Microeconomics

BRIEF EDITION, FIRST EDITION

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With the special assistance of

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Dedication

To **Mem,** to **Terri** and **Craig,** and to **past instructors**

About the Authors



Campbell R. McConnell earned his Ph.D. from 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 is coauthor of *Economics*, eighteenth edition (McGraw-Hill/

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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 Vassar College in Poughkeepsie, New York and is also the author of *Economics for Dummies* (Wiley) and co-author of *Economics*, eighteenth edition (McGraw-Hill/Irwin) and *Essentials of Economics*, second edition (McGraw-Hill/Irwin). His research interests include finance and behavioral economics. An accomplished martial artist, he has represented the United States in international aikido tournaments and is the author of *Understanding Shodokan Aikido* (Shodokan Press). Other hobbies include running, traveling, and enjoying ethnic food.

Welcome a New Text and a New Author

Welcome to Microeconomics, Brief Edition, 1e, the new trimmed and edited version of *Economics*, 18e, the nation's best-selling economics textbook. In the tradition of the market-leading text Economics: Problems, Principles, and Policies, the cover for the Brief Edition includes a photograph of steps. The photo is a metaphor for the step-bystep approach that we use to present basic economic principles. It also represents the simplicity, beauty, and power of basic economic models. We have chosen a highly modern photo to reflect the addition of our new coauthor, Sean M. Flynn, who has helped modernize the content of the book from cover to cover. Sean did his undergraduate work at USC, received his Ph.D. from U.C. Berkeley (in 2002), teaches principles at Vassar, and is the author of *Economics for Dummies*. We are greatly pleased to have Sean working on the text, since he shares our commitment to present economics in a way that is understandable to all.

Fundamental Objectives

We have three main goals for *Microeconomics*, *Brief Edition*:

- Help the beginning student master the principles essential for understanding the economizing problem, specific economic issues, and the policy alternatives.
- Help the 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.

Integrated, Distinct Book

Although *Microeconomics*, *Brief Edition* is a spin-off of *Microeconomics*, 18e, it is not a cut-and-paste book that simply eliminates several chapters of *Microeconomics*, 18e and reorders and renumbers the retained content. We can prepare such books via custom publication. Instead, the *Brief Edition* is a very concise, highly integrated microeconomics textbook that is distinct in purpose, style, and coverage from *Economics*, 18e and its Micro and Macro splits.

Distinguishing Features

Microeconomics, Brief Edition includes several features that encourage students to read and retain the content.

State-of-the-Art Design and Pedagogy

The *Brief Edition* incorporates a single-column design with a host of pedagogical aids, including a strategically placed "To the Student" statement, chapter opening objectives, definitions in the margins, combined tables and graphs, complete chapter summaries, lists of key terms, carefully constructed study questions, connections to our Web site, an appendix on graphs and a Web appendix on additional examples of demand and supply, and an extensive glossary.

Focus on Core Models

Microeconomics, Brief Edition shortens and simplifies explanations where appropriate but stresses the importance of the economic perspective, including explaining and applying core economic models. Our strategy is to develop a limited set of essential models, illustrate them with analogies or anecdotes, explain them thoroughly, and apply them to real-world situations. Eliminating unnecessary graphs and elaborations makes perfect sense in a brief edition, but cutting explanations of the truly fundamental graphs does not. In dealing with the basics, brevity at the expense of clarity is false economy.

We created a student-oriented textbook that draws on the methodological strengths of the discipline and helps students improve their analytical reasoning skills. Regardless of students' eventual occupations, they will discover that such skills are highly valuable in their workplaces.

Illustrating the Idea

Numerous analogies, examples, and anecdotes are included throughout the book to help drive home central economic ideas in a lively, colorful, and easy-to-remember way. For instance, elastic versus inelastic demand is illustrated by comparing the stretch of an Ace bandage and that of a tight rubber tie-down. A piece on Bill Gates, Oprah Winfrey, and Alex Rodriguez illustrates the importance of opportunity costs in decision making. Public goods and the free-rider problem are illustrated by public art; game theory is shown through a piece on the prisoners' dilemma; and a pizza analogy walks students through the equity-efficiency trade-off. These brief vignettes flow directly from the preceding content and segue to the content that follows, rather than being "boxed off" away from the flow and therefore easily overlooked.

Applying the Analysis

A glance though this book's pages will demonstrate that this is an application-oriented textbook. Applying the Analysis pieces immediately follow the development of economic analysis and are part of the flow of the chapters, rather than segregated from the main body discussion in a traditional boxed format. For example, the basics of the economic perspective are applied to why customers choose the shortest checkout lines. The book illustrates inelasticity of demand (with changing supply) with an explanation of fluctuating farm income. Differences in elasticity of supply are contrasted by the changing prices of antiques versus reproductions. Hidden car-retrieval systems (such as Lojack) explain the concept of positive externalities. The book describes the principal-agent problem via the problems of corporate accounting and financial fraud. The idea of minimum efficient scale is applied to ready-mix concrete plants and assembly plants for large commercial airplanes. The concept of price discrimination is illustrated by the difference in adult and child pricing for ballgame tickets compared to the pricing at the concession stands. These and many other applications clearly demonstrate the relevance and usefulness of mastering the basic economic principles and models to beginning students.

