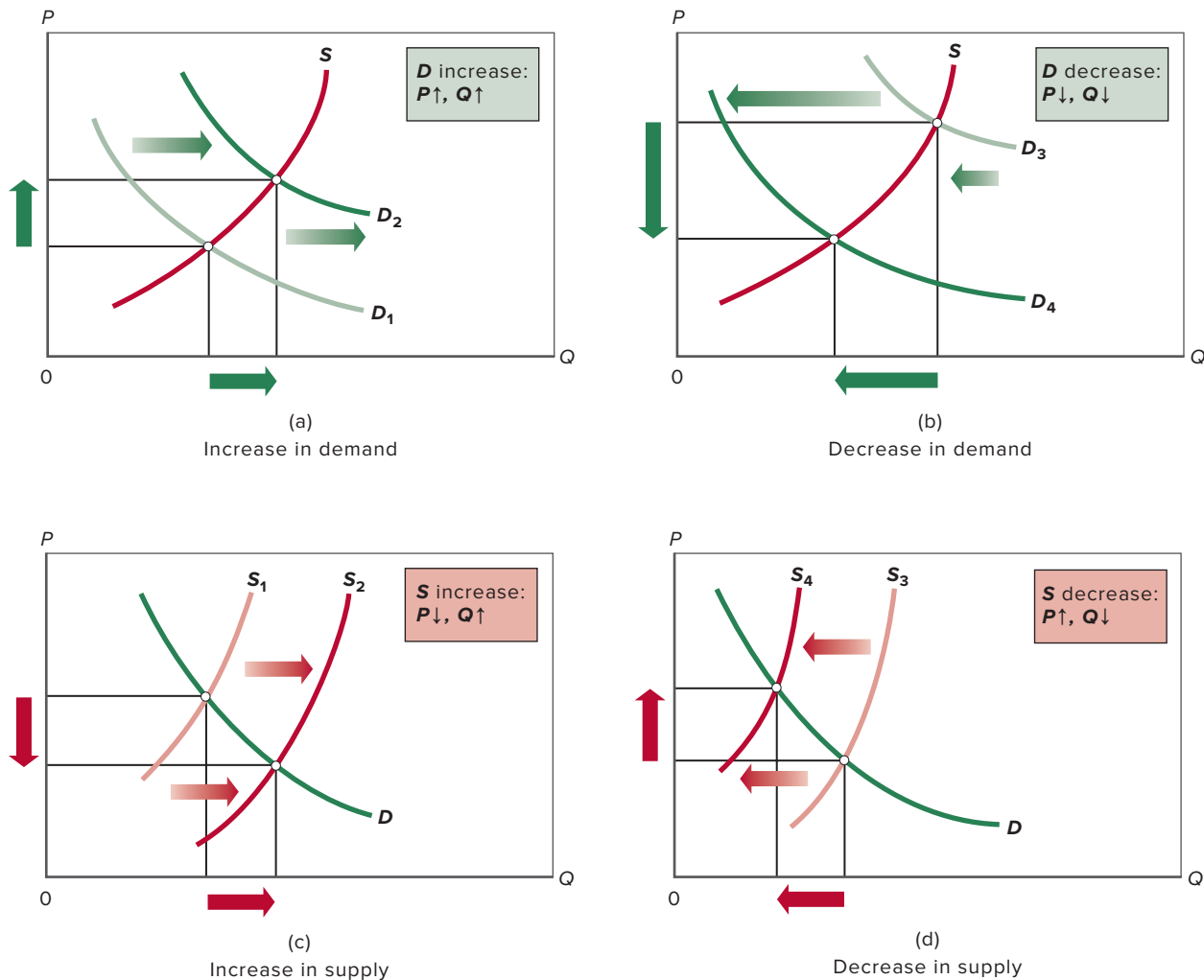
S decrease:
P↑, *Q*↓

Complex Cases

When both supply and demand change, the final effect is a combination of the individual effects.

Supply Increase; Demand Decrease What effect will a supply increase and a demand decrease for some good (for example, apples) have on equilibrium price? Both changes decrease price, so the net result is a price drop greater than that resulting from either change alone.

What happens to equilibrium quantity? Here the effects of the changes in supply and demand are opposed: The increase in supply increases equilibrium quantity, but the decrease in demand reduces it. The direction of the change in equilibrium quantity depends on the relative sizes of the changes in supply and demand. If the increase in supply is larger than the decrease in demand, the equilibrium quantity will increase. But if the decrease in demand is greater than the increase in supply, the equilibrium quantity will decrease.

Supply Decrease; Demand Increase A decrease in supply and an increase in demand for some good (for example, gasoline) both increase price. Their combined effect is an increase in equilibrium price greater than that caused by either change separately. But their effect on the equilibrium

Change in Supply	Change in Demand	Effect on Equilibrium Price	Effect on Equilibrium Quantity
1. Increase	Decrease	Decrease	Indeterminate
2. Decrease	Increase	Increase	Indeterminate
3. Increase	Increase	Indeterminate	Increase
4. Decrease	Decrease	Indeterminate	Decrease

TABLE 3.3
Effects of Changes in Both Supply and Demand

quantity is indeterminate, depending on the relative sizes of the changes in supply and demand. If the decrease in supply is larger than the increase in demand, the equilibrium quantity will decrease. In contrast, if the increase in demand is greater than the decrease in supply, the equilibrium quantity will increase.

Supply Increase; Demand Increase What if supply and demand both increase for some good (for example, smartphones)? A supply increase drops equilibrium price, while a demand increase boosts it. If the increase in supply is greater than the increase in demand, the equilibrium price will fall. If the opposite holds, the equilibrium price will rise.

The effect on equilibrium quantity is certain: The increases in supply and demand both raise the equilibrium quantity. Therefore, the equilibrium quantity will increase by an amount greater than that caused by either change alone.

Supply Decrease; Demand Decrease What about decreases in both supply and demand for some good (for example, new homes)? If the decrease in supply is greater than the decrease in demand, equilibrium price will rise. If the reverse is true, equilibrium price will fall. Because the decreases in supply and demand each reduce equilibrium quantity, we can be sure that equilibrium quantity will fall.

Table 3.3 summarizes these four cases. To understand them fully, you should draw supply and demand diagrams for each case to confirm the effects listed in this table.

Special cases arise when a decrease in demand and a decrease in supply, or an increase in demand and an increase in supply, exactly cancel out. In both cases, the net effect on equilibrium price will be zero; price will not change.

Global Perspective 3.1 shows that the price of a standard loaf of white bread varies considerably from country to country, reflecting substantial differences in local demand and supply.

GLOBAL PERSPECTIVE 3.1

AVERAGE PRICE OF A LOAF OF WHITE BREAD, SELECTED NATIONS, 2018

The market equilibrium price of a 500 gram (1.1 pound) loaf of white bread differs substantially across countries, reflecting local differences in supply and demand, as well as government interventions like subsidies and price ceilings. All prices given in U.S. dollars, with currency exchange rates being used to convert foreign prices into U.S. dollar values.

Source: Numbeo, www.numbeo.com.

Average Price for a 500g Loaf of White Bread, 2018
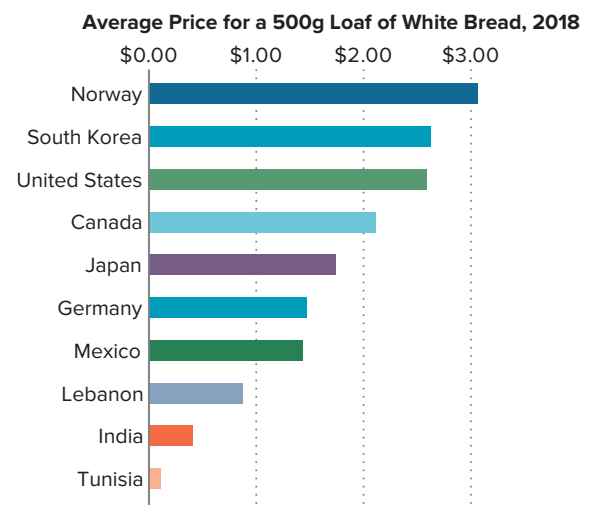
CONSIDER THIS . . .

Salsa and Coffee Beans

If you forget the other-things-equal assumption, you can encounter situations that *seem* to be in conflict with the laws of demand and supply. For example, suppose salsa manufacturers sell 1 million bottles of salsa at $4 a bottle in one year; 2 million bottles at $5 in the next year; and 3 million at $6 in the year thereafter. Price and quantity purchased vary directly, and these data seem to be at odds with the law of demand.

But there is no conflict here; the data do not refute the law of demand. The catch is that the law of demand's other-things-equal assumption has been violated over the three years in the example. Specifically, because of changing tastes and rising incomes, the demand for salsa has increased sharply, as in

Nancy R. Cohen/Photodisc/Getty Images

Figure 3.7a. The result is higher prices *and* larger quantities purchased.

Another example: The price of coffee beans occasionally shoots upward at the same time that the quantity of coffee beans harvested declines. These events seemingly contradict the direct relationship between price and quantity denoted by supply. The catch again is that the other-things-equal assumption underlying the upsloping supply curve is violated. Poor coffee harvests decrease supply, as in Figure 3.7d, increasing the equilibrium price of coffee and reducing the equilibrium quantity.

The laws of demand and supply are not refuted by observations of price and quantity made over periods of time in which either demand or supply curves shift.

AP | Application: Government-Set Prices

Prices in most markets are free to rise or fall to their equilibrium levels, no matter how high or low those levels might be. However, government sometimes concludes that supply and demand will produce prices that are unfairly high for buyers or unfairly low for sellers. So government may place legal limits on how high or low a price may go. Is that a good idea?

Price Ceilings on Gasoline

price ceiling A legally established maximum price for a good, or service. Normally set at a price below the equilibrium price.

A **price ceiling** sets the maximum legal price a seller may charge for a product or service. A price at or below the ceiling is legal; a price above it is not. The rationale for establishing price ceilings (or *ceiling prices*) on specific products is that they purportedly enable consumers to obtain some "essential" good or service that they could not afford at the equilibrium price. Examples are rent controls and usury laws, which specify maximum "prices" for rent and interest rates, respectively.

Graphical Analysis We can show the effects of price ceilings graphically. Suppose that rapidly rising world income boosts sales of automobiles and shifts the demand for gasoline to the right so that the market equilibrium price reaches $3.50 per gallon, shown as P_0 in Figure 3.8. The rapidly rising price of gasoline greatly burdens low- and moderate-income households, which pressure government to "do something." To keep gasoline prices down, the government imposes a ceiling price P_c of $3 per gallon. To affect the market, a price ceiling must be below the equilibrium price. A ceiling price of $4, for example, would have had no effect on the price of gasoline in the current situation.

What are the effects of this $3 ceiling price? The rationing ability of the free market is rendered ineffective. Because the ceiling price P_c is below the market-clearing price P_0, there is a lasting shortage of gasoline. The quantity of gasoline demanded at P_c is Q_d and the quantity supplied is only Q_s; a persistent shortage of amount $Q_d - Q_s$ occurs.

AP | FIGURE 3.8
A price ceiling.

A price ceiling is a maximum legal price such as P_c. When the ceiling price is below the equilibrium price, a persistent product shortage results. Here that shortage is shown by the horizontal distance between Q_d and Q_s.
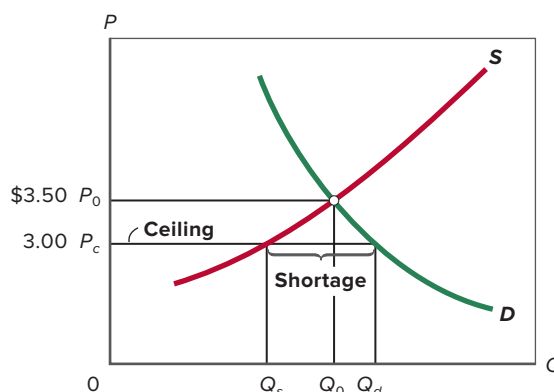
The price ceiling P_c prevents the usual market adjustment in which competition among buyers bids up price, inducing more production and rationing some buyers out of the market. That process would normally continue until the shortage disappeared at the equilibrium price and quantity, P_0 and Q_0.

By preventing these market adjustments from occurring, the price ceiling creates two related problems.

Rationing Problem How will the available supply Q_s be apportioned among buyers who want the greater amount Q_d? Should gasoline be distributed on a first-come, first-served basis—that is, to those willing and able to get in line the soonest or stay in line the longest? Or should gas stations decide how to distribute it? Because an unregulated shortage does not lead to an equitable distribution of gasoline, the government must establish some formal system for rationing it to consumers. One option is to issue ration coupons, which authorize bearers to purchase a fixed amount of gasoline per month. The rationing system might entail first the printing of coupons that permit the purchase of a certain amount of gasoline and then the equal distribution of the coupons so that every household receives the same number of coupons.

Black Markets Ration coupons will not prevent a second problem from arising. The demand curve in Figure 3.8 reveals that many buyers are willing to pay more than the ceiling price P_c. And, of course, it is more profitable for gas stations to sell at prices above the ceiling. Thus, despite the laws imposed by the price controls, *black markets* arise in which gasoline is illegally bought and sold at prices above the legal limits. Counterfeiting of ration coupons will also be a problem. And since the price of gasoline is now "set by the government," the government may face political pressure to set the price even lower.

Rent Controls

About 200 cities in the United States, including New York City, Boston, and San Francisco, have at one time or another enacted rent controls: maximum rents established by law (or, more recently, maximum rent increases for existing tenants). Such laws are intended to protect low-income families from escalating rents and to make housing more affordable to the poor.

What have been the actual economic effects? On the demand side, the below-equilibrium rents attract a larger number of renters. Some are locals seeking to move into their own apartments after sharing housing with friends or family. Others are outsiders attracted into the area by the artificially lower rents. But a large problem occurs on the supply side. Price controls make it less attractive for landlords to offer housing on the rental market. In the short run, owners may sell their rental units or convert them to condominiums. In the long run, low rents make it unprofitable for owners to repair or renovate their rental units. (Rent controls are one cause of the many abandoned apartment buildings found in larger cities.) Also, insurance companies, pension funds, and other potential new investors in housing will find it more profitable to invest in office buildings, shopping malls, or motels, where rents are not controlled.

In brief, rent controls distort market signals and thus resources are misallocated: Too few resources are allocated to rental housing and too many to alternative uses. Ironically, although rent controls are often legislated to lessen the effects of perceived housing shortages, controls in fact are a primary cause of such shortages. For that reason, most American cities either have abandoned or are in the process of dismantling rent controls.

Price Floors on Wheat

A **price floor** is a minimum price fixed by the government. A price at or above the price floor is legal; a price below it is not. Price floors above equilibrium prices are usually invoked when society feels that the market system has not provided a sufficient income for certain groups of resource suppliers or producers. Supported prices for agricultural products and minimum wage laws are two examples of price (or wage) floors. Let's look at the former.

Suppose that many farmers have extremely low incomes when the price of wheat is at its equilibrium value of $2 per bushel. The government decides to help out by establishing a legal price floor (or *price support*) of $3 per bushel.

price floor A legally established minimum price for a good, or service. Normally set at a price above the equilibrium price.

AP❚ FIGURE 3.9

A price floor.

A price floor is a minimum legal price such as P_f. When the price floor is above the equilibrium price, a persistent product surplus results. Here that surplus is shown by the horizontal distance between Q_s and Q_d.
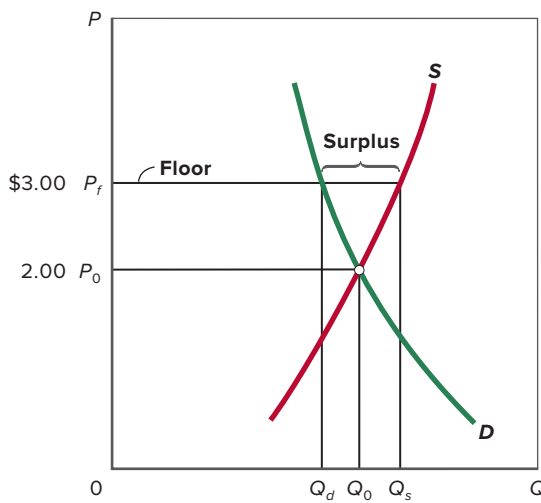
What will be the effects? At any price above the equilibrium price, quantity supplied will exceed quantity demanded—that is, there will be a persistent excess supply or surplus of the product. Farmers will be willing to produce and offer for sale more than private buyers are willing to purchase. Like a price ceiling, a price floor disrupts the rationing ability of the free market.

Graphical Analysis Figure 3.9 illustrates the effect of a price floor graphically. Suppose that S and D are the supply and demand curves for wheat. Equilibrium price and quantity are P_0 and Q_0, respectively. If the government imposes a price floor of P_f, farmers will produce Q_s but private buyers will purchase only Q_d. The surplus is the excess of Q_s over Q_d.

The government may cope with the surplus resulting from a price floor in two ways:

- It can restrict supply (for example, by instituting acreage allotments by which farmers agree to take a certain amount of land out of production) or increase demand (for example, by researching new uses for the product involved). These actions may reduce the difference between the equilibrium price and the price floor and thereby reduce the size of the surplus.

- If these efforts are not successful, then the government must purchase the surplus output at the $3 price (thereby subsidizing farmers) and store or otherwise dispose of it.

Additional Consequences Price floors such as P_f in Figure 3.9 not only disrupt prices' rationing ability but also distort resource allocation. Without the price floor, the $2 equilibrium price of wheat would cause financial losses and force high-cost wheat producers to plant other crops or abandon farming altogether. But the $3 price floor allows them to continue to grow wheat and remain farmers. So society devotes too many of its scarce resources to wheat production and too few to producing other, more valuable, goods and services. It fails to achieve allocative efficiency.

That's not all. Consumers of wheat-based products pay higher prices because of the price floor. Taxpayers pay higher taxes to finance the government's purchase of the surplus. And the price floor may cause environmental damage by encouraging wheat farmers to bring hilly, erosion-prone "marginal land" into production.

With all price ceilings and price floors, good intentions lead to bad economic outcomes. Government-controlled prices cause shortages or surpluses, distort resource allocation, and produce negative side effects.

AP❚ QUICK REVIEW

3.4

▶ An increase in demand (or an outward/rightward shift in the demand curve) increases equilibrium price and quantity; a decrease in demand (or an inward/leftward shift in the demand curve) decreases equilibrium price and quantity.

▶ An increase in supply (or an outward/rightward shift in the supply curve) reduces equilibrium price but increases equilibrium quantity; a decrease in supply (or an inward/leftward shift in the supply curve) increases equilibrium price but reduces equilibrium quantity.

▶ When *both* supply and demand change, there is greater ambiguity. Frequently, the impact on *either*

price or quantity will be known, while the impact on the other will be indeterminate. For example, if the number of consumers and the number of producers increase, both demand and supply will increase. There will be an increase in the equilibrium quantity, but an indeterminate change in the equilibrium price. Depending on the relative magnitudes of the shifts, price may increase, remain the same, or decrease.

▶ Government-controlled prices in the form of ceilings and floors attempt to correct for perceived unfairness to buyers or sellers, but they disrupt the rationing function of prices, distort resource allocations, can produce negative side effects, and generate deadweight economic loss.

Student Loans and Tuition Costs

Student Loans Increase the Price of Higher Education

Between the 1971–1972 school year and the 2017–2018 school year, the average cost of tuition, fees, room, and board increased from $1,405 to $25,290 at public colleges and universities, and from $2,929 to $50,900 at private colleges and universities.

It may seem obvious that student loans have helped students keep up with those rising costs. Under this commonly held hypothesis, college costs have risen over time due to outside factors like having to pay higher salaries to faculty and administrators, having to install the equipment necessary for digital classrooms, and having to increase staffing as schools added a wide variety of student services, including career centers and tutoring programs. From this point of view, outside factors increased costs and one of the only ways for students to keep up was by taking out loans.

But as far back as 1987, U.S. Secretary of Education William Bennett proposed that the commonly held hypothesis had things backward. Instead of loans helping students to keep up with rising tuition costs, loans were a major *cause* of rising tuition costs. As he wrote in the *New York Times,* ". . . increases in financial aid in recent years have enabled colleges and universities to blithely raise their tuitions, confident that Federal loan subsidies would help cushion the increase."

Recent research confirms Bennett's view.[1] Each $1 increase in the average amount of student loans received per full-time student increases tuition costs by an average of 70 cents. In addition, researchers were able to demonstrate the order of causation because the federal government increased the borrowing limits on student loans in the mid-2000s. When the limits were raised, students borrowed more. And when they did, tuition increased. So the order of causation was clear: more loans lead to higher tuition (rather than higher tuition causing students to take out more loans).

The model of demand and supply can explain why taking out more loans raises tuition. At any given time, the quantity supplied of higher education is essentially fixed because it is not easy for colleges and universities to expand enrollments without constructing new classrooms. But the demand curve for higher education is not fixed.

Baona/iStockphoto/Getty Images

It shifts rightward whenever any factor increases either the willingness or ability of students to pay for higher education.

That is important because student loans increase the ability to pay. Student loans consequently shift the demand curve for higher education to the right. That rightward shift in demand coupled with the fixed supply results in the equilibrium price of higher education rising. More loans mean higher tuition costs.

That is problematic because the federal government has aggressively subsidized student loans since the late 1970s. One alternative would be for the government to redirect its efforts toward subsidizing supply rather than demand. If the government pursued an increase in the supply of higher education, the equilibrium price of higher education would naturally fall as the supply curve for higher education shifted rightward. This was the approach taken after World War II, when heavily subsidized state university systems expanded their teaching capacity several fold by building additional campuses and hiring hundreds of thousands of additional instructors.

[1]David O. Lucca, Taylor Nauld, and Karen Shen, "Credit Supply and the Rise in College Tuition: Evidence from the Expansion in Federal Student Aid Programs," *Review of Financial Studies*, June 21, 2018.

Summary

LO3.1 Characterize and give examples of markets.
Markets bring buyers and sellers together. Some markets are local, others international. Some have physical locations while others are online. In highly competitive markets, large numbers of buyers and sellers come together to buy and sell standardized products. All such markets involve demand, supply, price, and quantity, with price being "discovered" through the interacting decisions of buyers and sellers.

LO3.2 Describe *demand* and explain how it can change.
Demand is a schedule or curve representing buyers' willingness and ability to purchase a particular product at each of various prices in a specific period. The law of demand states that consumers will buy more of a product at a low price than at a high price. So, other things equal, the relationship between price and quantity demanded is negative or inverse; it graphs as a downward sloping curve.

Market demand curves are found by adding horizontally the demand curves of the many individual consumers in the market.

A change in demand is different from a change in quantity demanded.

A *change in demand* occurs when there is a change in one or more of the determinants of demand (consumer tastes, the number of buyers in the market, the money incomes of consumers, the prices of related goods, and consumer expectations). A change in demand will shift the market demand curve either right or left. A shift to the right is an increase in demand; a shift to the left is a decrease in demand.

A *change in quantity demanded* is a movement from one point to another point on a fixed demand curve because of a change in the product's price.

LO3.3 Describe *supply* and explain how it can change.

Supply is a schedule or curve showing the amounts of a product that producers are willing to offer in the market at each possible price during a specific period of time. The law of supply states that, other things equal, producers will offer more of a product at a high price than at a low price. Thus, the relationship between price and quantity supplied is positive or direct; it graphs as an upward sloping curve.

The market supply curve is the horizontal summation of the supply curves of the individual producers of the product.

A *change in supply* occurs when there is a change in one or more of the determinants of supply (resource prices, production techniques, taxes or subsidies, the prices of other goods, producer expectations, or the number of sellers in the market). A change in supply shifts a product's supply curve. A shift to the right is an increase in supply; a shift to the left is a decrease in supply.

In contrast, a change in the price of the product being considered causes a *change in the quantity supplied*, which is shown as a movement from one point to another point along a fixed supply curve.

LO3.4 Explain how supply and demand interact to determine market equilibrium.

The equilibrium price and quantity are established at the intersection of the supply and demand curves. The interaction of market demand and market supply adjusts the price to the point at which the quantities demanded and supplied are equal. This is the equilibrium price. The corresponding quantity is the equilibrium quantity.

The ability of market forces to synchronize selling and buying decisions to eliminate potential surpluses and shortages is known as the rationing function of prices. The equilibrium quantity in competitive markets reflects both productive efficiency (least-cost production) and allocative efficiency (producing the right amount of the product relative to other products).

LO3.5 Explain how changes in supply and demand affect equilibrium prices and quantities.

A change in either demand or supply changes the equilibrium price and quantity. Increases in demand raise both equilibrium price and equilibrium quantity; decreases in demand lower both equilibrium price and equilibrium quantity. Increases in supply lower equilibrium price and raise equilibrium quantity. Decreases in supply raise equilibrium price and lower equilibrium quantity.

Simultaneous changes in demand and supply affect equilibrium price and quantity in various ways, depending on their direction and relative magnitudes (see Table 3.3).

LO3.6 Define government-set prices and explain how they can cause surpluses and shortages.

A price ceiling is a maximum price set by government and is designed to help consumers. Effective price ceilings produce persistent product shortages, and if an equitable distribution of the product is sought, government must ration the product to consumers.

A price floor is a minimum price set by government and is designed to aid producers. Effective price floors lead to persistent product surpluses; the government must either purchase the product or eliminate the surplus by imposing restrictions on production or increasing private demand.

Legally fixed prices stifle the rationing function of prices and distort the allocation of resources.

Terms and Concepts

demand	substitute goods	change in quantity supplied
demand schedule	complementary goods	equilibrium price
law of demand	change in demand	equilibrium quantity
diminishing marginal utility	change in quantity demanded	surplus
income effect	supply	shortage
substitution effect	supply schedule	productive efficiency
demand curve	law of supply	allocative efficiency
determinants of demand	supply curve	price ceiling
normal good	determinants of supply	price floor
inferior good	change in supply	

Discussion Questions

1. Explain the law of demand. Why does a demand curve slope downward? How is a market demand curve derived from individual demand curves? **LO3.2**

2. What are the determinants of demand? What happens to the demand curve when any of these determinants change? Distinguish between a change in demand and a movement along a fixed demand curve, noting the cause(s) of each. **LO3.2**

3. Explain the law of supply. Why does the supply curve slope upward? How is the market supply curve derived from the supply curves of individual producers? **LO3.3**

4. What are the determinants of supply? What happens to the supply curve when any of these determinants change? Distinguish between a change in supply and a change in the quantity supplied, noting the cause(s) of each. **LO3.3**

5. In 2001 an outbreak of hoof-and-mouth disease in Europe led to the burning of millions of cattle carcasses. What impact would you expect on the supply of cattle hides, hide prices, the supply of leather goods, and the price of leather goods? Explain. **LO3.5**

6. For each stock in the stock market, the number of shares sold daily equals the number of shares purchased. That is, the quantity of each firm's shares demanded equals the quantity supplied. Why, then, do the prices of stock shares change? **LO3.5**

7. What do economists mean when they say "Price floors and ceilings stifle the rationing function of prices and distort resource allocation"? **LO3.6**

8. **LAST WORD** Real (inflation-adjusted) tuition costs were nearly constant during the 1960s despite a huge increase in the number of college students as the very large Baby Boom generation came of age. What do these constant tuition costs suggest about the supply of higher education during that period? When the much smaller Baby Bust generation followed in the 1970s, real tuition costs fell. What does that fact suggest about demand relative to supply during the 1970s?

AP Review Questions

1. What effect will each of the following have on the demand for fuel-efficient small cars such as the Mini Cooper and Fiat 500? **LO3.2**
   a. Small cars become more fashionable.
   b. The price of large cars, a substitute for small cars, rises (with the price of small cars remaining the same).
   c. Income declines and small cars are an inferior good.
   d. Consumers anticipate that the price of small cars will decrease substantially in the near future.
   e. The price of gasoline substantially drops.

2. True or False: A "change in quantity demanded" is a shift of the entire demand curve to the right or to the left. **LO3.2**

3. What effect will each of the following have on the supply of auto tires? **LO3.3**
   a. A technological advance in the methods of producing tires
   b. A decline in the number of firms in the tire industry.
   c. An increase in the price of rubber used in the production of tires
   d. The expectation that the equilibrium price of auto tires will be lower in the future than it is now
   e. A decline in the price of the large tires used for semi trucks and earth-hauling rigs (with no change in the price of auto tires)
   f. The levying of a per-unit tax on each auto tire sold
   g. The granting of a 50-cent-per-unit subsidy for each auto tire produced

4. "In the corn market, demand often exceeds supply, and supply sometimes exceeds demand." "The price of corn rises and falls in response to changes in supply and demand." In which of these two statements are the terms "supply" and "demand" used correctly? Explain. **LO3.3**

5. Suppose that in the market for computer memory chips, the equilibrium price is $50 per chip. If the current price is $55 per chip, then there will be a(an) ——————— of memory chips. **LO3.4**
   a. shortage
   b. surplus
   c. equilibrium quantity
   d. a future increase in the production
   e. none of the above

6. Label each of the following scenarios with the set of symbols that best indicates the price change and quantity change that occur in the scenario. In some scenarios, it may not be possible from the information given to determine the direction of a particular price change or a particular quantity change. We will symbolize those cases as, respectively, "P?" and "Q?" The four possible combinations of price and quantity changes are: **LO3.5**

   P↓Q?   P? Q↓
   P↑Q?   P? Q↑

   a. On a hot day, both the demand for lemonade and the supply of lemonade increase.
   b. On a cold day, both the demand for ice cream and the supply of ice cream decrease.
   c. When Hawaii's Mt. Kilauea erupts violently, tourists' demand for sightseeing flights increases, but the supply of pilots willing to provide these dangerous flights decreases.
   d. In a hot area of Arizona where a lot of electricity is generated with wind turbines, the demand for electricity falls on windy days as people switch off their air conditioners and enjoy the breeze. But at the same time, the amount of electricity supplied increases as the wind turbines spin faster.

7. Suppose the total demand for wheat and the total supply of wheat per month in the Kansas City grain market are as shown in the following table. Suppose that the government establishes a price ceiling of $3.70 for wheat. What might prompt the government to establish this price ceiling? Explain carefully the main effects. Demonstrate your answer graphically. Next, suppose that the government establishes a price floor of $4.60 for wheat. What will be the main effects of this price floor? Demonstrate your answer graphically. **LO3.6**

Thousands of Bushels Demanded	Price per Bushel	Thousands of Bushels Supplied
85	$3.40	72
80	3.70	73
75	4.00	75
70	4.30	77
65	4.60	79
60	4.90	81

8. A price ceiling will result in a shortage only if the ceiling price is ——————— the equilibrium price. **LO3.6**
   a. less than
   b. equal to
   c. greater than

Problems

1. Suppose there are three buyers of candy in a market: Tex, Dex, and Rex. The market demand and the individual demands of Tex, Dex, and Rex are shown in the following table. **LO3.2**
   a. Fill in the missing values.
   b. Which buyer demands the least at a price of $5? The most at a price of $7?
   c. Which buyer's quantity demanded increases the most when the price decreases from $7 to $6?
   d. In which direction would the market demand curve shift if Tex withdrew from the market? What would happen if Dex doubled his purchases at each possible price?
   e. Suppose that at a price of $6, the total quantity demanded increases from 19 to 38. Is this a "change in the quantity demanded" or a "change in demand"? Explain.

Price per Candy	Individual Quantities Demanded						Total Quantity Demanded
	Tex		Dex		Rex		
$8	3	+	1	+	0	=	___
7	8	+	2	+	___	=	12
6	___	+	3	+	4	=	19
5	17	+	___	+	6	=	27
4	23	+	5	+	8	=	___

2. The figure below shows the supply curve for tennis balls, S_1, for Drop Volley Tennis, a producer of tennis equipment. Use the figure and the table below to give your answers to the following questions. **LO3.3**
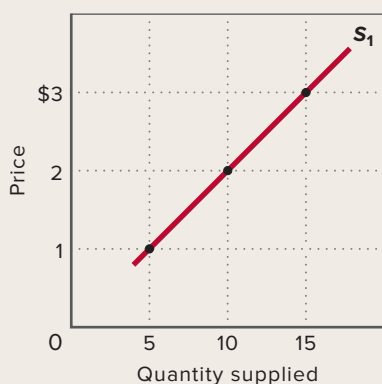
a. Use the figure to fill in the quantity supplied on supply curve S_1 for each price in the following table.

Price	S_1 Quantity Supplied	S_2 Quantity Supplied	Change in Quantity Supplied
$3	___	4	___
2	___	2	___
1	___	0	___

b. If production costs were to increase, the quantities supplied at each price would be as shown by the third column of the table ("S_2 Quantity Supplied"). Use those data to draw supply curve S_2 on the same graph as supply curve S_1.
c. In the fourth column of the table, enter the amount by which the quantity supplied at each price changes due to the increase in product costs. (Use positive numbers for increases and negative numbers for decreases.)
d. Did the increase in production costs cause a "decrease in supply" or a "decrease in quantity supplied"? Explain.

3. Refer to the following expanded table from review question 8. **LO3.4**
   a. What is the equilibrium price? At what price is there neither a shortage nor a surplus? Fill in the surplus-shortage column and use it to confirm your answers.
   b. Graph the demand for wheat and the supply of wheat. Be sure to label the axes of your graph correctly. Label equilibrium price P and equilibrium quantity Q.
   c. How big is the surplus or shortage at $3.40? At $4.90? How big a surplus or shortage results if the price is 60 cents higher than the equilibrium price? 30 cents lower than the equilibrium price?