Photo Ops

Photo sets under the title *Photo Op* are included throughout the book to add visual interest, break up the density, and highlight important distinctions. Just a few of the many examples are sets of photos on traffic congestion and holiday lighting to contrast negative and positive externalities, large- and small-scale production activities to illustrate economies and diseconomies of scale, and Social Security checks and food stamps to highlight the differences between social insurance and public assistance. Other photo sets illustrate normal versus inferior goods, complements versus substitutes in consumption, homogeneous versus differentiated products, substitute resources versus complementary resources, and more.

Web Buttons

The in-text Web buttons (or indicators) merit special mention. Three differing colors of rectangular indicators appear throughout the book, informing readers that complementary content on a subject can be found at our Web site, **www. mcconnellbriefmicro1e.com**. Scattered throughout the text you'll see:

Worked Problems Written by Norris Peterson of Pacific Lutheran University, these pieces consist

WORKED PROBLEMS

of side-by-side computational questions and computational procedures used to derive the answers.

From a student perspective, they provide "cookbook" help for problem solving.

Interactive Graphs These pieces (developed under the supervision of Norris Peterson) depict major graphs and instruct students to shift the curves, observe the outcomes,

INTERACTIVE GRAPHS
G 3.I
Supply and Demand

and derive relevant generalizations. This handson graph work will greatly reinforce the main graphs and their meaning.

Origin of the Ideas These brief histories, written by Randy Grant of Linfield College (OR), examine the origins of major ideas identified in the book. Students will find it interesting to learn about the economists who first

ORIGIN OF THE IDEA		
O 2.2		
Specialization/division of labor		

developed such ideas as opportunity costs, equilibrium price, elasticity, creative destruction, and comparative advantage.

Global Snapshots

Global Snapshot pieces show bar charts and line graphs that compare data for a particular year or other time period among selected nations. Examples of these lists and comparisons include income per capita, the world's 10 largest corporations, the world's top brand names, the index of economic freedom, the differing economic status of North Korea and South Korea, and so forth. These *Global Snapshots* join other significant international content to help convey that the United States operates in a global economy.

Supplements for Students Online Learning Center

At **www.mcconnellbriefmicro1e.com**, students have access to several learning aids. Along with the Interactive Graphs, Worked Problems, and Origin of the Idea pieces, the student portion of the Web site includes Web-based study questions, self-grading quizzes, and PowerPoint presentations. For math-minded students, there is a "See the Math" section, written by Norris Peterson, where the mathematical details of the concepts in the text can be explored.

Premium Content

The Premium Content, available at the Online Learning Center, offers a range of dynamic study aids to the student. Premium Content enables students to study and self-test on their computer or on the go.

- One of the world's leading experts on economic education—William Walstad of the University of Nebraska at Lincoln—has prepared the *Study Guide*. Each chapter contains an introductory statement, a checklist of behavioral objectives, an outline, a list of important terms, fill-in questions, problems and projects, objective questions, and discussion questions. The text's glossary is repeated in the *Study Guide* so that the student does not have to go back and forth between books. Many students will find this "digital tutor" indispensable.
- Narrated PowerPoint presentations enable students to see key concepts and hear the explanation simultaneously.
- The Solman Videos, a set of more than 250 minutes of video created by Paul Solman of *The News Hour with Jim Lehrer*, cover core economic concepts such as elasticity, deregulation, and perfect competition.
- Chapter quizzes can be purchased and downloaded to an iPod, mp3 player, or desktop computer.

McGraw-Hill Connect Economics

Connect Economics is a complete, online supplement system that duplicates and expands upon the textbook's endof chapter material and test banks. Nearly all the questions



from the text, including the numerous graphing exercises, are presented in an autogradable format and tied to the text's learning

objectives. Instructors may edit existing questions and author entirely new problems. Connect Economics can be used for student practice, homework, quizzes, and formal examinations. Detailed grade reports enable instructors to see how each student performs on a particular problem, a full assignment, and in the context of the overall class. The Connect Economics grade reports can be easily integrated with WebCT and Blackboard. Connect Economics is also available with an integrated online version of the textbook. With a single access code, students can read the eBook, work through practice problems, do homework, and take exams.

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advantage of digital navigation, to which students are accustomed. Students can search the text, highlight, take



notes, and use e-mail tools to share notes with their classmates. CourseSmart also includes tech support in case help is ever needed. To

buy *Microeconomics*, *Brief Edition* as an eText or learn more about this digital solution, visit **www.CourseSmart.com** and search by title, author, or ISBN.