Thousands of Bushels Demanded	Price per Bushel	Thousands of Bushels Supplied	Surplus (+) or Shortage (−)
85	$3.40	72	_____
80	3.70	73	_____
75	4.00	75	_____
70	4.30	77	_____
65	4.60	79	_____
60	4.90	81	_____

4. How will each of the following changes in demand and/or supply affect equilibrium price and equilibrium quantity in a competitive market? That is, do price and quantity rise, fall, or remain unchanged, or are the answers indeterminate because they depend on the magnitudes of the shifts? **LO3.5**
   a. Supply decreases and demand is constant.
   b. Demand decreases and supply is constant.
   c. Supply increases and demand is constant.
   d. Demand increases and supply increases.
   e. Demand increases and supply is constant.
   f. Supply increases and demand decreases.
   g. Demand increases and supply decreases.
   h. Demand decreases and supply decreases.

5. Use two market diagrams to explain how an increase in state subsidies to public colleges might affect tuition and enrollments in both public and private colleges. **LO3.5**

6. **ADVANCED ANALYSIS** Assume that demand for a commodity is represented by the equation $P = 10 - .2Q_d$ and supply by the equation $P = 2 + .2Q_s$, where Q_d and Q_s are quantity demanded and quantity supplied, respectively, and P is price. Using the equilibrium condition $Q_s = Q_d$, solve the equations to determine equilibrium price and equilibrium quantity. **LO3.5**

7. Suppose that the demand and supply schedules for rental apartments in the city of Gotham are as given in the following table. **LO3.6**

Monthly Rent	Apartments Demanded	Apartments Supplied
$2,500	10,000	15,000
2,000	12,500	12,500
1,500	15,000	10,000
1,000	17,500	7,500
500	20,000	5,000

a. What is the market equilibrium rental price per month and the market equilibrium number of apartments demanded and supplied?

b. If the local government can enforce a rent-control law that sets the maximum monthly rent at $1,500, will there be a surplus or a shortage? Of how many units? How many units will actually be rented each month?

c. Suppose that a new government is elected that wants to keep out the poor. It declares that the minimum rent that landlords can charge is $2,500 per month. If the government can enforce that price floor, will there be a surplus or a shortage? Of how many units? And how many units will actually be rented each month?

d. Suppose that the government wishes to decrease the market equilibrium monthly rent by increasing the supply of housing. Assuming that demand remains unchanged, how many additional units of housing would the government need to supply to get the market equilibrium rental price to fall to $1,500 per month? To $1,000 per month? To $500 per month?

Additional Examples of Supply and Demand

LO3.7 Use supply-and-demand analysis to analyze actual-economy situations.

Supply-and-demand analysis is a powerful tool for understanding equilibrium prices and quantities. The information provided in this chapter is fully sufficient for moving forward in the book, but you may find that additional examples of supply and demand are helpful. This appendix provides several concrete illustrations of changes in supply and demand.

AP | Changes in Supply and Demand

As Figure 3.7 demonstrates, changes in supply and demand cause changes in equilibrium price, quantity, or both. The following applications illustrate this fact in several real-world markets. The simplest situations are those in which either supply changes while demand remains constant or demand changes while supply remains constant. Let's consider a simple case first, before looking at more complex applications.

Lettuce

Every now and then extreme weather severely reduces the size of some crop. Suppose, for example, that a severe freeze destroys a sizable portion of the lettuce crop. This unfortunate situation implies a significant decline in supply, which we represent as a leftward shift of the supply curve from S_1 to S_2 in Figure 1. At each price, consumers desire as much lettuce as before, so the freeze does not affect the demand for lettuce. That is, demand curve D_1 does not shift.

What are the consequences of the reduced supply of lettuce? As Figure 1 shows, the leftward shift of the supply curve disrupts the previous equilibrium in the lettuce market and drives the equilibrium price upward from P_1 to P_2. Consumers respond to that price hike by reducing the quantity of lettuce demanded from Q_1 to Q_2. Equilibrium is restored at P_2 and Q_2.

Consumers who are willing and able to pay price P_2 obtain lettuce; consumers unwilling or unable to pay that price do not. Some consumers continue to buy as much lettuce as before, even at the higher price. Others buy some lettuce but not as much as before, and still others opt out of the market completely.

The latter two groups use the money they would have spent on lettuce to obtain other products—carrots, for example. (Because of our other-things-equal assumption, the prices of other products have not changed.)

Pink Salmon

Now let's see what happens when both supply and demand change at the same time. Several decades ago, people who caught salmon earned as much as $1 for each pound of pink salmon—the type of salmon most commonly used for canning. In Figure 2 that price is represented as P_1, at the intersection of supply curve S_1 and demand curve D_1. The corresponding quantity of pink salmon is shown as Q_1 pounds.

As time passed, supply and demand changed in the market for pink salmon. On the supply side, improved technology in the form of larger, more efficient fishing boats greatly increased the catch and lowered the cost of obtaining it. Also, high profits at price P_1 encouraged many new fishers to enter the industry. As a result of these changes, the supply of pink salmon greatly increased and the supply curve shifted to the right, as from S_1 to S_2 in Figure 2.

FIGURE 1 **The market for lettuce.**
The decrease in the supply of lettuce, shown here by the shift from S_1 to S_2, increases the equilibrium price of lettuce from P_1 to P_2 and reduces the equilibrium quantity from Q_1 to Q_2.

FIGURE 2 **The market for pink salmon.**
In the last several decades, the supply of pink salmon has increased and the demand for pink salmon has decreased. As a result, the price of pink salmon has declined, as from P_1 to P_2. Because supply has increased by more than demand has decreased, the equilibrium quantity of pink salmon has increased, as from Q_1 to Q_2.
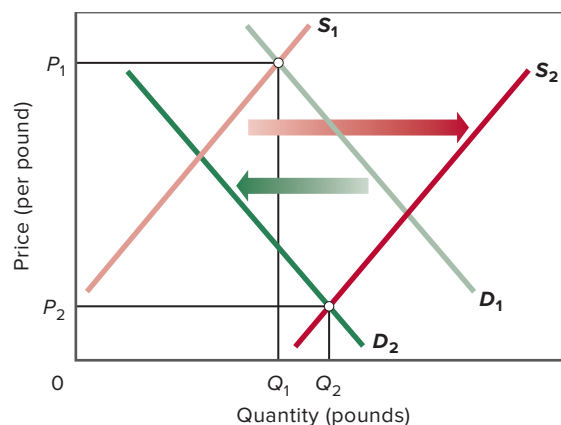
Over the same years, the demand for pink salmon declined, as represented by the leftward shift from D_1 to D_2 in Figure 2. That decrease was caused by increases in consumer income and reductions in the price of substitute products. As buyers' incomes rose, consumers shifted demand away from canned fish and toward higher-quality fresh or frozen fish, including more-valued chinook, sockeye, and coho salmon. Moreover, the emergence of fish farming, in which salmon are raised in ocean net pens, lowered the prices of these other species, thus reducing the demand for pink salmon.

The altered supply and demand reduced the price of pink salmon to as low as $0.10 per pound, as represented by the drop in price from P_1 to P_2 in Figure 2. Both the supply increase and the demand decrease helped reduce the equilibrium price. However, in this particular case, the equilibrium quantity of pink salmon increased, as represented by the move from Q_1 to Q_2. Both shifts reduced the equilibrium price, but equilibrium quantity increased because the increase in supply exceeded the decrease in demand.

Gasoline

The price of gasoline in the United States has increased rapidly several times during the past several years. For example, the average price of a gallon of gasoline rose from around $1.87 in February 2016 to $2.99 in May 2018. What caused this 60 percent rise in the price of gasoline? How would we graph this increase?

We begin in Figure 3 with the price of a gallon of gasoline at P_1, representing the $1.87 price. Simultaneous supply and demand factors disturbed this equilibrium. Supply uncertainties relating to Middle East politics and expanded demand for oil by

FIGURE 3 The market for gasoline.

An increase in the demand for gasoline, as shown by the shift from D_1 to D_2, coupled with a decrease in supply, as shown by the shift from S_1 to S_2, boosts equilibrium price (here from P_1 to P_2). In this case, equilibrium quantity increases from Q_1 to Q_2 because the increase in demand outweighs the decrease in supply.
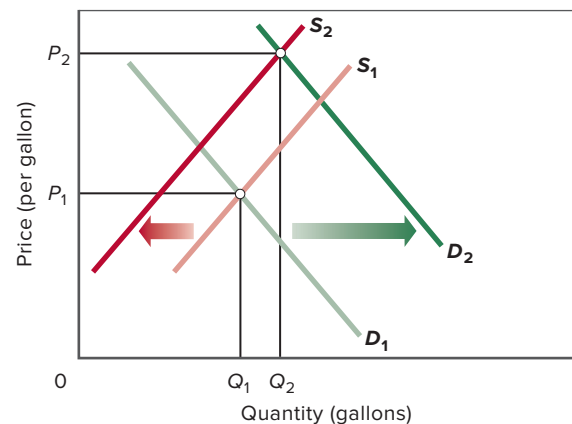
fast-growing countries such as China pushed up the price of oil from just under $30 per barrel in February 2016 to a bit over $70 per barrel in May 2018. Oil is the main input for producing gasoline, so any sustained rise in its price boosts the per-unit cost of producing gasoline. Such increases in cost decrease the supply of gasoline, as represented by the leftward shift of the supply curve from S_1 to S_2 in Figure 3. At times refinery breakdowns in the United States have also contributed to reduced supply.

While the supply of gasoline declined between February 2016 and May 2018, the demand for gasoline increased, as depicted by the rightward shift of the demand curve from D_1

CONSIDER THIS . . .

Uber and Dynamic Pricing

The ride-sharing service known as Uber rose to prominence in 2013 by offering consumers an alternative to government-regulated taxi companies. Uber works via the Internet, matching people who need a ride with people who are willing to use their own vehicles to provide rides. Both parties can find each other easily and instantly via a mobile phone app and Uber makes its money by taking a percentage of the fare.

Uber is innovative in many ways, including empowering anybody to become a paid driver, breaking up local taxi monopolies, and making it effortless to arrange a quick pickup. But Uber's most interesting feature is dynamic pricing, under which Uber sets equilibrium prices in real time, constantly adjusting fares so as to equalize quantity demanded and quality supplied. The result is extremely short waiting times for both riders and drivers as Uber will, for instance, set a substantially

SURGE PRICING ✕

Demand is off the charts! Rates have increased to get more Ubers on the road.

1.75X

TIMES THE NORMAL RATE
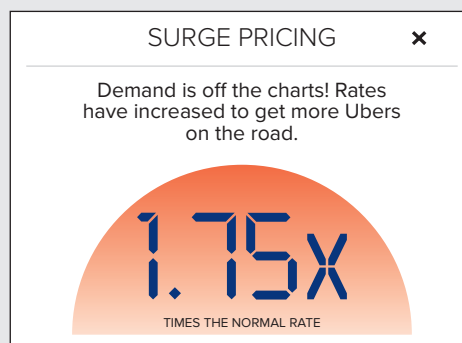
Source: Uber Manila Tips

higher "surge price" in a given location if demand suddenly increases due to, say, a bunch of people leaving a concert all at once and wanting rides. The higher fare encourages more Uber drivers to converge on the area, thereby minimizing waiting times for both drivers and passengers.

The short wait times created by Uber's use of dynamic pricing stand in sharp contrast to taxi fares, which are fixed by law and therefore unable to adjust to ongoing changes in supply and demand. On days when demand is high relative to supply, taxi shortages arise. On days when demand is low relative to supply, drivers sit idle for long stretches of time. All of that inefficiency and inconvenience is eliminated by Uber's use of market equilibrium prices to equalize the demand and supply of rides.

to D_2. Incomes in general were rising over this period because the U.S. economy was expanding. Rising incomes raise demand for all normal goods, including gasoline. An increased number of low-gas-mileage SUVs and light trucks on the road also contributed to growing gas demand.

The combined decline in gasoline supply and increase in gasoline demand boosted the price of gasoline from $1.87 to $2.99, as represented by the rise from P_1 to P_2 in Figure 3. Because the demand increase outweighed the supply decrease, the equilibrium quantity expanded, from Q_1 to Q_2.

In other periods the price of gasoline has *declined* as the demand for gasoline has increased. Test your understanding of the analysis by explaining how such a price decrease could occur.

AP | Upward Sloping versus Vertical Supply Curves

As you already know, the typical good or service has an upward sloping supply curve because a higher market price causes producers to increase the quantity supplied. There are, however, some goods and services whose quantities supplied are fixed and totally unresponsive to changes in price. Examples include the amount of land in a given area, the number of seats in a stadium, and the limited part of the electromagnetic spectrum that is reserved for cellular telephone transmissions. These goods and services have vertical supply curves because the same fixed amount is available no matter what price is offered to suppliers.

Reactions to Demand Shifts

Markets react very differently to a shift in demand depending upon whether they have upward sloping or vertical supply curves.

Upward Sloping Supply Curves When a market has an upward sloping supply curve, any shift in demand will cause both the equilibrium price *and* the equilibrium quantity to adjust. As we saw in the chapter, price and quantity both change.

Vertical Supply Curves When a market has a vertical supply curve, any shift in demand will cause only the equilibrium price to change; the equilibrium quantity remains the same because the quantity supplied is fixed and cannot adjust. Consider Figure 4, in which the supply of land in San Francisco is fixed at quantity Q_0. If demand increases from D_1 to D_2, the movement from the initial equilibrium at point *a* to the final equilibrium at point *b* is accomplished solely by a rise in the equilibrium price from P_1 to P_2. Because the quantity of land is fixed, the increase in demand cannot cause any change in the equilibrium quantity supplied. The entire adjustment from the initial equilibrium to the final equilibrium has to come in the form of a higher equilibrium price.

This fact explains why real estate prices are so high in San Francisco and other major cities. With the quantity of land in fixed supply, any increase in the demand for land leads to an increase in the price of land.

FIGURE 4 **The market for land in San Francisco.**
Because the quantity of land in San Francisco is fixed at Q_0, the supply curve is vertical above Q_0 in order to indicate that the same quantity of land will be supplied no matter what the price is. As demand increases from D_1 to D_2, the equilibrium price rises from P_1 to P_2. Because the quantity of land is fixed at Q_0, the movement from equilibrium *a* to equilibrium *b* involves only a change in the equilibrium price; the equilibrium quantity remains at Q_0 due to land being in fixed supply.
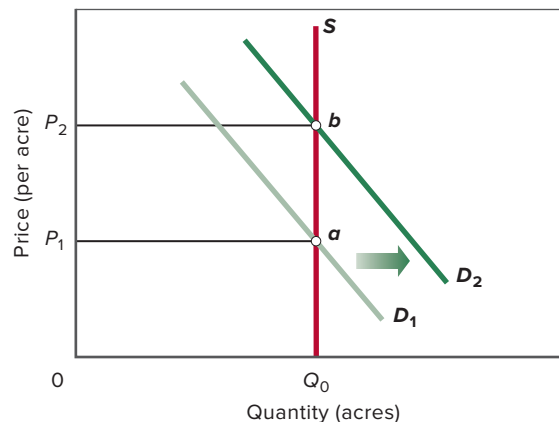
Preset Prices

In this chapter, we saw that an effective government-imposed price ceiling (legal maximum price) causes quantity demanded to exceed quantity supplied—a shortage. An effective government-imposed price floor (legal minimum price) causes quantity supplied to exceed quantity demanded—a surplus.

We now want to establish that shortages and surpluses can occur in markets other than those in which government imposes price floors and ceilings. Such market imbalances happen when sellers set prices in advance of sales and those prices turn out to be below or above equilibrium prices. Consider the following two examples.

Olympic Figure Skating Finals

Tickets for the women's figure skating championship at the Olympics are among the world's "hottest tickets." The popularity of this event and the high incomes of buyers translate into tremendous ticket demand. The Olympic officials set the price for the tickets in advance. Invariably, the price, although high, is considerably below the equilibrium price that would equate quantity demanded and quantity supplied. A severe shortage of tickets therefore occurs in the *primary market*—that is, the market involving the official ticket office.

The shortage, in turn, creates a *secondary market* in which buyers bid for tickets held by initial purchasers rather than the original seller. Scalping tickets—selling them above the original ticket price—may be legal or illegal, depending on local laws.

Figure 5 shows how the shortage in the primary ticket market looks in terms of supply and demand analysis. Demand curve D represents the demand for tickets and supply curve S represents the supply of tickets. The supply curve is vertical because a fixed number of tickets are printed to match the

FIGURE 5 The market for tickets to the Olympic women's figure skating finals.
The demand curve *D* and supply curve *S* for the Olympic women's figure skating finals produce an equilibrium price that is above the P_1 price printed on the ticket. At price P_1 the quantity of tickets demanded, Q_2, greatly exceeds the quantity of tickets available, Q_1. The resulting shortage of $ab (= Q_2 - Q_1)$ gives rise to a legal or illegal secondary market.

FIGURE 6 The market for tickets to the Olympic curling preliminaries.
The demand curve *D* and supply curve *S* for the Olympic curling preliminaries produce an equilibrium price below the P_1 price printed on the ticket. At price P_1 the quantity of tickets demanded is less than the quantity of tickets available. The resulting surplus of $ba (= Q_1 - Q_2)$ means the event is not sold out.
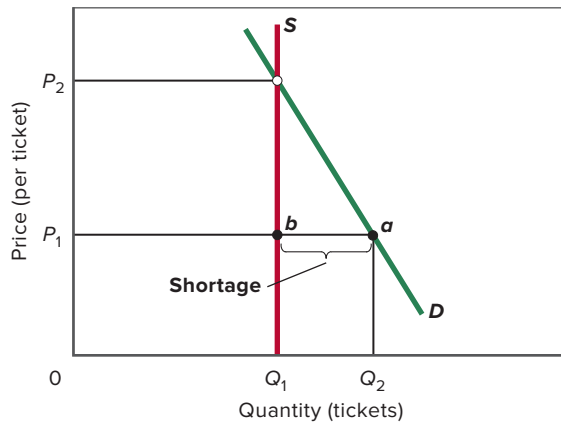
arena's capacity. At the printed ticket price of P_1, the quantity of tickets demanded, Q_2, exceeds the quantity supplied, Q_1. The result is a shortage of ab–the horizontal distance between Q_2 and Q_1 in the primary market.

Olympic Curling Preliminaries

Contrast the shortage of tickets for the women's figure skating finals at the Olympics to the surplus of tickets for one of the preliminary curling matches. For the uninitiated, curling is a sport in which participants slide a heavy round object called a "stone" down a lane painted on an ice rink toward a target while teammates called "sweepers" use brooms to alter the course of the stone.

Curling is a popular spectator sport in a few nations, including Canada, but it does not draw many fans in most countries. So the demand for tickets to most of the preliminary curling events is not very strong. We demonstrate this weak demand as *D* in Figure 6. As in our previous example, the supply of tickets is fixed by the size of the arena and is shown as vertical line *S*.

We represent the printed ticket price as P_1 in Figure 6. In this case the printed price is much higher than the equilibrium price of P_2. At the printed ticket price, quantity supplied is Q_1 and quantity demanded is Q_2. So a surplus of tickets of $ba (= Q_1 - Q_2)$ occurs. No ticket scalping occurs and there are numerous empty seats. Only if the Olympic officials had priced the tickets at the lower price P_2 would the event have been a sellout. (Actually, Olympic officials try to adjust to demand realities for curling contests by holding them in smaller arenas and by charging less for tickets. Nevertheless, the stands are rarely full for the preliminary contests, which compete against final events in other winter Olympic sports.)

Appendix Summary

LO3.7 **Use supply-and-demand analysis to analyze actual-economy situations.**
A decrease in the supply of a product increases its equilibrium price and reduces its equilibrium quantity. In contrast, an increase in the demand for a product boosts both its equilibrium price and its equilibrium quantity.

Simultaneous changes in supply and demand affect equilibrium price and quantity in various ways, depending on the relative magnitudes of the changes in supply and demand. Equal increases in supply and demand, for example, leave equilibrium price unchanged.

Products (such as land) whose quantities supplied do not vary with price have vertical supply curves. For these products, any shift in demand will lead to a change in the equilibrium price but no change in the equilibrium quantity.

Sellers set prices of some items such as tickets in advance of the event. These items are sold in a primary market that involves the original sellers and buyers. If preset prices turn out to be below the equilibrium prices, shortages occur, and scalping in legal or illegal secondary markets arises. The prices in the secondary market then rise above the preset prices. In contrast, surpluses occur when the preset prices end up exceeding the equilibrium prices.

Appendix Discussion Questions

1. Why are shortages or surpluses more likely with preset prices (such as those on tickets) than with flexible prices (such as those on gasoline)? **LO3.7**

2. Most scalping laws make it illegal to sell—but not to buy—tickets at prices above those printed on the tickets. Assuming the existence of such laws, use supply-and-demand analysis to explain why the equilibrium ticket price in an illegal secondary market tends to be higher than in a legal secondary market. **LO3.7**

3. Go to the website of the Energy Information Administration, www.eia.doe.gov, and follow the links to find the current retail price of gasoline. How does the current price of regular gasoline compare with the price a year ago? What must have happened to supply, demand, or both to explain the observed price change? **LO3.7**

4. Suppose the supply of apples sharply increases because of perfect weather conditions throughout the growing season. Assuming no change in demand, explain the effect on the equilibrium price and quantity of apples. Explain why quantity demanded increases even though demand does not change. **LO3.7**

5. Assume the demand for lumber suddenly rises because of rapid growth in demand for new housing. Assume no change in supply. Why does the equilibrium price of lumber rise? What would happen if the price did not rise under the demand and supply circumstances described? **LO3.7**

6. Assume that both the supply of bottled water and the demand for bottled water rise during the summer but that supply increases more rapidly than demand. What can you conclude about the changes in equilibrium price and equilibrium quantity? **LO3.7**

7. When asked for investment advice, humorist Will Rogers joked that people should "[b]uy land. They ain't making any more of the stuff." Explain his advice in terms of the supply-and-demand model. **LO3.7**

AP Appendix Review Questions

1. Will the equilibrium price of orange juice increase or decrease in each of the following situations? **LO3.7**
   a. A medical study reporting that orange juice reduces cancer is released at the same time that a freak storm destroys half of the orange crop in Florida.
   b. The prices of all beverages except orange juice fall by half while unexpectedly perfect weather in Florida results in an orange crop that is 20 percent larger than normal.

2. Consider the market for coffee beans. Suppose that the prices of all other caffeinated beverages go up 30 percent while at the same time a new fertilizer boosts production at coffee plantations dramatically. Which of the following best describes what is likely to happen to the equilibrium price and quantity of coffee beans? **LO3.7**
   a. Both the equilibrium price and the quantity will rise.
   b. The equilibrium price will rise but the equilibrium quantity will fall.
   c. The equilibrium price may rise or fall but the equilibrium quantity will rise for certain.
   d. Neither the price change nor the quantity change can be determined for certain.
   e. None of the above.

3. Suppose that the demand for euros increases as more Americans travel to Europe for vacation. What is the effect on the market for euros? **LO3.7**
   a. The dollar will appreciate.
   b. The equilibrium price of one euro for one dollar would be higher.
   c. The equilibrium price of one euro for one dollar would be lower.

   d. The euro will stay the same equilibrium price for the dollar.
   e. The dollar will appreciate, and the euro will depreciate.

4. Suppose that you are the economic advisor to a local government that has to deal with a politically embarrassing surplus that was caused by a price floor that the government recently imposed. Your first suggestion is to get rid of the price floor, but the politicians don't want to do that. Instead, they present you with the following list of options that they hope will get rid of the surplus while keeping the price floor. Identify each one as either *could work* or *can't work*. **LO3.7**
   a. Restricting supply.
   b. Decreasing demand.
   c. Purchasing the surplus at the floor price.

5. Suppose both the demand for olives and the supply of olives decline by equal amounts over some time period. Use graphical analysis to show the effect on equilibrium price and quantity. **LO3.7**

6. When the supply curve is vertical, which statement is true? **LO3.7**
   a. Any shift in the demand curve will cause both equilibrium price and quantity to adjust.
   b. Any shift in the demand curve will cause only the equilibrium price to adjust.
   c. Any shift in the demand curve will cause only the equilibrium quantity to adjust.
   d. Any shift in the vertical supply curve will cause both the equilibrium price and quantity to adjust.
   e. There can be no equilibrium position between demand and supply.

Appendix Problems

1. Demand and supply often shift in the retail market for gasoline. Below are two demand curves and two supply curves for gallons of gasoline in the month of May in a small town in Maine. Some of the data are missing. **LO3.7**

Price	Quantities Demanded		Quantities Supplied	
	D_1	D_2	S_1	S_2
$4.00	5,000	7,500	9,000	9,500
____	6,000	8,000	8,000	9,000
2.00	____	8,500	____	8,500
____	____	9,000	5,000	____

a. Use the following facts to fill in the missing data in the table. If demand is D_1 and supply is S_1, the equilibrium quantity is 7,000 gallons per month. When demand is D_2 and supply is S_1, the equilibrium price is $3.00 per gallon. When demand is D_2 and supply is S_1, there is an excess demand of 4,000 gallons per month at a price of $1.00 per gallon. If demand is D_1 and supply is S_2, the equilibrium quantity is 8,000 gallons per month.

b. Compare two equilibriums. In the first, demand is D_1 and supply is S_1. In the second, demand is D_1 and supply is S_2. By how much does the equilibrium quantity change? By how much does the equilibrium price change?

c. If supply falls from S_2 to S_1 while demand declines from D_2 to D_1, does the equilibrium price rise, fall, or stay the same? What happens if only supply falls? What happens if only demand falls?

d. Suppose that supply is fixed at S_1 and that demand starts at D_1. By how many gallons per month would demand have to increase at each price such that the equilibrium price per gallon would be $3.00? $4.00?

2. The following table shows two demand schedules for a given style of men's shoe–that is, how many pairs per month will be demanded at various prices at Stromnord, a men's clothing store.

Price	D_1 Quantity Demanded	D_2 Quantity Demanded
$75	53	13
70	60	15
65	68	18
60	77	22
55	87	27

Suppose that Stromnord has exactly 65 pairs of this style of shoe in inventory at the start of the month of July and will not receive any more pairs of this style until at least August 1. **LO3.7**

a. If demand is D_1, what is the lowest price that Stromnord can charge so that it will not run out of this model of shoe in the month of July? What if demand is D_2?

b. If the price of shoes is set at $75 for both July and August and demand will be D_2 in July and D_1 in August, how many pairs of shoes should Stromnord order if it wants to end the month of August with exactly zero pairs of shoes in its inventory? How many pairs of shoes should it order if the price is set at $55 for both months?

3. Use the following table to answer the questions that follow: **LO3.7**

a. If this table reflects the supply of and demand for tickets to a particular World Cup soccer game, what is the stadium capacity?

b. If the preset ticket price is $45, would we expect to see a secondary market for tickets? Why or why not? Would the price of a ticket in the secondary market be higher than, the same as, or lower than the price in the primary (original) market?

c. Suppose for some other World Cup game the quantity of tickets demanded is 20,000 lower at each ticket price than shown in the table. If the ticket price remains $45, would the event be a sellout?

Quantity Demanded, Thousands	Price	Quantity Supplied, Thousands
80	$25	60
75	35	60
70	45	60
65	55	60
60	65	60
55	75	60
50	85	60

Business Cycles, Unemployment, and Inflation

>> **LEARNING OBJECTIVES**

LO23.1 Describe the phases of the business cycle.

LO23.2 Measure unemployment and explain the different types of unemployment.

LO23.3 Measure inflation and distinguish between cost-push inflation and demand-pull inflation.

LO23.4 Explain how unanticipated inflation can redistribute real income.

LO23.5 Describe how inflation may affect the economy's level of real output.

AP❘ CHAPTER FOCUS

The United States has experienced remarkable economic growth over time. But this growth has not been smooth, steady, and predictable from year to year. At various times the United States has experienced recessions with high unemployment and high inflation. For example, U.S. unemployment rose by 8 million workers and the unemployment rate increased from 4.7 percent to 10.1 percent during the 2007–2009 recession. Other nations have also suffered from high unemployment and inflation. For example, Greece's unemployment rate exceeded 25 percent in 2015, and Venezuela's inflation rate soared to 1.4 *million* percent in 2018!

Our goal in this chapter is to examine the concepts, terminology, and facts relating to macroeconomic instability. Specifically, we want to discuss the business cycle, unemployment, and inflation. The concepts discussed are extremely important for understanding subsequent chapters on macroeconomic theory and economic policy.

AP❘ The Business Cycle

In the United States, real GDP grows by about 3 percent per year, *on average*. So the long-run trend is up, as illustrated by the upsloping line labeled "Growth Trend" in Figure 23.1. There is, however, a lot of variation around the average growth trend. That's because the U.S. economy demonstrates a pattern of alternating rises and declines in the rate of economic activity.

Economists refer to this cyclical pattern as the **business cycle.** Individual cycles (one "up" followed by one "down") vary substantially in duration and intensity. So while each cycle has similar stages, no two are identical.

>> **LO23.1** Describe the phases of the business cycle.

business cycle Recurring increases and decreases in the level of economic activity over periods of years; consists of peak, recession, trough, and expansion phases.
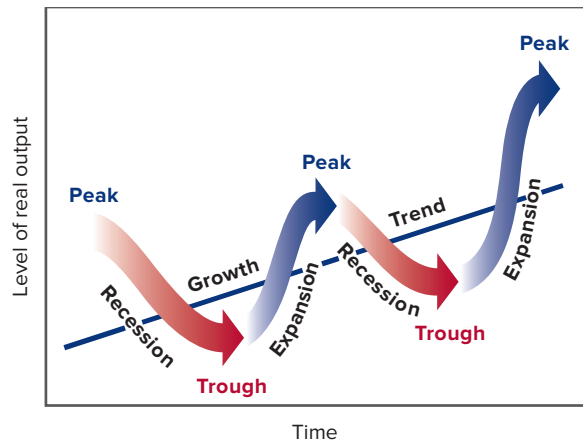
peak The point in a business cycle at which business activity has reached a temporary maximum; the point at which an expansion ends and a recession begins. At the peak, the economy is near or at full employment and the level of real output is at or very close to the economy's capacity.

recession A period of declining real GDP, accompanied by lower real income and higher unemployment.

Phases of the Business Cycle

Figure 23.1 shows the four phases of a generalized business cycle:

- At a **peak,** business activity has reached a temporary maximum. Here the economy is near or at full employment, and the level of real output is at or very close to the economy's capacity. The price level is likely to rise during this phase.

- A **recession** is a period of decline in total output, income, and employment that lasts at least six months. Recessions generate a widespread contraction of business activity in many sectors of the economy. Along with a decline in real GDP, unemployment increases significantly. Table 23.1 documents the duration and intensity of the 10 recessions that the United States experienced between 1950 and 2018.

- In the **trough** of the recession or depression, output and employment "bottom out" at their lowest levels. The trough phase may be either short-lived or quite long.

- A recession is usually followed by a recovery and **expansion,** a period in which real GDP, income, and employment rise. At some point, the economy again approaches full employment. If spending then expands faster than production capacity, the prices of nearly all goods and services will rise, thereby generating a bout of inflation.

Although all business cycles pass through the same phases, they vary greatly in duration and intensity. Many economists prefer to talk of business fluctuations rather than business cycles because the word cycles implies regularity while the term fluctuations does not.

The Great Depression of the 1930s resulted in a 27 percent decline in U.S. real GDP over a 3-year period and seriously impaired business activity for a decade. By comparison, the more recent recessions detailed in Table 23.1 were less severe in both intensity and duration.

The Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) declares the start and end of recessions in the United States. Citing evidence of declining real output and falling employment, the NBER officially declared that the 2007–2009 recession—the so-called Great Recession—began in December 2007. The NBER subsequently declared that the Great Recession ended in June 2009, 18 months after it began.

Recessions occur in other countries, too. Nearly all industrial nations and many developing nations have suffered recessions in the past decade.

Period	Duration, Months	Depth (Decline in Real Output)
1953–54	10	−2.6%
1957–58	8	−3.7
1960–61	10	−1.1
1969–70	11	−0.2
1973–75	16	−3.2
1980	6	−2.2
1981–82	16	−2.9
1990–91	8	−1.4
2001	8	−0.4
2007–09	18	−4.3

Source: Bureau of Economic Analysis.

Causation: A First Glance

A key question in macroeconomics is why the economy experiences business cycle fluctuations rather than slow, smooth growth. In terms of Figure 23.1, why does output move up and down rather than just staying on the smooth trend line?

The most prominent theory is that business cycle fluctuations are the result of sticky prices interacting with economic shocks. As discussed in Chapter 20, economic shocks are events that unexpectedly shift demand or supply. If prices were fully flexible, markets could always adjust very quickly to unexpected shifts in demand or supply because market prices would rapidly adjust to equalize the quantities demanded

and quantities supplied of every product in the economy. But the prices of many goods and services are, in fact, sticky (barely able to adjust) or stuck (completely unable to adjust) in the weeks and months after a shock occurs. As a result, the economy is forced to respond to shocks primarily through changes in output and employment rather than through changes in prices.

With these factors in mind, economists cite several sources for the demand and supply shocks that cause business cycles.

- *Political events* Unexpected political events, such as peace treaties, new wars, or terrorist attacks, can create economic opportunities or strains. In adjusting to these shocks, the economy may experience upswings or downswings.

- *Financial instability* Unexpected financial bubbles (rapid asset price increases) or bursts (abrupt asset price decreases) can spill over to the general economy. They may expand or contract lending, and they may boost or erode the confidence of consumers and businesses. Booms and busts in the rest of the economy may follow.

- *Irregular innovation* Significant new products or production methods, such as those associated with railroads, automobiles, computers, and the Internet, can rapidly spread through the economy, sparking sizable increases in investment, consumption, output, and employment. After the economy has largely absorbed the new innovation, the economy may for a time slow down or even decline. Because such innovations occur irregularly and unexpectedly, they may contribute to the variability of economic activity.