Supplements for Instructors Instructor's Manual

Darlene De Vera of De Anza College prepared the Instructor's Manual. It includes chapter learning objectives, outlines, and summaries; numerous teaching suggestions; discussions of "student stumbling blocks;" listings of data and visual aid sources with suggestions for classroom use; and answers to the end-of-chapter study questions. Available in MS Word on the instructor's side of the Web site and on the Instructor's Resource CD, the manual enables instructors to print portions of the contents, complete with their own additions and alterations, for use as student handouts or in whatever ways they wish. This capability includes printing answers to the end-of-chapter questions.

Test Bank

The *Microeconomics*, *Brief Edition* Test Bank, originally written by William Walstad and newly compiled and updated by Mohammad Bajwa of Northampton Community College, contains multiple choice and true-false questions. Each question is tied to a learning objective, topic, and AACSB Assurance of Learning and Bloom's Taxonomy guidelines. While crafting tests in EZTest Online, instructors can use the whole chapter, scramble questions, and narrow the group by selecting the criteria. The Test Bank is also available in MS Word on the instructor's side of the Web site.

PowerPoints

Galina Hale, Economist, Federal Reserve Bank of San Francisco, created these in-depth slides to accompany lectures. The slides highlight all the main points of each chapter and include key figures and tables from the text. Each slide is tied to a learning objective.

Digital Image Library

Every graph and table in the text is available on the Web site. These figures allow instructors to create their own PowerPoint presentations and lecture materials.

Online Learning Center

The password-protected instructor's side of the Online Learning Center, **www.mcconnellbriefmicro1e.com**, holds all of the instructor resource materials. There, instructors may find the Instructor's Manual, Test Bank, PowerPoint presentations, Digital Image Library, and information on CPS by eInstruction or the "clicker" system.

Acknowledgments

We give special thanks to Randy Grant of Linfield College, who not only wrote the Origin of the Idea pieces on our Web site but also served as the content coordinator for *Microeconomics, Brief Edition.* Professor Grant modified and seamlessly incorporated appropriate new content and revisions that the authors made in the eighteenth edition of *Economics* into this first edition of the *Brief Edition.* He also updated the tables and other information in *Microeconomics, Brief Edition* and made various improvements that he deemed helpful or were suggested to him by the authors, reviewers, and publisher. We also want to acknowledge Norris Peterson of Pacific Lutheran University, who created the See the Math pieces and the new Worked Problem pieces on our Web site. Professor Peterson also oversaw the development of the Interactive Graph pieces that are on the site. Finally, we wish to acknowledge William Walstad and Tom Barbiero (the coauthor of the Canadian edition of *Economics*) for their ongoing ideas and insights.

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> Stanley L. Brue Sean M. Flynn Campbell R. McConnell



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PART ONE Introduction

- I LIMITS, ALTERNATIVES, AND CHOICES
- 2 THE MARKET SYSTEM AND THE CIRCULAR FLOW

To the Student

This book and its ancillaries contain several features designed to help you learn economics:

• *Icons in the margins* A glance through the book reveals many pages with Web buttons in the margins. Three differing colored rectangular indicators appear throughout the book, alerting you when complementary content on a subject can be found at our Online Learning Center, **www.mcconnellbriefmicro1e.com**. The **Worked Problems** serve as your "cookbook" for problem solving. Numeric problems are presented and then solved, side-by-side, step-by-step. Seeing how the problems are worked will help you solve similar problems on quizzes and exams. Practice hands-on graph work with the **Interactive Graphs** exercises. Manipulate the graphs by clicking on a specific curve and dragging it to a new location. This interaction will enhance your understanding of the underlying concepts. The **Origin of the Ideas** pieces trace a particular idea to the person or persons who first developed it.

WORKED PROBLEMS

W I.I Budget lines

INTERACTIVE GRAPHS

G 3.1 Supply and demand

ORIGIN OF THE IDEA

Specialization/division of labor

- *Other Internet aids* Our Internet site contains many other aids. In the student section at the Online Learning Center, you will find self-testing multiple-choice quizzes, PowerPoint slides, and much more.
- *Appendix on graphs* To understand the content in this book, you will need to be comfortable with basic graphical analysis and a few quantitative concepts. The appendix (pages 24–29) at the end of Chapter 1 reviews graphing and slopes of curves. Be sure not to skip it.
- *Key terms* Key terms are set in boldface type within the chapters, defined in the margins, listed at the end of each chapter, and again defined in the Glossary toward the end of the book.
- *"Illustrating the Idea" and "Applying the Analysis"* These sections flow logically and smoothly from the content that precedes them. They are part and parcel of the development of the ideas and cannot be skipped.
- **Questions** Each "Illustrating the Idea" and "Applying the Analysis" section is followed by a question. A comprehensive list of study questions is located at the end of each chapter. Each question is keyed to a particular learning objective (LO) in the list of LOs at the beginning of the chapter. At the Internet site, there are multiple-choice quizzes and one or more Web-based questions that require you to find information at specified Web sites to formulate answers.
- *Study Guide* We enthusiastically recommend the *Study Guide* accompanying this text. This "portable tutor" contains not only a broad sampling of various kinds of questions but a host of useful learning aids.