- *Productivity changes* When productivity—output per unit of input—unexpectedly increases, the economy booms; when productivity unexpectedly decreases, the economy recedes. These changes in productivity can result from unexpected changes in resource availability (of, say, oil or agricultural commodities) or from unexpected changes in the general rate of technological advance.

- *Monetary factors* Some economists see business cycles as purely monetary phenomena. When a nation's central bank shocks the economy by creating more money than people were expecting, an inflationary boom in output occurs. By contrast, printing less money than people were expecting triggers an output decline and, eventually, a decrease in the price level.

The severe recession of 2007–2009 was precipitated by a combination of excessive money and a financial frenzy that led to overvalued real estate and unsustainable mortgage debt. Institutions bundled this debt into new securities ("derivatives") that they sold to financial investors. Some of the investors, in turn, bought insurance against losses that might arise from the securities. As real estate prices plummeted and mortgage defaults unexpectedly skyrocketed, the securitization and insurance structure buckled and nearly collapsed. Credit markets froze, pessimism prevailed, and spending by businesses and households declined.

Whatever the source of economic shocks, most economists agree that unexpected changes in the level of total spending cause the majority of cyclical fluctuations. If total spending unexpectedly sinks and firms cannot lower prices, firms sell fewer units of output (because with prices fixed, lower spending implies fewer items purchased). Slower sales cause firms to cut back on production. As they do, GDP falls. And because fewer workers are needed to produce less output, employment also falls. The economy contracts and enters a recession.

By contrast, if the level of spending unexpectedly rises, then output, employment, and incomes rise. With prices sticky, the increased spending means that consumers buy more goods and services (because, with prices fixed, more spending means more items purchased). Firms respond by increasing output, which increases GDP. And because firms need to hire more workers to produce the larger volume of output, employment also increases. The economy booms and enjoys an expansion. Eventually, as time passes and prices become more flexible, prices also rise due to the increased spending.

Cyclical Impact: Durables and Nondurables

Although the business cycle is felt throughout the economy, it affects different sectors in different ways and to different degrees.

Firms and industries producing *capital goods* (for example, housing, commercial buildings, and heavy equipment) and *consumer durables* (for example, automobiles, personal computers, and refrigerators) are affected most by the business cycle. Within limits, firms can postpone the

trough The point in a business cycle at which business activity has reached a temporary minimum; the point at which a recession ends and an expansion (recovery) begins. At the trough, the economy experiences substantial unemployment and real GDP is less than potential output.

expansion The phase of the business cycle in which real GDP, income, and employment rise.

purchase of capital goods. When a recession strikes, firms patch up their old equipment and make do rather than replace the old equipment. As a result, investment in capital goods declines sharply. The pattern is much the same for consumer durables such as cars and refrigerators. When recession occurs and households must trim their budgets, they often defer their purchases of these goods. Families repair their old cars and appliances rather than buy new ones, and the firms producing these products suffer. (However, producers of capital goods and consumer durables also benefit most from expansions.)

In contrast, *service* industries and industries that produce *nondurable consumer goods* are somewhat insulated from the recession's most severe effects. People find it difficult to cut back on needed medical and legal services, for example. And a recession actually helps some service firms, such as pawnbrokers and law firms that specialize in bankruptcy. Nor are the purchases of many nondurable goods, such as food and clothing, easy to postpone. As a result, the quantity and quality of the nondurable goods that are purchased will decline, but not by as much as the quantity and quality of the capital goods and consumer durables that are purchased.

AP❚ QUICK REVIEW
23.1

▶ The typical business cycle goes through four phases: peak, recession, trough, and expansion, followed by a peak and a recurring recession.

▶ Fluctuations in output and employment are caused by economic shocks combined with sticky wages and prices.

▶ Sources of shocks that can cause recessions include irregular innovation, productivity changes,

monetary factors, input price shocks, political events, and financial instability.

▶ During a recession, industries that produce capital goods and consumer durables normally suffer greater output and employment declines than do industries producing services and nondurable consumer goods.

AP❚ Unemployment

>> **LO23.2** Measure unemployment and explain the different types of unemployment.

Two problems that arise over the course of the business cycle are unemployment and inflation. Let's look at unemployment first.

Measurement of Unemployment

The U.S. Bureau of Labor Statistics (BLS) conducts a nationwide random survey of some 60,000 households each month to determine who is employed and who is not. It asks which members of the household are working, unemployed and looking for work, not looking for work, and so on. From the answers, it determines the nation's unemployment rate.

Figure 23.2 explains the mathematics.

To construct Figure 23.2, the BLS divides the total U.S. population into four groups:

AP❚ FIGURE 23.2
The U.S. labor force, employment, and unemployment, 2018.*

The labor force consists of persons 16 years of age or older who are not in institutions and who are (1) employed or (2) unemployed but seeking employment.

Under 16 and/or institutionalized (69.4 million)

Not in labor force (95.6 million)

Total population (328.2 million)

Employed (156.9 million)

Labor force (163.2 million)

Unemployed (6.3 million)

Source: U.S. Bureau of Labor Statistics.

• ***Under 16 and/or institutionalized*** is composed of people under 16 years of age as well as people who are institutionalized, for example, in psychological hospitals or correctional institutions. These people are assumed to be unemployable either because of child labor laws or due to the circumstances that accompany institutionalization.

• ***Not in labor force*** is composed of noninstitutionalized people 16 years of age or older who are neither employed nor seeking work. They include stay-at-home parents, full-time students, and retirees.

- *Employed* consists of noninstitutionalized people age 16 and older who have jobs. These are people who both want to work *and* have a job.
- *Unemployed* consists of every noninstitutionalized person age 16 or older who is not employed but who wants to work and is actively seeking employment. (Please note that to be classified as unemployed, a person has to not only want a job but also be *actively seeking employment*. A person who claims to want a job but who isn't bothering to look for work is classified as "not in labor force.")

The **labor force** consists of the latter two groups—the employed plus the unemployed. The labor force includes anyone who has a job plus anyone lacking a job who is actively seeking employment.

The **unemployment rate** is the percentage of the labor force that is unemployed:

$$\text{Unemployment rate} = \frac{\text{unemployed}}{\text{labor force}} \times 100$$

The statistics underlying the rounded numbers in Figure 23.2 show that in 2018 the unemployment rate averaged

$$\frac{6{,}300{,}000}{163{,}200{,}000} \times 100 = 3.9\%$$

Despite the use of scientific sampling and interviewing techniques, the data collected by the monthly BLS surveys are subject to the following criticisms:

- *Part-time employment* The BLS lists all part-time workers as fully employed. In 2018 about 27 million people worked part-time as a result of personal choice. But another 6 million part-time workers either (1) wanted to work full-time and could not find a full-time job or (2) worked fewer part-time hours than desired. By counting them as fully employed, critics say, the BLS understates the unemployment rate.
- *Discouraged workers* You must be actively seeking work to be counted as unemployed. But many jobless people who actively search for employment become discouraged after a period of unsuccessful efforts. They stop actively searching for employment and get reclassified as "not in the labor force." According to critics, that reclassification understates the unemployment problem. The discouraged workers still want jobs, but are missing entirely in the official unemployment statistics. The number of such **discouraged workers** was roughly 423,000 in 2018, up from 396,000 in 2007.

Types of Unemployment

There are three types of unemployment: frictional, structural, and cyclical.

Frictional Unemployment At any given time some workers are "between jobs." Some of them are moving voluntarily from one job to another. Others have been fired and are seeking reemployment. Still others have been laid off because they work seasonal jobs and the season just changed. In addition to those between jobs, there are always many young workers searching for their first job.

As these unemployed people find jobs or are called back from temporary layoffs, other job seekers and laid-off workers replace them in the "unemployment pool." While the pool itself persists because newly unemployed workers are always flowing into it, most workers do not stay in the unemployment pool for very long. Indeed, when the economy is strong, most unemployed workers find new jobs within a couple of months. We should be careful not to confuse the permanence of the pool itself with the false idea that the pool's membership is permanent, too. That being said, there are workers who do remain unemployed and in the unemployment pool for many months or even several years.

Economists use the term **frictional unemployment,** or search unemployment, for workers who are unemployed as they actively search for a job. The word "frictional" reflects the fact that the labor market does not operate perfectly and instantaneously (without friction) in matching workers and jobs.

Frictional unemployment is inevitable and, at least in part, desirable. Many workers who are voluntarily between jobs are moving from low-paying, low-productivity jobs to higher-paying, higher-productivity positions. Their new jobs mean greater income for the workers, a better allocation of labor resources, and a larger real GDP for the economy.

labor force Persons 16 years of age and older who are not in institutions and who are employed or are unemployed and seeking work.

unemployment rate The percentage of the labor force unemployed at any time.

discouraged workers Employees who have left the labor force because they have not been able to find employment.

frictional unemployment A type of unemployment caused by workers voluntarily changing jobs and by temporary layoffs; unemployed workers between jobs.

structural unemployment
Unemployment of workers whose skills are not demanded by employers, who lack sufficient skill to obtain employment, or who cannot easily move to locations where jobs are available.

Structural Unemployment Frictional unemployment blurs into **structural unemployment.** Changes over time in consumer demand and in technology alter the "structure" of the total demand for labor, both occupationally and geographically.

Occupationally, the demand for certain skills (for example, sewing clothes or working on farms) may decline or even vanish. The demand for other skills (for example, designing software or maintaining computer networks) will intensify. Structural unemployment occurs because the composition of the labor force does not respond immediately or completely to the new structure of job opportunities. Workers whose skills and experience have become obsolete or unneeded thus find that they have no marketable talents. They are structurally unemployed until they develop skills that employers want.

Geographically, the demand for labor also changes over time. An example is the migration of industry and thus of employment opportunities from the Snowbelt to the Sunbelt over the past few decades. Another example is the *offshoring* of jobs that occurs when the demand for a particular type of labor shifts from domestic firms to foreign firms. As job opportunities shift from one place to another, some workers become structurally unemployed.

The distinction between frictional and structural unemployment is hazy. The key difference is that *frictionally* unemployed workers have marketable skills and either live in areas where jobs exist or are able to move to areas that have job opportunities. *Structurally* unemployed workers find it hard to obtain new jobs without retraining or additional education. Frictional unemployment is short-term; structural unemployment is more likely to be long-term and consequently more serious.

cyclical unemployment
A type of unemployment caused by insufficient total spending (insufficient aggregate demand) and which typically begins in the recession phase of the business cycle.

Cyclical Unemployment Unemployment that is caused by a decline in total spending is called **cyclical unemployment.** It typically begins in the recession phase of the business cycle. As the demand for goods and services decreases, employment falls and unemployment rises. Cyclical unemployment results from insufficient demand for goods and services and is exacerbated by the downward stickiness of wages in the economy, as discussed in the nearby story. The 25 percent unemployment rate in the depth of the Great Depression in 1933 reflected mainly cyclical unemployment.

We will say more about the high costs of cyclical unemployment later, but first we need to define "full employment."

CONSIDER THIS . . .

Downwardly Sticky Wages and Unemployment

Labor markets have an important quirk that helps to explain why unemployment goes up so much during a recession.

The quirk is that wages are flexible upward but sticky downward.

On the one hand, workers are perfectly happy to accept wage increases. So when the economy is booming and firms start bidding for the limited supply of labor, wages rise—often quite rapidly.

On the other hand, workers deeply resent pay cuts. So if the economy goes into a recession and firms need to reduce labor costs, managers almost never cut wages because doing so would only lead to disgruntled employees, low productivity, and—in extreme cases—workers stealing supplies or actively sabotaging their own firms.

Instead, managers usually opt for layoffs. The workers who are let go obviously don't like being unemployed. But those who remain get to keep their old wages. As a result, they keep on being as productive and cooperative as they were before.

The preference that managers show for layoffs over wage cuts results in downwardly sticky wages and an informal price floor that help to explain why unemployment goes up so much during a recession. The problem is that when the demand for labor falls during a recession, the informal price floor prevents wages from falling. As a result, there is

Source: © JGI/Jamie Grill/Getty Images RF

no way for falling wages to help entice at least some firms to hire a few more workers. Thus, when a recession hits, employment falls more precipitously than it would have if wages had been downwardly flexible.

Definition of Full Employment

Because frictional and structural unemployment are largely unavoidable in a dynamic economy, *full employment* is something less than 100 percent employment of the labor force. Economists say that the economy is "fully employed" when it is experiencing only frictional and structural unemployment. That is, full employment occurs when there is no cyclical unemployment.

Economists label the unemployment rate that is consistent with full employment as the **full-employment rate of unemployment,** or the **natural rate of unemployment (NRU).** At the NRU, the economy is said to be producing its **potential output,** the real GDP that occurs when the labor force and other inputs are "fully employed."

Note that a fully employed economy does not mean zero unemployment. Even when the economy is fully employed, the NRU is some positive percentage because it takes time for frictionally unemployed job seekers to find jobs. Also, it takes time for the structurally unemployed to achieve the skills needed for reemployment.

"Natural" does not mean that the economy will always operate at the NRU and thus realize its potential output. When cyclical unemployment occurs, the economy has much more unemployment than it would at the NRU. Moreover, the economy can operate for a while at an unemployment rate *below* the NRU. At times, the demand for labor may be so great that firms take a stronger initiative to hire and train the structurally unemployed. Also, some parents, teenagers, college students, and retirees who were casually looking for just the right part-time or full-time jobs may quickly find them. Thus the unemployment rate temporarily falls below the natural rate.

Also note that the NRU can vary over time as demographic factors, job-search methods, and public policies change. In the 1980s, the NRU was about 6 percent. Today, it is 4 to 5 percent.

Economic Cost of Unemployment

High unemployment involves heavy economic and social costs.

The GDP Gap The basic economic cost of unemployment is forgone output. When the economy fails to create enough jobs for all who are able and willing to work, potential production is irretrievably lost. Unemployment above the natural rate means that society is operating at some point inside its production possibilities curve. Economists call this sacrifice of output a **GDP gap**—the difference between actual and potential GDP. That is:

$$\text{GDP gap} = \text{actual GDP} - \text{potential GDP}$$

The GDP gap can be either negative or positive:

- When unemployment is above the natural rate of unemployment, the GDP gap will be negative (actual GDP < potential GDP) because only a smaller amount of output can be produced when employing a smaller amount of labor.
- By contrast, when unemployment is below the natural rate, the GDP gap will be positive (actual GDP > potential GDP) because the large quantity of labor being utilized allows the economy to produce more than the full-employment level of output.

To calculate potential GDP at any point in time, the BLS estimates what the economy's output would be at that instant if the actual unemployment rate equaled the natural rate of unemployment. Figure 23.3a shows the U.S. GDP gap for recent years while Figure 23.3b shows the actual unemployment rate over the same time period. Please note the close correlation between the actual unemployment rate (Figure 23.3b) and the GDP gap (Figure 23.3a). The higher the unemployment rate, the larger the GDP gap.

Okun's Law Arthur Okun was the first macroeconomist to quantify the inverse relationship between the actual unemployment rate and the GDP gap. He noticed that, on average:

$$\text{GDP gap} = -2.0 \times (\text{actual unemployment rate} - \text{natural unemployment rate})$$

This relationship came to be known as **Okun's law.** With respect to recessions, it implies that for every 1 percentage point by which the actual unemployment rate exceeds the natural rate, a GDP gap of about negative 2.0 percent will occur.

By applying Okun's law, we can calculate the absolute loss of output associated with any above-natural unemployment rate. For example, in 2009 the unemployment rate was 9.3 percent,

full-employment rate of unemployment The unemployment rate at which there is no cyclical unemployment of the labor force; equal to between 5 and 6 percent (rather than zero percent) in the United States because frictional and structural unemployment are unavoidable.

natural rate of unemployment (NRU) The full-employment rate of unemployment; the unemployment rate occurring when there is no cyclical unemployment and the economy is achieving its potential output; the unemployment rate at which actual inflation equals expected inflation.

potential output The real output (GDP) an economy can produce when it fully employs its available resources.

GDP gap Actual gross domestic product minus potential output; may be either a positive amount (a positive GDP gap) or a negative amount (a negative GDP gap).

Okun's law The generalization that any 1-percentage-point rise in the unemployment rate above the full-employment rate of unemployment is associated with a rise in the negative GDP gap by 2 percent of potential output (potential GDP).

AP▮ FIGURE 23.3 **Actual and potential real GDP and the unemployment rate.**

(a) The difference between actual and potential GDP is the GDP gap. A negative GDP gap measures the output the economy sacrifices when actual GDP falls short of potential GDP. A positive GDP gap indicates that actual GDP is above potential GDP. (b) A high unemployment rate means a large GDP gap (negative), and a low unemployment rate means a small or even positive GDP gap.