Our two main goals are to help you understand and apply economics and help you improve your analytical skills. An understanding of economics will enable you to comprehend a whole range of economic, social, and political problems that otherwise would seem puzzling and perplexing. Also, your study will enhance reasoning skills that are highly prized in the workplace.

Good luck with your study. We think it will be well worth your time and effort.

IN THIS CHAPTER YOU WILL LEARN:

- I The definition of economics and the features of the economic perspective.
- **2** The role of economic theory in economics.
- **3** The distinction between microeconomics and macroeconomics.
- 4 The categories of scarce resources and the nature of the economic problem.
- 5 About production possibilities analysis, increasing opportunity costs, and economic growth.
- 6 (Appendix) About graphs, curves, and slopes as they relate to economics.



Limits, Alternatives, and Choices

(An appendix on understanding graphs follows this chapter. If you need a quick review of this mathematical tool, you might benefit by reading the appendix first.)

Economics is about wants and means. Biologically, people need only air, water, food, clothing, and shelter. But in modern society people also desire goods and services that provide a more comfortable or affluent standard of living. We want bottled water, soft drinks, and fruit juices, not just water from the creek. We want salads, burgers, and pizzas, not just berries and nuts. We want jeans, suits, and coats, not just woven reeds. We want apartments, condominiums, or houses, not just mud huts. And, as the saying goes, "that is not the half of it." We also want flat-panel TVs, Internet service, education, homeland security, cell phones, and much more.

ORIGIN OF THE IDEA

Origin of the term "economics"

Fortunately, society possesses productive resources such as labor and managerial talent, tools and machinery, and land and mineral deposits. These resources, employed in the economic system (or simply the economy), help us produce goods and services that satisfy many of our economic wants. But the blunt reality is that our economic wants far exceed the productive capacity of our scarce (limited) resources. We are forced to make choices. This unyielding truth underlies the definition of **economics,** which is the social science concerned with how individuals, institutions, and society make choices under conditions of scarcity.

The Economic Perspective

economics

The study of how people, institutions, and society make economic choices under conditions of scarcity.

economic perspective

A viewpoint that envisions individuals and institutions making rational decisions by comparing the marginal benefits and marginal costs of their actions.

opportunity cost

The value of the good, service, or time forgone to obtain something else.

ILLUSTRATING THE IDEA

Economists view things through a particular perspective. This **economic perspective**, or economic way of thinking, has several critical and closely interrelated features.

Scarcity and Choice

From our definition of economics, it is easy to see why economists view the world through the lens of scarcity. Scarce economic resources mean limited goods and services. Scarcity restricts options and demands choices. Because we "can't have it all," we must decide what we will have and what we must forgo.

At the core of economics is the idea that "there is no free lunch." You may be treated to lunch, making it "free" to you, but someone bears a cost. Because all resources are either privately or collectively owned by members of society, ultimately, scarce inputs of land, equipment, farm labor, the labor of cooks and waiters, and managerial talent are required. Because these resources could have been used to produce something else, society sacrifices those other goods and services in making the lunch available. Economists call such sacrifices **opportunity costs:** To obtain more of one thing, society forgoes the opportunity of getting the next best thing. That sacrifice is the opportunity cost of the choice.

Did Gates, Winfrey, and Rodriguez Make Bad Choices?

The importance of opportunity costs in decision making is illustrated by different choices people make with respect to college. College graduates usually earn about 50% more during their lifetimes than 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 Microsoft cofounder Bill Gates and talk-show host Oprah Winfrey* both dropped out of college, and baseball star Alex Rodriguez ("A-Rod") never even bothered to enroll. What were they thinking? Unlike most students, Gates faced enormous opportunity costs for staying in college. He had a vision for his company, and his starting work young helped ensure Microsoft's success. Similarly, Winfrey landed a spot in local television news when she was a teenager, eventually producing and starring in the *Oprab Winfrey Show* when she was 32 years old. Getting a degree in her twenties might have interrupted the string of successes that made her famous talk show possible. And Rodriguez knew that professional athletes have short careers. Therefore, going to college directly after high school would have taken away 4 years of his peak earning potential.

So Gates, Winfrey, and Rodriguez understood opportunity costs and made their choices accordingly. The size of opportunity costs greatly matters in making individual decisions.

Question:

Professional athletes sometimes return to college after they retire from professional sports. How does that college decision relate to opportunity costs?

* Winfrey eventually went back to school and earned a degree from Tennessee State University when she was in her thirties.

Purposeful Behavior

Economics assumes that human behavior reflects "rational self-interest." Individuals look for and pursue opportunities to increase their **utility:** pleasure, happiness, or satisfaction. They allocate their time, energy, and money to maximize their satisfaction. Because they weigh costs and benefits, their decisions are "purposeful" or "rational," not "random" or "chaotic."

Consumers are purposeful in deciding what goods and services to buy. Business firms are purposeful in deciding what products to produce and how to produce them. Government entities are purposeful in deciding what public services to provide and how to finance them.

"Purposeful behavior" does not assume that people and institutions are immune from faulty logic and therefore are perfect decision makers. They sometimes make mistakes. Nor does it mean that people's decisions are unaffected by emotion or the decisions of those around them. "Purposeful behavior" simply means that people make decisions with some desired outcome in mind.

Nor is rational self-interest the same as selfishness. We will find that increasing one's own wage, rent, interest, or profit normally requires identifying and satisfying somebody else's want. Also, many people make personal sacrifices to others without expecting any monetary reward. They contribute time and money to charities because they derive pleasure from doing so. Parents help pay for their children's education for the same reason. These self-interested, but unselfish, acts help maximize the givers' satisfaction as much as any personal purchase of goods or services. Self-interested behavior is simply behavior designed to increase personal satisfaction, however it may be derived.

Marginalism: Benefits and Costs

The economic perspective focuses largely on **marginal analysis**—comparisons of marginal benefits and marginal costs. To economists, "marginal" means "extra," "additional," or "a change in." Most choices or decisions involve changes in the status quo, meaning the existing state of affairs.

Should you attend school for another year? Should you study an extra hour for an exam? Should you supersize your fries? Similarly, should a business expand or reduce its output? Should government increase or decrease its funding for a missile defense system?

Each option involves marginal benefits and, because of scarce resources, marginal costs. In making choices rationally, the decision maker must compare those two

utility The satisfaction obtained from consuming a good or service.

ORIGIN OF THE IDEA

marginal analysis The comparison of marginal ("extra" or "additional") benefits and marginal costs, usually for decision making.

ORIGIN OF THE IDEA

O I.3 Marginal analysis amounts. Example: You and your fiancée are shopping for an engagement ring. Should you buy a 1/2-carat diamond, a 5/8-carat diamond, a 3/4-carat diamond, a 1-carat diamond, or something even larger? The marginal cost of a larger-size diamond is the added expense beyond the cost of the smaller-size diamond. The marginal benefit is the perceived greater lifetime pleasure (utility) from the larger-size stone. If the marginal benefit of the larger diamond exceeds its marginal cost (and you can afford it), buy the larger stone. But if the marginal cost is more than the marginal benefit, buy the smaller diamond instead, even if you can afford the larger stone!

In a world of scarcity, the decision to obtain the marginal benefit associated with some specific option always includes the marginal cost of forgoing something else. The money spent on the larger-size diamond means forgoing some other product. An opportunity cost, the value of the next best thing forgone, is always present whenever a choice is made.

APPLYING THE ANALYSIS

Fast-Food Lines

The economic perspective is useful in analyzing all sorts of behaviors. Consider an everyday example: the behavior of fast-food customers. When customers enter the restaurant, they go to the shortest line, believing that line will minimize their time cost of obtaining food. They are acting purposefully; time is limited, and people prefer using it in some way other than standing in a long line.

If one fast-food line is temporarily shorter than other lines, some people will move to that line. These movers apparently view the time saving from the shorter line (marginal benefit) as exceeding the cost of moving from their present line (marginal cost). The line switching tends to equalize line lengths. No further movement of customers between lines occurs once all lines are about equal.

Fast-food customers face another cost-benefit decision when a clerk opens a new station at the counter. Should they move to the new station or stay put? Those who shift to the new line decide that the time saving from the move exceeds the extra cost of physically moving. In so deciding, customers must also consider just how quickly they can get to the new station compared with others who may be contemplating the same move. (Those who hesitate in this situation are lost!)

Customers at the fast-food establishment do not have perfect information when they select lines. Thus, not all decisions turn out as expected. For example, you might enter a short line and find someone in front of you is ordering hamburgers and fries for 40 people in the Greyhound bus parked out back (and the employee is a trainee)! Nevertheless, at the time you made your decision, you thought it was optimal.

Finally, customers must decide what food to order when they arrive at the counter. In making their choices, they again compare marginal costs and marginal benefits in attempting to obtain the greatest personal satisfaction for their expenditure.

Economists believe that what is true for the behavior of customers at fast-food restaurants is true for economic behavior in general. Faced with an array of choices, consumers, workers, and businesses rationally compare marginal costs and marginal benefits in making decisions.