(a)
The GDP gap

(b)
Unemployment rate
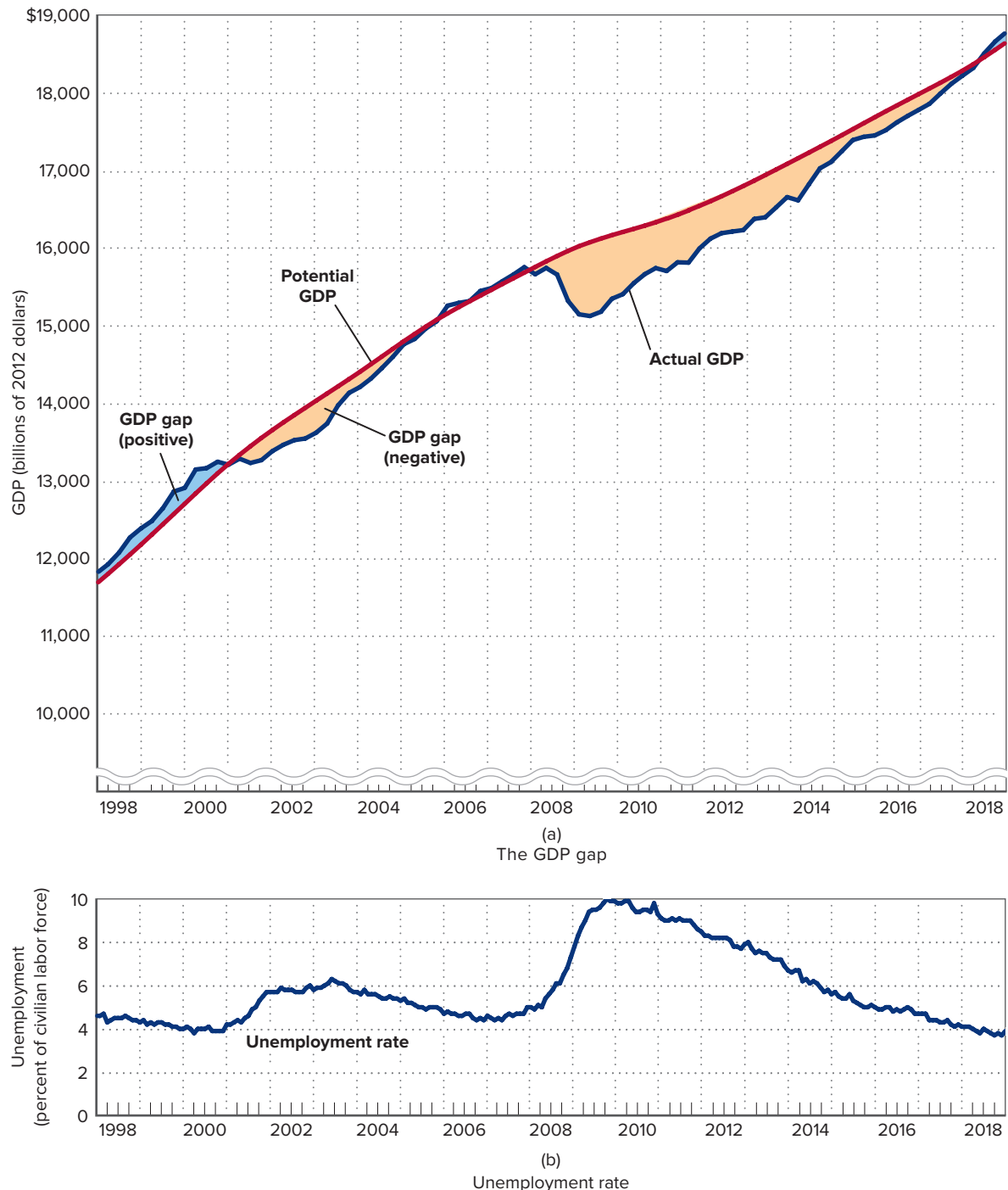
Sources: Congressional Budget Office; Bureau of Economic Analysis; and Bureau of Labor Statistics. Note that the actual real GDP and potential real GDP data plotted above may differ from the real GDP data in the previous two chapters because they are indexed to year 2012 dollars to account for inflation.

or 4.3 percentage points above that period's 5.0 percent natural rate of unemployment. Multiplying this 4.3 percent by Okun's negative 2.0 indicates that 2009's GDP gap was approximately negative 8.6 percent of potential GDP (in real terms). Applying this 8.6 percent loss of output to 2009's potential GDP of $13,894 billion, we find that the economy sacrificed $1,195 billion of real output.

As Figure 23.3 shows, sometimes the economy's actual output exceeds its potential or full-employment output. An unusually strong economic expansion in 1999 and 2000, for example,

Demographic Group	Unemployment Rate		
	2007	**2009**	**2018**
Overall	4.6%	9.3%	4.1%
Occupation:			
Managerial and professional	2.1	4.6	2.0
Construction and extraction	7.6	19.7	6.7
Age:			
16–19	15.7	24.3	11.5
African American, 16–19	29.4	39.5	19.9
White, 16–19	13.9	21.8	10.1
Male, 20+	4.1	9.6	3.3
Female, 20+	4.0	7.5	3.2
Race and ethnicity:			
African American	8.3	14.8	6.1
Hispanic	5.6	12.1	4.3
White	4.1	8.5	3.2
Gender:			
Women	4.5	8.1	3.5
Men	4.7	10.3	3.6
Education:†			
Less than high school diploma	7.1	14.6	5.8
High school diploma only	4.4	9.7	3.8
College degree or more	2.0	4.6	2.1
Duration:			
15 or more weeks	1.5	4.7	1.3

*Civilian labor force data
†People age 25 or over

Sources: Economic Report of the President 2019. Bureau of Labor Statistics. Census Bureau.

caused actual GDP to exceed potential GDP, thereby generating a positive GDP gap for those two years. You should note, though, that while actual GDP can exceed potential GDP for a time, positive GDP gaps create strong demand-pull inflationary pressures and cannot be sustained indefinitely.

Unequal Burdens An increase in the unemployment rate from, say, 5 percent to 9 or 10 percent might be more tolerable to society if every worker's hours and income were reduced proportionally. But this is not the case. The burden of unemployment is unequally distributed. Some workers retain their hours and income, while others become unemployed and earn nothing.

Table 23.2 examines unemployment rates for both the overall labor force and various demographic subgroups. We look at the years 2007, 2009, and 2018 as a way of investigating how unemployment varies over the course of the business cycle. In 2007, for example, the business cycle reached a peak, with the unemployment rate falling to 4.6 percent. The economy then started to recede. By 2009, the economy reached a trough, with the unemployment rate rising to 9.3 percent. The economy then slowly recovered, with the unemployment rate falling to 4.1 percent in 2018 as the economy approached its next peak.

By observing the large differences in unemployment rates in 2007, 2008, and 2018 for different demographic subgroups, we can generalize as follows:

- *Occupation* Workers in lower-skilled occupations (for example, laborers) have higher unemployment rates than workers in higher-skilled occupations (for example, professionals). Lower-skilled workers have more and longer spells of structural unemployment than higher-skilled workers. They also are less likely to be self-employed than are higher-skilled workers. Manufacturing, construction, and mining workers tend to be particularly hard-hit, but businesses generally retain most of their higher-skilled workers, in whom they have invested the expense of training.

- *Age* Teenagers have much higher unemployment rates than adults. Teenagers have lower skill levels, quit their jobs more frequently, are more frequently fired, and have less geographic mobility than adults. Many unemployed teenagers are new in the labor market, searching for their first jobs. Male African American teenagers, in particular, have very high unemployment rates. The unemployment rate for all teenagers rises during recessions.

- *Race and ethnicity* The unemployment rates of African Americans and Hispanics exceed the white unemployment rate at all stages of the business cycle. The causes include lower rates of educational attainment, greater concentration in lower-skilled occupations, and discrimination in the labor market. In general, the unemployment rate for African Americans is twice that of whites and rises by twice as many percentage points during recessions.

- *Gender* The unemployment rates for men and women normally are very similar. But during the 2007–2009 recession, the unemployment rate for men significantly exceeded that for women.

- *Education* Less-educated workers, on average, have higher unemployment rates than workers with more education. Less education is usually associated with lower-skilled, less-permanent jobs; more time between jobs; and jobs that are more vulnerable to cyclical layoff.

- *Duration* The number of persons unemployed for long periods—15 weeks or more—as a percentage of the labor force is much lower than the overall unemployment rate. But that percentage rises significantly during recessions. Notice that it rose from 1.5 percent of the labor force in 2007 to 4.7 percent in 2009.

Noneconomic Costs

Policymakers are deeply concerned with unemployment rates and how to minimize the length and depth of business cycle downturns as a way of moderating the harm caused by unemployment. Their attention is warranted because severe cyclical unemployment is more than an economic malady; it is a social catastrophe.

- At the individual level, research links high unemployment to increases in suicide, homicide, heart attacks, strokes, and mental illness. The unemployed lose skills and self-respect. Morale plummets and families disintegrate. Widespread joblessness increases poverty, reduces hope for material advancement, and heightens ethnic tensions.

- At the social level, severe unemployment can lead to rapid and sometimes violent political upheaval. Witness Adolph Hitler's ascent to power against a background of unemployment in Germany.

AP **QUICK REVIEW**
23.2

▶ There are three types of unemployment: frictional, structural, and cyclical.

▶ The natural rate of unemployment (frictional plus structural) is assumed to be in the 4 to 5 percent range in the United States.

▶ A positive GDP gap occurs when actual GDP exceeds potential GDP, possibly generating inflation; a negative GDP gap occurs when actual GDP falls short of potential GDP, generating excessive unemployment.

▶ According to Okun's law, for each 1 percentage point of unemployment above the natural rate, the U.S. economy suffers an additional 2 percent decline in real GDP below potential GDP.

▶ Lower-skilled workers, teenagers, African Americans and Hispanics, and less-educated workers frequently bear a disproportionate burden of unemployment.

>> **LO23.3** Measure inflation and distinguish between cost-push inflation and demand-pull inflation.

inflation A rise in the general level of prices in an economy; an increase in an economy's price level.

AP Inflation

Inflation is a rise in the general level of prices. When inflation occurs, each dollar of income buys fewer goods and services than before. Inflation reduces the "purchasing power" of money. But inflation does not mean that all prices are rising. Even during periods of rapid inflation, some prices may be relatively constant, while others may even fall. For example, although the United States experienced high rates of inflation in the 1970s and early 1980s, the prices of video recorders, digital watches, and personal computers declined.

Measurement of Inflation

The **Consumer Price Index (CPI)** is the main measure of inflation in the United States. The government uses this index to report inflation rates each month and each year. It also uses the CPI to adjust Social Security benefits and income tax brackets for inflation. The CPI reports the price of a "market basket" of some 300 consumer goods and services that are purchased by typical urban consumers.

The composition of the market basket for the CPI is based on spending patterns of urban consumers in a specific period, presently 2013–2014. The BLS updates the composition of the market basket every few years so that it reflects the most recent patterns of consumer purchases and captures current inflation.

The BLS arbitrarily sets the CPI equal to 100 for 1982–1984. So the CPI for any particular year is calculated as follows:

$$\text{CPI} = \frac{\text{price of the most recent market basket in the particular year}}{\text{price estimate of the market basket in 1982–1984}} \times 100$$

The inflation rate is equal to the percentage growth of CPI from one year to the next. For example, the CPI was 251.1 in 2018, up from 245.1 in 2017. So the rate of inflation for 2018 is calculated as follows:

$$\text{Rate of inflation} = \frac{251.1 - 245.1}{245.1} \times 100 = 2.4\%$$

In rare cases, the CPI declines from one year to the next. For example, the CPI fell from 215.3 in 2008 to 214.5 in 2009. So the rate of inflation for 2009 was −0.4 percent. A decline in the price level is called **deflation.**

In Chapter 22, we discussed the *rule of 70,* which tells us that we can find the number of years it will take for some measure to double, assuming that it grows at a constant annual percentage rate. To do so, we divide the number 70 by the annual percentage growth rate. Inflation is the growth rate of the price level. So a 3 percent annual rate of inflation will double the price level in about 23 (= 70 ÷ 3) years. Inflation of 8 percent per year will double the price level in about 9 (= 70 ÷ 8) years.

Facts of Inflation

Figure 23.4 shows December-to-December rates of annual inflation in the United States between 1960 and 2018. Observe that inflation reached double-digit rates in the 1970s and early 1980s before declining. It remained muted during the 10-year period following the Great Recession of 2007–2009.

Consumer Price Index (CPI) An index that measures the prices of a fixed "market basket" of some 300 goods and services bought by a "typical" consumer.

deflation A decline in the general level of prices in an economy; a decline in an economy's price level.
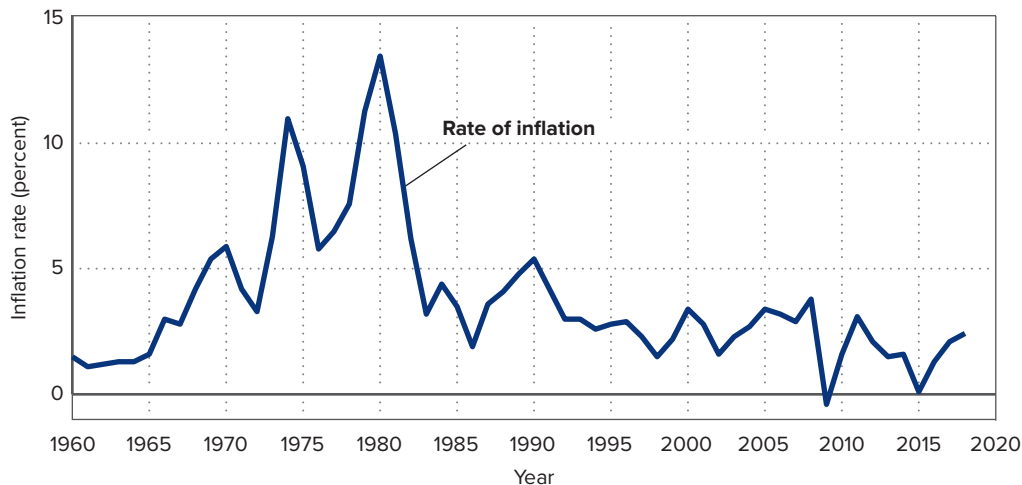
AP FIGURE 23.4

Annual inflation rates in the United States, 1960–2018 (December-to-December changes in the CPI).

Since 1960, the major periods of rapid inflation in the United States were in the 1970s and early 1980s.

Source: U.S. Bureau of Labor Statistics.

GLOBAL PERSPECTIVE 23.1

INFLATION RATES IN FIVE INDUSTRIAL NATIONS, 2008–2018

Inflation rates in the United States in recent years were neither extraordinarily high nor extraordinarily low relative to rates in other industrial nations.

Source: International Monetary Fund.
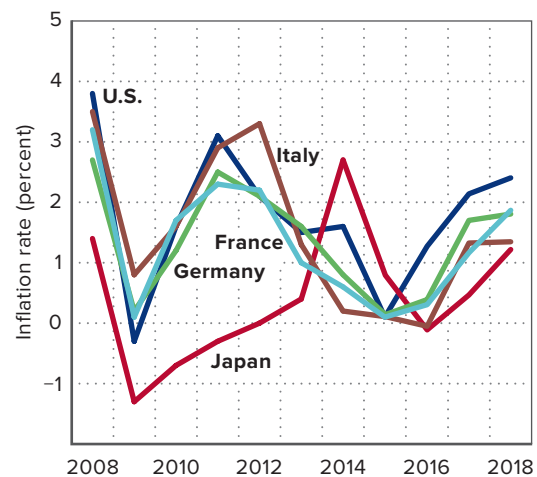
In recent years, U.S. inflation has been neither unusually high nor unusually low relative to the inflation rates typical of industrial nations (see Global Perspective 23.1). By contrast, some other nations (not shown) have had double-digit or even higher annual rates of inflation in recent years. In 2017, for example, the annual inflation rate in Ukraine was 14 percent; Argentina, 25 percent; Libya, 33 percent; Yemen, 53 percent; and Venezuela, 1.4 *million* percent.

Types of Inflation

Nearly all prices in the economy are set by supply and demand. So if the overall price level is rising, we need to look for an explanation in terms of supply and demand.

Demand-Pull Inflation Usually, increases in the price level are caused by an excess of total spending beyond the economy's capacity to produce. Where inflation is rapid and sustained, the cause invariably is an overissuance of money by the central bank (the Federal Reserve in the United States). When resources are already fully employed, the business sector cannot respond to excess demand by expanding output. The excess demand bids up the prices of the limited output, producing **demand-pull inflation.** This type of inflation is characterized by "too much spending chasing too few goods."

demand-pull inflation
Increases in the price level (inflation) resulting from increases in aggregate demand.

cost-push inflation
Increases in the price level (inflation) resulting from an increase in resource costs (for example, raw-material prices) and hence in per-unit production costs; inflation caused by reductions in aggregate supply.

per-unit production cost
The average production cost of a particular level of output; total input cost divided by units of output.