Question:

Have you ever gone to a fast-food restaurant only to observe long lines and then leave? Use the economic perspective to explain your behavior.

Theories, Principles, and Models

Like the physical and life sciences, as well as other social sciences, economics relies on the **scientific method.** That procedure consists of several elements:

- Observing real-world behavior and outcomes.
- Based on those observations, formulating a possible explanation of cause and effect (hypothesis).
- Testing this explanation by comparing the outcomes of specific events to the outcome predicted by the hypothesis.
- Accepting, rejecting, or modifying the hypothesis, based on these comparisons.
- Continuing to test the hypothesis against the facts. As favorable results accumulate, the hypothesis evolves into a *theory*. A very well-tested and widely accepted theory is referred to as a *law* or *principle*. Combinations of such laws or principles are incorporated into *models*, which are simplified representations of how something works, such as a market or segment of the economy.

Economists develop theories of the behavior of individuals (consumers, workers) and institutions (businesses, governments) engaged in the production, exchange, and consumption of goods and services. Economic theories and **principles** are statements about economic behavior or the economy that enable prediction of the probable effects of certain actions. They are "purposeful simplifications." The full scope of economic reality itself is too complex and bewildering to be understood as a whole. In developing theories and principles, economists remove the clutter and simplify.

Economic principles and models are highly useful in analyzing economic behavior and understanding how the economy operates. They are the tools for ascertaining cause and effect (or action and outcome) within the economic system. Good theories do a good job of explaining and predicting. They are supported by facts concerning how individuals and institutions actually behave in producing, exchanging, and consuming goods and services.

There are some other things you should know about economic principles:

- *Generalizations* Economic principles are *generalizations* relating to economic behavior or to the economy itself. Economic principles are expressed as the tendencies of typical or average consumers, workers, or business firms. For example, economists say that consumers buy more of a particular product when its price falls. Economists recognize that some consumers may increase their purchases by a large amount, others by a small amount, and a few not at all. This "price-quantity" principle, however, holds for the typical consumer and for consumers as a group.
- **Other-things-equal assumption** Like other scientists, economists use the *ceteris paribus* or **other-things-equal assumption** to construct their theories. They assume that all variables except those under immediate consideration are held constant for a particular analysis. For example, consider the relationship between the price of Pepsi and the amount of it purchased. It helps to assume that, of all the factors that might influence the amount of Pepsi purchased (for example, the price of Pepsi, the price of Coca-Cola, and consumer incomes and preferences), only the price of Pepsi varies. The economist can then focus on the relationship between the price of Pepsi in isolation without being confused by changes in other variables.
- *Graphical expression* Many economic models are expressed graphically. Be sure to read the special appendix at the end of this chapter as a review of graphs.

Microeconomics and Macroeconomics

Economists develop economic principles and models at two levels.

scientific method

The systematic pursuit of knowledge by observing facts and formulating and testing hypotheses to obtain theories, principles, and laws.

principles

Statements about economic behavior that enable prediction of the probable effects of certain actions.

other-things-equal assumption

The assumption that factors other than those being considered do not change.



microeconomics

The part of economics concerned with individual decisionmaking units, such as a consumer, a worker, or a business firm.

macroeconomics

The part of economics concerned with the economy as a whole or major components of the economy.

aggregate

A collection of specific economic units treated as if they were one unit.

Microeconomics

Microeconomics is the part of economics concerned with individual units such as a person, a household, a firm, or an industry. At this level of analysis, the economist observes the details of an economic unit, or very small segment of the economy, under a figurative microscope. In microeconomics we look at the decision making by individual consumers, households, and business firms. We measure the price of a specific product, the number of workers employed by a single firm, the revenue or income of a particular firm or household, or the expenditures of a specific firm, government entity, or family.

Macroeconomics

Macroeconomics examines either the economy as a whole or its basic subdivisions or aggregates, such as the government, household, and business sectors. An **aggregate** is a collection of specific economic units treated as if they were one unit. Therefore, we might lump together the millions of consumers in the U.S. economy and treat them as if they were one huge unit called "consumers."

In using aggregates, macroeconomics seeks to obtain an overview, or general outline, of the structure of the economy and the relationships of its major aggregates. Macroeconomics speaks of such economic measures as total output, total employment, total income, aggregate expenditures, and the general level of prices in analyzing various economic problems. No or very little attention is given to specific units making up the various aggregates.



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Photo Op Micro versus Macro

Figuratively, microeconomics examines the sand, rock, and shells, not the beach; in contrast, macroeconomics examines the beach, not the sand, rocks, and shells.

Individual's Economic Problem

economic problem The need for individuals and society to make choices because wants exceed means. It is clear from our previous discussion that both individuals and society face an **economic problem:** They need to make choices because economic wants are unlimited but the means (income, time, resources) for satisfying those wants are limited. Let's first look at the economic problem faced by individuals. To explain the idea, we will construct a very simple microeconomic model.

Limited Income

We all have a finite amount of income, even the wealthiest among us. Sure Bill Gates earns a bit more than the rest of us, but he still has to decide how to spend his money! And the majority of us have much more limited means. Our income comes to us in the form of wages, interest, rent, and profit, although we may also receive money from government programs or family members. As Global Snapshot 1.1 shows, the average income of Americans in 2006 was \$44,970. In the poorest nations, it was less than \$500.

Unlimited Wants

For better or worse, most people have virtually unlimited wants. We desire various goods and services that provide utility. Our wants extend over a wide range of products, from *necessities* (food, shelter, clothing) to *luxuries* (perfumes, yachts, sports cars). Some wants such as basic food, clothing, and shelter have biological roots. Other wants, for example, specific kinds of food, clothing, and shelter, arise from the conventions and customs of society.

Over time, economic wants tend to change and multiply, fueled by new and improved products. Only recently have people wanted iPods, Internet service, digital cameras, or camera phones because those products did not exist a few decades ago. Also, the satisfaction of certain wants may trigger others: The acquisition of a Ford Focus or a Honda Civic has been known to whet the appetite for a Lexus or a Mercedes.



GLOBAL SNAPSHOT 1.1

Average Income, Selected Nations

Average income (total income/population) and therefore typical budget constraints vary greatly among nations.

Country	Per Capita Income, 2006*
Switzerland	\$57,230
United States	44,970
Japan	38,410
France	36,550
South Korea	17,690
Mexico	7,870
Brazil	4,730
China	2,010
Pakistan	770
Nigeria	640
Rwanda	250
Liberia	140

* U.S. dollars.

Source: World Bank, www.worldbank.org.







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Photo Op Necessities versus Luxuries

Economic wants include both necessities and luxuries. Each type of item provides utility to the buyer.

Services, as well as goods, satisfy our wants. Car repair work, the removal of an inflamed appendix, legal and accounting advice, and haircuts all satisfy human wants. Actually, we buy many goods, such as automobiles and washing machines, for the services they render. The differences between goods and services are often smaller than they appear to be.

For most people, the desires for goods and services cannot be fully satisfied. Bill Gates may have all that he wants for himself, but his massive charitable giving suggests that he keenly wants better health care for the world's poor. Our desires for a *particular* good or service can be satisfied; over a short period of time we can surely obtain enough toothpaste or pasta. And one appendectomy is plenty. But our broader desire for more goods and services and higher-quality goods and services seems to be another story.

Because we have only limited income but seemingly insatiable wants, it is in our self-interest to economize: to pick and choose goods and services that maximize our satisfaction.

A Budget Line

The economic problem facing individuals can be depicted as a **budget line** (or, more technically, *budget constraint*). It is a schedule or curve that shows various combinations of two products a consumer can purchase with a specific money income.

To understand this idea, suppose that you received a Barnes & Noble (or Borders) gift card as a birthday present. The \$120 card is soon to expire. You take the card to the store and confine your purchase decisions to two alternatives: DVDs and paperback

budget line

A line that shows various combinations of two products a consumer can purchase with a specific money income, given the products' prices.

e Budget DVDs and	Line: Whole-Un Paperback Book an Income of \$	t Combinations of s Attainable with s 120	12	2							
s of DVDs e = \$20)	Units of Books (Price = \$10)	Total Expenditure	s Š	3	ln	come P _{dvd} =	= \$120 \$20				
6	0	(\$120 = \$120 + \$0)	of D					Una	ttainab	le	
5	2	(\$120 = \$100 + \$20)	eity 6	5							
4	4	(\$120 = \$80 + \$40)	lant	1							
3	6	(\$120 = \$60 + \$60)	õ 1	+					Inc	ome =	\$1 2
2	8	(\$120 = \$40 + \$80)	2	,	Α	ttainal	ble			$P_b = $	0
I.	10	(120 = 20 + 100)	2	2							
0	12	(\$120 = \$0 + \$120)									7
			0)	2	4	4	6	8 1	0	2
						Qu	antity o	of paper	back bo	oks	

FIGURE 1.1 A consumer's budget line. The budget line (or budget constraint) shows all the combinations of any two products that can be purchased, given the prices of the products and the consumer's money income.

books. DVDs are \$20 each, and paperback books are \$10 each. Your purchase options are shown in the table in Figure 1.1.

At one extreme, you might spend all of your \$120 "income" on 6 DVDs at \$20 each and have nothing left to spend on books. Or, by giving up 2 DVDs and thereby gaining \$40, you can have 4 DVDs at \$20 each, and 4 books at \$10 each. And so on to the other extreme, at which you could buy 12 books at \$10 each, spending your entire gift card on books with nothing left to spend on DVDs.