Cost-Push Inflation Inflation also may arise on the supply, or cost, side of the economy. During some periods in U.S. economic history, including the mid-1970s, the price level increased even though total spending was not excessive. In these periods, output and employment were both *declining* (evidence that total spending was not excessive) while the general price level was *rising*.

The theory of **cost-push inflation** explains rising output prices in terms of factors that raise **per-unit production costs** at each level of spending. Rising per-unit production costs squeeze profits and reduce the amount of output firms are willing to supply at the existing price level. As a result, the economy's supply of goods and services declines, and the price level rises.

$$\text{Per-unit production cost} = \frac{\text{total input cost}}{\text{units of output}}$$

In this scenario, costs are *pushing* the price level upward, whereas in demand-pull inflation demand is *pulling* it upward.

The major source of cost-push inflation has been *supply shocks*. Specifically, abrupt increases in the costs of raw materials or energy inputs have occasionally driven up per-unit production costs and thus product prices. The rocketing prices of imported oil in 1973–1974 and again in 1979–1980 are good illustrations. As energy prices surged upward during these periods, the costs of producing and transporting virtually every product in the economy rose. Cost-push inflation ensued.

Core Inflation

The inflation statistics calculated by the BLS are supposed to reflect the general trend in overall prices. That general trend can be obscured, though, by the rapid up and down price movements typical of energy and food products like wheat, gasoline, corn, and natural gas.

To avoid being misled by these rapid but temporary price changes, BLS employees calculate a measure of inflation called **core inflation** that excludes food and energy items.

If core inflation is low and stable, policymakers may be satisfied with current policy even though changes in the overall CPI index may be suggesting a rising inflation rate. But policymakers become greatly concerned when core inflation is high and rising, and they take deliberate measures to try to halt it.

We discuss these policy actions in detail in later chapters, but at this point it is important to add that the Federal Reserve (the U.S. central bank) has set a 2.0 percent inflation target since 2012, with the promise that it will adjust monetary policy as necessary to keep the U.S. inflation rate at or near 2.0 percent per year.

core inflation The underlying increases in the price level after volatile food and energy prices are removed.

AP▌ QUICK REVIEW
23.3

▶ Inflation is a rising general level of prices and is measured as a percentage change in a price index such as the CPI; deflation is a decline in the general level of prices.

▶ Demand-pull inflation occurs when total spending exceeds the economy's ability to provide goods and services at the existing price level; total spending *pulls* the price level upward.

▶ Cost-push inflation occurs when factors such as rapid increases in the prices of imported raw materials or the wage rate drive up per-unit production costs; higher costs *push* the price level upward.

▶ Core inflation is the underlying inflation rate after volatile food and energy prices have been removed.

AP▌ Redistribution Effects of Inflation

Inflation redistributes real income. This redistribution helps some people, hurts other people, and leaves yet others largely unaffected. Who gets hurt? Who benefits? Who is unaffected? Before we can answer those questions, we need some terminology.

>> **LO23.4** Explain how unanticipated inflation can redistribute real income.

Nominal and Real Income

There is a difference between money (nominal) income and real income. **Nominal income** is the number of dollars received as wages, rent, interest, or profit. **Real income** measures the amount of goods and services that nominal income can buy; it is the purchasing power of nominal income, or income adjusted for inflation, and it is calculated as follows:

$$\text{Real income} = \frac{\text{nominal income}}{\text{price index (in hundredths)}}$$

Inflation need not alter an economy's overall real income—its total purchasing power. The above equation makes it clear that real income will remain the same when nominal income rises at the same percentage rate as the price index.

But when inflation occurs, not everyone's nominal income rises at the same pace as the price level. Therein lies the potential for a redistribution of real income. If the change in the price level differs from the change in a person's nominal income, his or her real income will be affected. The following approximation (shown by the $\cong$ sign) tells us roughly how much real income will change:

$$
\begin{array}{ccc}
\text{Percentage} & \text{percentage} & \text{percentage} \\
\text{change in} \cong & \text{change in} & - \; \text{change in} \\
\text{real income} & \text{nominal income} & \text{price level}
\end{array}
$$

nominal income The number of dollars received by an individual or group for its resources during some period of time.

real income The amount of goods and services that can be purchased with nominal income during some period of time; nominal income adjusted for inflation.

For example, suppose that the price level rises by 6 percent. If Bob's nominal income rises by 6 percent, his real income will *remain unchanged*. But if his nominal income instead rises by 10 percent, his real income will increase by about 4 percent. If Bob's nominal income rises by only 2 percent, his real income will *decline* by about 4 percent.

Anticipations

The redistribution effects of inflation depend on whether or not it is expected:

unanticipated inflation An increase of the price level (inflation) at a rate greater than expected.

anticipated inflation Increases in the price level (inflation) that occur at the expected rate.

- We will first discuss situations involving **unanticipated inflation,** which causes real income and wealth to be redistributed, harming some and benefiting others.
- We will then discuss situations involving **anticipated inflation,** in which people see an inflation coming. With the ability to plan ahead, people are able to avoid or lessen the redistribution effects of inflation.

Who Is Hurt by Inflation?

Unanticipated inflation hurts fixed-income recipients, savers, and creditors. It redistributes real income away from them and toward others.

Fixed-Income Receivers People whose incomes are fixed see their real incomes fall when inflation occurs. The classic case is the elderly couple living on a private pension or annuity that provides a fixed amount of nominal income each month. They may have retired in, say, 1998 on what appeared to be an adequate pension. However, by 2018, they would have discovered that inflation had cut the annual purchasing power of that pension—their real income—by one-third.

Similarly, landlords who receive lease payments of fixed dollar amounts are hurt by inflation as they receive dollars of declining value over time. Likewise, public sector workers whose incomes are based on fixed pay schedules may see a decrease in their purchasing power. The fixed "steps" (the upward yearly increases) in their pay schedules may not keep up with inflation. Minimum-wage workers and families living on fixed welfare incomes are also hurt by inflation.

Savers Unanticipated inflation hurts savers. As prices rise, the real value (purchasing power) of accumulated savings deteriorates. Paper assets such as savings accounts, insurance policies, and annuities that were once adequate to meet rainy-day contingencies or provide for a comfortable retirement decline in real value. The simplest case is the person who hoards cash. A $1,000 cash balance lost one-third of its real value between 1995 and 2015. Of course, most forms of savings earn interest. But the value of savings will still decline if the inflation rate exceeds the interest rate.

Creditors Unanticipated inflation harms creditors (lenders). Suppose Chase Bank lends Bob $1,000, to be repaid in two years. If in that time the price level doubles, the $1,000 that Bob repays will possess only half the purchasing power of the $1,000 he borrowed. As prices go up, the purchasing power of the dollar goes down. So the borrower pays back less-valuable dollars than those received from the lender. The owners of Chase Bank suffer a loss of real income.

Who Is Unaffected or Helped by Inflation?

Not everyone is hurt by unanticipated inflation.

Flexible-Income Receivers People who have flexible incomes may escape inflation's harm or even benefit from it. For example, individuals who derive their incomes solely from Social Security are largely unaffected by inflation because Social Security payments are *indexed* to the CPI. Nominal benefits automatically increase when the CPI increases, thus preventing inflation from eroding their purchasing power. Some union workers also get automatic **cost-of-living adjustments (COLAs)** in their pay when the CPI rises, although such increases rarely equal the full percentage rise in inflation.

cost-of-living adjustment (COLA) An automatic increase in the incomes (wages) of workers when inflation occurs; often included in collective bargaining agreements between firms and unions. Cost-of-living adjustments are also guaranteed by law for Social Security benefits and certain other government transfer payments.

In addition, some flexible-income receivers are helped by unanticipated inflation. The strong product demand and labor shortages implied by rapid demand-pull inflation may cause some nominal incomes to spurt ahead of the price level, thereby enhancing real incomes. For some, the 3 percent increase in nominal income that occurs when inflation is 2 percent may become a 7 percent increase when inflation is 5 percent. As an example, property owners faced with an inflation-induced real estate boom may be able to boost rents by more than the inflation rate. Also, some business owners may benefit from inflation. If product prices rise faster than resource prices, business revenues will increase more rapidly than costs.

Debtors Unanticipated inflation benefits debtors (borrowers). In our earlier example, Chase Bank's loss of real income from inflation is Bob's gain of real income. Debtor Bob borrows "dear" dollars but, because of inflation, pays back the principal and interest with "cheap" dollars whose

purchasing power has been eroded by inflation. Real income is redistributed away from the owners of Chase Bank toward borrowers such as Bob.

The federal government, which had amassed over $22 trillion of public debt through 2019, has also benefited from inflation. Historically, the federal government has regularly paid off loans by taking out new loans. Inflation allows the Treasury to pay off loans with dollars of less purchasing power than the dollars originally borrowed. Nominal national income and therefore tax collections rise with inflation; the amount of public debt owed does not. Thus, inflation reduces the real burden of the public debt.

Anticipated Inflation

The redistribution effects of inflation are less severe or eliminated altogether if people anticipate inflation and can adjust their future nominal incomes to reflect expected increases in the price level. The prolonged inflation that began in the late 1960s prompted many labor unions in the 1970s to insist on labor contracts that provided cost-of-living adjustments.

Similarly, if inflation is anticipated, the redistribution of income from lender to borrower may be altered. Suppose a lender (perhaps a commercial bank) and a borrower (a household) both agree that 5 percent is a fair rate of interest on a 1-year loan provided the price level is constant. But assume that inflation has been occurring and is expected to be 6 percent over the next year. If the bank lends the household $100 at 5 percent interest, the borrower will pay the bank $105 at the end of the year. But if 6 percent inflation occurs during that year, the purchasing power of the $105 will have been reduced to about $99. The lender will, in effect, have paid the borrower $1 for the use of the lender's money for a year.

The lender can avoid this subsidy by charging an *inflation premium*—that is, by raising the interest rate by 6 percent, the amount of the anticipated inflation. By charging 11 percent interest, the lender will receive back $111 at the end of the year. Adjusted for the 6 percent inflation, that amount will have roughly the same purchasing power as $105 worth of today's money. The result then will be a mutually agreeable transfer of purchasing power from borrower to lender of $5, or 5 percent, for the use of $100 for one year.

Our example reveals the difference between the real interest rate and the nominal interest rate. The **real interest rate** is the percentage increase in *purchasing power* that the borrower pays the lender. In our example, the real interest rate is 5 percent. The **nominal interest rate** is the percentage increase in *money* that the borrower pays the lender, including that resulting from the built-in expectation of inflation, if any. In equation form:

$$\text{Nominal interest rate} = \text{real interest rate} + \text{inflation premium (the expected rate of inflation)}$$

As Figure 23.5 shows, the nominal interest rate in our example is 11 percent.

Other Redistribution Issues

We end our discussion of the redistribution effects of inflation by making three final points:

- *Deflation* The effects of unanticipated deflation—declines in the price level—are the reverse of those of inflation. People with fixed nominal incomes will find their real incomes enhanced. Creditors will benefit at the expense of debtors. And savers will discover that the purchasing power of their savings has grown because of the falling prices.

- *Mixed effects* A person who is simultaneously an income earner, a holder of financial assets, and a debtor will probably find that the redistribution impact of unanticipated inflation is cushioned. If the person owns fixed-value monetary assets (savings accounts, bonds, and insurance policies), inflation will lessen their real value. But that same inflation may produce
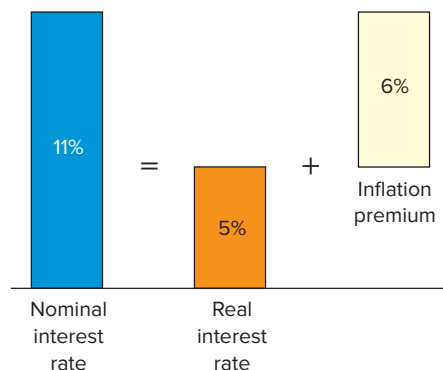
real interest rate The interest rate expressed in dollars of constant value (adjusted for inflation) and equal to the nominal interest rate less the expected rate of inflation.

nominal interest rate The interest rate expressed in terms of annual amounts currently charged for interest and not adjusted for inflation.

AP▌ FIGURE 23.5
The inflation premium and nominal and real interest rates.

The inflation premium—the expected rate of inflation—gets built into the nominal interest rate. Here, the nominal interest rate of 11 percent comprises the real interest rate of 5 percent plus the inflation premium of 6 percent.

an increase in the person's nominal wage. Also, if the person holds a fixed-interest-rate mortgage, the real burden of that debt will decline. In short, many individuals are simultaneously hurt and helped by inflation. All these effects must be considered before we can conclude that any particular person's net position is better or worse because of inflation.

- *Arbitrariness* The redistribution effects of inflation occur regardless of society's goals and values. Inflation lacks a social conscience. It takes from some and gives to others, whether they are rich, poor, young, old, healthy, or infirm.

AP❚ QUICK REVIEW
23.4

▶ Inflation harms those who receive relatively fixed nominal incomes and either leaves unaffected or helps those who receive flexible nominal incomes.

▶ Unanticipated inflation hurts savers and creditors while benefiting debtors.

▶ The nominal interest rate equals the real interest rate plus the inflation premium (the expected inflation rate). Alternatively, the real interest rate equals the nominal interest rate minus the expected inflation rate.

Does Inflation Affect Output?

>> **LO23.5** Describe how inflation may affect the economy's level of real output.

Thus far, our discussion has focused on how inflation redistributes a specific level of total real income. But inflation also may affect an economy's level of real output (and thus its level of real income).

Cost-Push Inflation and Real Output

Recall that abrupt and unexpected increases in the prices of key resources such as oil can drive up overall production costs and generate cost-push inflation. As prices rise, the quantity demanded of goods and services falls. Firms respond by producing less output, and unemployment goes up.

Economic events of the 1970s provide an example of how inflation can reduce real output. In late 1973, the Organization of Petroleum Exporting Countries (OPEC) managed to quadruple the price of oil by unexpectedly restricting supply. The resulting cost-push inflation generated rapid price-level increases in the 1973–1975 period. At the same time, the U.S. unemployment rate rose from slightly less than 5 percent in 1973 to 8.5 percent in 1975. Similar outcomes occurred in 1979–1980 in response to a second OPEC oil supply shock.

Like other forms of unexpected inflation, cost-push inflation redistributes income and output. But cost-push inflation is unique in that it reduces the overall quantity of real output that gets divided. Prices rose for everybody during the 1973–1975 period, but OPEC members experienced higher incomes while unemployed workers in oil importing countries like the United States lost their incomes entirely.

Demand-Pull Inflation and Real Output

Economists do not fully agree on the effects of mild inflation (less than 3 percent) on real output.

The Case for Zero Inflation Some economists believe that even low levels of inflation reduce real output because inflation diverts time and effort toward activities designed to hedge against inflation. For example:

- Businesses incur the cost of changing thousands of prices on their shelves and in their computers simply to keep up with inflation.
- Households and businesses spend considerable time and effort obtaining the information they need to distinguish between real and nominal prices, wages, and interest rates.

These economists argue that without inflation, more time and effort would be spent producing valuable goods and services. Proponents of "zero inflation" bolster their case by pointing to cross-country studies indicating that lower inflation rates are associated with higher rates of economic growth. Even mild inflation, say these economists, is detrimental to economic growth.

The Case for Mild Inflation Other economists note that full employment and economic growth depend on strong levels of total spending.

- They argue that strong spending creates high profits, a strong demand for labor, and a powerful incentive for firms to expand their plants and equipment. In this view, the mild inflation that is a by-product of strong spending is a small price to pay for full employment and continued economic growth.

- A low but steady rate of inflation also makes it easier for firms to adjust real wages downward when the level of total spending declines. That is helpful to the overall economy because if real wages can be cut during a recession, firms can afford to hire more workers. To see why having some inflation matters, note that with mild inflation, firms can reduce real wages by holding nominal wages steady. That is a good strategy for firms because workers tend to focus on what happens to nominal, rather than real, wages. Their real wages will in fact be falling because of the inflation, but they will continue to work just as hard because their nominal wages remain unchanged. By contrast, if inflation were zero, the only way to reduce real wages would be by cutting nominal wages and thereby angering employees, who would likely retaliate by putting in less effort and agitating for higher pay.

The defenders of mild inflation argue that it is much better for an economy to err on the side of strong spending, full employment, economic growth, and mild inflation than on the side of weak spending, unemployment, recession, and deflation.

Hyperinflation

A **hyperinflation** occurs when a country's inflation rate exceeds 50 percent per month. Compounded over a year, that is equivalent to an annual rate of about 13,000 percent.

hyperinflation An extremely high rate of inflation, usually defined as an inflation rate in excess of 50 percent per month.

Adverse Effects Unlike mild inflation, which has its fans, hyperinflation is roundly condemned by all economists because it has devastating impacts on real output and employment.

- As prices shoot up during a hyperinflation, normal economic relationships are disrupted. Business owners do not know what to charge for their products. Consumers do not know what to pay.

- Production declines because businesses, anticipating further price increases, find that it makes more financial sense to hoard (rather than use) materials, and to stockpile (rather than sell) finished products. Why sell today when the same product will fetch more money tomorrow?

- Investment also declines as savers refuse to extend loans to businesses, knowing that the loans will be repaid with rapidly depreciating money.

- Many people give up on money altogether and revert to barter, causing production and exchange to drop further as people spend literally hours every day trading and bartering instead of working and producing.

- The net result is economic collapse and, often, political chaos.

Examples Examples of hyperinflation include Germany after the First World War and Japan after the Second World War. In Germany, "prices increased so rapidly that waiters changed the prices on the menu several times during the course of a lunch. Sometimes customers had to pay double the price listed on the menu when they ordered."[1] In postwar Japan in 1947, "fishermen and farmers . . . used scales to weigh currency and change, rather than bothering to count it."[2]

Causation Hyperinflations are *always* caused by governments instituting highly imprudent expansions of the money supply. The rocketing money supply produces frenzied total spending and severe demand-pull inflation. Zimbabwe's 14.9 billion percent inflation rate in 2008 is just the worst recent example. Venezuela in 2018 and several dozen other countries over the last century have caused inflation rates of 1 million percent per year or more.

Motivation Because hyperinflation causes so much harm, you may be asking why governments are sometimes willing to engage in the reckless money printing that invariably generates hyperinflation. The answer is that governments sometimes find themselves in a situation in which they cannot obtain enough revenue through either taxation or borrowing to cover the government's desired level of spending.

This is often the case during or immediately after a war, when government expenses skyrocket but tax revenues stagnate or even decline due to a depressed wartime or postwar economy. Unwilling or unable to slash spending down to a level that could be paid for by taxes plus borrowing, the

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[1]Theodore Morgan, *Income and Employment,* 2nd ed. (Englewood Cliffs, NJ: Prentice Hall, 1952), p. 361.

[2]Rayburn M. Williams, *Inflation! Money, Jobs, and Politicians* (Arlington Heights, IL: AHM Publishing, 1980), p. 2.

The Great Skills Shortage

Many Skilled Jobs Are Going Unfilled Despite High Pay and Good Benefits. What's to Blame?

The job market was slow to recover after the Great Recession of 2007–2009. But even after the unemployment rate fell below 5 percent in late 2015, many people were still spending months or even years unemployed despite there being millions of job openings that were going unfilled, month after month.

As the economy continued to improve through the late 2010s, the disequilibrium persisted. In March of 2019, there were 6.2 million unemployed workers as compared with 7.6 million job openings. How could 6.2 million people be unemployed when there were more job openings than job seekers?

One answer is that the economy always has some *frictional unemployment*, or unemployment of people between jobs. But there wasn't nearly enough frictional unemployment during the late 2010s to explain why so many job openings were going unfilled.

The labor economists who have studied the issue think that there are several other factors at work. Perhaps the most important is what they refer to as skills mismatches. These occur when the skills possessed by job seekers do not match up with the skills needed to fill particular job openings. As an example, a construction boom may greatly increase the demand for carpenters and plumbers, but it takes years to train a carpenter or a plumber. So until more can be trained, many job openings for carpenters and plumbers will go unfilled.

Prior to about 1970, most high schools in the United States had extensive vocational education programs. Students had the opportunity to learn instantly marketable job skills in fields as diverse as auto repair, carpentry, draftsmanship, electronics, livestock management, and nursing. But those programs were nearly eliminated by the late 1980s in favor of having students concentrate almost exclusively on "college prep" classes, such as English, history, social studies, chemistry, biology, and foreign languages.

This has led to a demographic divide in the labor market. There are plenty of carpenters and electricians older than 55 years of age, because there were plenty of vocational training programs when they went to high school. But if you look around at 25-year-olds today, hardly any have the training necessary to fill those positions. So, as skilled older workers retire, there are not enough younger people with the jobs skills necessary to replace them. The result is many job openings going unfilled for months or even years.

In response, many businesses that face shortages of skilled labor have taken to starting or expanding in-house training programs or working with community colleges to expand vocational programs. Consider welders. They can start at $20 per hour in many parts of the country, a substantially higher wage than is

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earned by tens of millions of service sector workers. But because there are not enough welders to satisfy demand, manufacturing companies have established welding education programs where trainees start off at $15 per hour while they perfect their skills. Once fully certified, they can earn upwards of $30 per hour, plus benefits, in locations with high demand.

Besides skills mismatches, another reason for so many job openings going unfilled is less geographic relocation. In previous generations, a high fraction of Americans moved at least once or twice from one part of the country to another chasing employment opportunities. These days, people appear to be more rooted in the areas where they grew up.

That matters for job filling because job openings are not dispersed equally across the country. In March 2019, there were 2.1 million job openings in the Southeastern United States, but only 1.2 million in the Northeast, which is the most densely populated part of the country. If workers are unwilling to move in sufficient numbers to where the job openings are plentiful, many jobs will go unfilled.

A final problem may be unrealistic expectations on the part of employers. In job ads, employers sometimes ask for qualifications that are not necessary to actually do the job. Among people currently employed as executive secretaries, for example, only 19 percent have college degrees. But 65 percent of job ads for executive secretaries require that applicants have a college degree. From this and other examples, it appears that there are quite a few job openings that aren't being filled because employers have set unreasonably high recruiting criteria.

government resorts to the printing press and prints up whatever amount of money is needed to cover its funding gap. The by-product is hyperinflation. The government maintains its rate of spending, but crashes the economy as a side effect.

Termination Hyperinflation ends when governments cut their spending down to or below the amount of revenue that they can obtain through taxes and borrowing. Because the collateral damage is so great, most bouts of hyperinflation last 12 months or less. On the other hand, Greece in the 1940s and Nicaragua in the late 1980s each experienced over four years of continuous hyperinflation.

▶ Cost-push inflation reduces real output and employment.

▶ Economists argue about the effects of demand-pull inflation. Some argue that a modest amount of inflation is helpful to ensure relative price adjustments.

▶ Hyperinflation, caused by highly imprudent expansion of the money supply, may undermine the monetary system and severely decrease real output.

AP ▍ QUICK REVIEW
23.5

Summary

LO23.1 Describe the phases of the business cycle.
The United States and other industrial economies have gone through periods of fluctuations in real GDP, employment, and the price level. Although they have certain phases in common—peak, recession, trough, expansion—business cycles vary greatly in duration and intensity.

Although economists explain the business cycle in terms of underlying causal factors such as major innovations, productivity shocks, money creation, and financial crises, they generally agree that changes in the level of total spending are the immediate causes of fluctuating real output and employment.

The business cycle affects all sectors of the economy, though in varying ways and degrees. The cycle has greater effects on output and employment in the capital goods and durable consumer goods industries than in the services and nondurable goods industries.

LO23.2 Measure unemployment and explain the different types of unemployment.
Economists distinguish among frictional, structural, and cyclical unemployment. The full-employment or natural rate of unemployment, which is composed of frictional and structural unemployment, is currently between 4 and 5 percent. The presence of part-time and discouraged workers makes it difficult to measure unemployment accurately.

The GDP gap, which can be either a positive or a negative value, is found by subtracting potential GDP from actual GDP. The economic cost of unemployment, as measured by the GDP gap, consists of the goods and services forgone by society when its resources are involuntarily idle. Okun's law suggests that every 1-percentage-point increase in the actual unemployment rate above the natural rate of unemployment causes an additional 2 percent negative GDP gap.

LO23.3 Measure inflation and distinguish between cost-push inflation and demand-pull inflation.
Inflation is a rise in the general price level and is measured in the United States by the Consumer Price Index (CPI). When inflation occurs, each dollar of income buys fewer goods and services than before. That is, inflation reduces the purchasing power of money. Deflation is a decline in the general price level.

Economists identify both demand-pull and cost-push (supply-side) inflation. Demand-pull inflation results from an excess of total spending relative to the economy's capacity to produce. The main source of cost-push inflation is abrupt and rapid increases in the prices of key resources. These supply shocks push up per-unit production costs and ultimately raise the prices of consumer goods.

LO23.4 Explain how unanticipated inflation can redistribute real income.
Unanticipated inflation arbitrarily redistributes real income at the expense of fixed-income receivers, creditors, and savers. If inflation is anticipated, individuals and businesses may be able to take steps to lessen or eliminate adverse redistribution effects.

When inflation is anticipated, lenders add an inflation premium to the interest rate charged on loans. The nominal interest rate thus reflects the real interest rate plus the inflation premium (the expected inflation rate).

LO23.5 Describe how inflation may affect the economy's level of real output.
Cost-push inflation reduces real output and employment. Proponents of zero inflation argue that even mild demand-pull inflation (1 to 3 percent) reduces the economy's real output. Other economists say that mild inflation may be a necessary by-product of the high and growing spending that produces high levels of output, full employment, and economic growth. A mild inflation also makes it easier for firms to adjust real wages downward when the the level of total spending declines. They can do so by keeping nominal wages fixed while inflation reduces the purchasing power of every dollar received by employees.

Hyperinflation, caused by highly imprudent expansions of the money supply, may undermine the monetary system and severely decrease real output.

Terms and Concepts

business cycle

peak

recession

trough

expansion

labor force

unemployment rate

discouraged workers

frictional unemployment

structural unemployment

cyclical unemployment

full-employment rate of unemployment

natural rate of unemployment (NRU)

potential output

GDP gap

Okun's law

inflation

Consumer Price Index (CPI)

deflation

demand-pull inflation

cost-push inflation

per-unit production costs

core inflation

nominal income

real income

unanticipated inflation

anticipated inflation

cost-of-living adjustments (COLAs)

real interest rate

nominal interest rate

hyperinflation

Discussion Questions

1. What are the four phases of the business cycle? How long do business cycles last? Why does the business cycle affect output and employment in capital goods industries and consumer durable goods industries more severely than in industries producing consumer nondurables? **LO23.1**

2. How can a financial crisis lead to a recession? How can a major new invention lead to an expansion? **LO23.1**

3. How is the labor force defined, and who measures it? How is the unemployment rate calculated? Does an increase in the unemployment rate necessarily mean a decline in the size of the labor force? Why is a positive unemployment rate—more than zero percent—fully compatible with full employment? **LO23.2**

4. How do unemployment rates vary by race and ethnicity, gender, occupation, and education? Why does the average length of time people are unemployed rise during a recession? **LO23.2**

5. Why is it difficult to distinguish among frictional, structural, and cyclical unemployment? Why is unemployment an economic problem? What are the consequences of a negative GDP gap? What are the noneconomic effects of unemployment? **LO23.2**

6. Even though the United States has an unemployment compensation program that provides income for those out of work, why should we worry about unemployment? **LO23.2**

7. What is the Consumer Price Index (CPI), and how is it determined each month? How does the Bureau of Labor Statistics calculate the inflation rate from one year to the next? How does inflation affect the purchasing power of a dollar? How does it explain differences between nominal and real interest rates? How does deflation differ from inflation? **LO23.3**

8. Distinguish between demand-pull inflation and cost-push inflation. Which of the two types is more likely to be associated with a negative GDP gap? Which is more likely to be associated with a positive GDP gap, in which actual GDP exceeds potential GDP? What is core inflation? Why is it calculated? **LO23.3**

9. Explain how an increase in your nominal income and a decrease in your real income might occur simultaneously. Who loses from inflation? Who gains? **LO23.4**

10. Explain how hyperinflation might lead to a severe decline in total output. **LO23.5**

11. **LAST WORD** Can frictional unemployment by itself explain the fact that the late 2010s saw more job openings than unemployed workers? Why are there plenty of skilled workers among older job seekers but very few in their twenties, thirties, and forties? What happens to the speed at which positions are filled if employers ask for unnecessary qualifications?

AP Review Questions

1. Place the phases of the business cycle in order, starting with the highest level of GDP: recession, trough, peak, expansion. **LO23.1**

2. Most economists agree that the immediate cause of most cyclical changes in real output and employment is an unexpected change in _____. **LO23.1**
   a. the level of total spending
   b. the value of the stock market
   c. the value of the trade deficit
   d. the unemployment rate
   e. the level of inflation

3. Suppose that a country has 9 million people working full-time. It also has 1 million people who are actively seeking work but are currently unemployed, along with 2 million discouraged workers who have given up looking for work and are currently unemployed. What is this country's unemployment rate? **LO23.2**
   a. 10 percent
   b. 15 percent
   c. 20 percent
   d. 25 percent
   e. 33 percent

4. Label each of the following scenarios as either frictional unemployment, structural unemployment, or cyclical unemployment. **LO23.2**
   a. Tim just graduated from college and is looking for a job.
   b. A recession causes a local factory to lay off 30 workers.
   c. Thousands of bus and truck drivers permanently lose their jobs to self-driving vehicles.
   d. Hundreds of New York legal jobs permanently disappear when a lot of legal work gets outsourced to lawyers in India.
   e. A waiter at a Wall Street restaurant loses his job as the number of lunch-time customers falls during a recession.

5. The unemployment rate that is consistent with full employment is _____. **LO23.2**
   a. the natural rate of unemployment
   b. the unnatural rate of unemployment
   c. the status quo rate of unemployment
   d. cyclical unemployment
   e. Okun's rate of unemployment

6. A country's current unemployment rate is 11 percent. Economists estimate that its natural rate of unemployment is 5 percent. What is the approximate level of cyclical unemployment with this economy's negative GDP gap? **LO23.2**
   a. 1 percent   d. 10 percent
   b. 3 percent   e. 12 percent
   c. 6 percent

7. Cost-push inflation occurs in the presence of _____. **LO23.3**
   a. excess inventory
   b. a trade deficit
   c. rising per-unit production costs
   d. excess demand for goods and services
   e. rising consumer spending from higher incomes

8. In 2018 Tatum's nominal income rose by 4.6 percent and the price level rose by 1.6 percent. We can conclude that Tatum's real income: **LO23.3**
   a. may have either increased or decreased.
   b. rose by 6.2 percent.
   c. rose by 3 percent.
   d. fell by 3 percent.
   e. fell by 13 percent.

9. Kaitlin has $10,000 of savings that she may deposit with her local bank. Kaitlin wants to earn a real rate of return of at least 4 percent, and she is expecting inflation to be exactly 3 percent. What is the lowest nominal interest rate that Kaitlin would be willing to accept from her local bank? **LO23.4**
   a. 4 percent   d. 7 percent
   b. 5 percent   e. 8 percent
   c. 6 percent

10. Real income is found by: **LO23.3**
    a. dividing nominal income by 70.
    b. multiplying nominal income by 1.03.
    c. dividing the price index (in hundredths) by nominal income.
    d. dividing nominal income by the price index (in hundredths).
    e. dividing the nominal income by the expected rate of inflation.

11. Demand-pull inflation: **LO23.3**
    a. occurs when prices of resources rise, pushing up costs and the price level.
    b. occurs when total spending exceeds the economy's ability to provide output at the existing price level.
    c. occurs only when the economy has reached its absolute production capacity.
    d. is also called cost-push inflation.
    e. increases real income.

Problems

1. Suppose that a country's annual growth rates were 5, 3, 4, −1, −2, 2, 3, 4, 6, and 3 percent in yearly sequence over a 10-year period. What was the country's trend rate of growth over this period? Which set of years most clearly demonstrates an expansionary phase of the business cycle? Which set of years best illustrates a recessionary phase of the business cycle? **LO23.1**

2. Assume the following data for a country: total population, 500; population under 16 years of age or institutionalized, 120; not in the labor force, 150; unemployed, 23; part-time workers looking for full-time jobs, 10. What is the size of the labor force? What is the official unemployment rate? **LO23.2**

3. Suppose that the natural rate of unemployment in a particular year is 5 percent and the actual unemployment rate is 9 percent. Use Okun's law to determine the size of the GDP gap in percentage-point terms. If potential GDP is $500 billion in that year, how much output is forgone because of cyclical unemployment? **LO23.2**

4. If the CPI was 110 last year and is 121 this year, what is this year's inflation rate? In contrast, suppose that the CPI was 110 last year and is 108 this year. What is this year's inflation rate?

   What term do economists use to describe this second outcome? **LO23.3**

5. How long would it take for the price level to double if inflation persisted at (a) 2 percent per year, (b) 5 percent per year, and (c) 10 percent per year? **LO23.3**

6. If your nominal income rises by 5.3 percent and the price level rises by 3.8 percent in some year, by what percentage will your real income (approximately) increase? If your nominal income rises by 2.8 percent and your real income rises by 1.1 percent in some year, what is the (approximate) inflation rate? **LO23.4**

7. Suppose that the nominal inflation rate is 4 percent and the inflation premium is 2 percent. What is the real interest rate? Alternatively, assume that the real interest rate is 1 percent and the nominal interest rate is 6 percent. What is the inflation premium? **LO23.4**

8. If the inflation premium is 2 percent and the nominal interest rate is 1 percent, what is the real interest rate? What is the real interest rate if the inflation premium is 3 percent while the nominal interest rate is 0.5 percent? **LO23.4**