The graph in Figure 1.1 shows the budget line. Note that the graph is not restricted to whole units of DVDs and books as is the table. Every point on the graph represents a possible combination of DVDs and books, including fractional quantities. The slope of the graphed budget line measures the ratio of the price of books (P_b) to the price of DVDs (P_{dvd}) ; more precisely, the slope is $P_b/P_{dvd} = \$ -10/\$ + 20 = -1/2$ or -.5. So you must forgo 1 DVD (measured on the vertical axis) to buy 2 books (measured on the horizontal axis). This yields a slope of -1/2 or -.5.

The budget line illustrates several ideas.

Attainable and Unattainable Combinations All the combinations of DVDs and books on or inside the budget line are *attainable* from the \$120 of money income. You can afford to buy, for example, 3 DVDs at \$20 each and 6 books at \$10 each. You also can obviously afford to buy 2 DVDs and 5 books, if so desired, and not use up the value on the gift card. But to achieve maximum utility you will want to spend the full \$120.

In contrast, all combinations beyond the budget line are *unattainable*. The \$120 limit simply does not allow you to purchase, for example, 5 DVDs at \$20 each and 5 books at \$10 each. That \$150 expenditure would clearly exceed the \$120 limit. In Figure 1.1 the attainable combinations are on and within the budget line; the unattainable combinations are beyond the budget line.

Trade-Offs and Opportunity Costs The budget line in Figure 1.1 illustrates the idea of trade-offs arising from limited income. To obtain more DVDs, you ORIGIN OF THE IDEA 0 1.5 Opportunity cost constant opportunity cost An opportunity cost that remains the same as consumers shift purchases from one product to another along a straight-line budget line.

WORKED PROBLEMS

W I.I Budget lines have to give up some books. For example, to acquire the first DVD, you trade off 2 books. So the opportunity cost of the first DVD is 2 books. To obtain the second DVD, the opportunity cost is also 2 books. The straight-line budget constraint, with its constant slope, indicates **constant opportunity cost**. That is, the opportunity cost of 1 extra DVD remains the same (= 2 books) as more DVDs are purchased. And, in reverse, the opportunity cost of 1 extra book does not change (= 1/2 DVD) as more books are bought.

Choice Limited income forces people to choose what to buy and what to forgo to fulfill wants. You will select the combination of DVDs and paperback books that you think is "best." That is, you will evaluate your marginal benefits and your marginal costs (here, product price) to make choices that maximize your satisfaction. Other people, with the same \$120 gift card, would undoubtedly make different choices.

Income Changes The location of the budget line varies with money income. An increase in money income shifts the budget line to the right; a decrease in money income shifts it to the left. To verify this, recalculate the table in Figure 1.1, assuming the card value (income) is (a) \$240 and (b) \$60, and plot the new budget lines in the graph. No wonder people like to have more income: That shifts their budget lines outward and enables them to buy more goods and services. But even with more income, people will still face spending trade-offs, choices, and opportunity costs.

Society's Economic Problem

Society must also make choices under conditions of scarcity. It, too, faces an economic problem. Should it devote more of its limited resources to the criminal justice system (police, courts, and prisons) or to education (teachers, books, and schools)? If it decides to devote more resources to both, what other goods and services does it forgo? Health care? Homeland security? Energy development?

Scarce Resources

Society's economic resources are limited or scarce. By **economic resources** we mean all natural, human, and manufactured resources that go into the production of goods and services. That includes the entire set of factory and farm buildings and all the equipment, tools, and machinery used to produce manufactured goods and agricultural products; all transportation and communication facilities; all types of labor; and land and mineral resources.

Resource Categories

Economists classify economic resources into four general categories.

Land Land means much more to the economist than it does to most people. To the economist **land** includes all natural resources ("gifts of nature") used in the production process, such as arable land, forests, mineral and oil deposits, and water resources.

Labor The resource **labor** consists of the physical and mental talents of individuals used in producing goods and services. The services of a logger, retail clerk, machinist,

economic resources The land, labor, capital, and entrepreneurial ability used in the production of goods and services.

land

Natural resources ("gifts of nature") used to produce goods and services.

labor

The physical and mental talents and efforts of people used to produce goods and services.

teacher, professional football player, and nuclear physicist all fall under the general heading "labor."

Capital For economists, **capital** (or *capital goods*) includes all manufactured aids used in producing consumer goods and services. Included are all factory, storage, transportation, and distribution facilities, as well as all tools and machinery. Economists refer to the purchase of capital goods as **investment**.

Capital goods differ from consumer goods because consumer goods satisfy wants directly, while capital goods do so indirectly by aiding the production of consumer goods. Note that the term "capital" as used by economists refers not to money but to tools, machinery, and other productive equipment. Because money produces nothing, economists do not include it as an economic resource. Money (or money capital or financial capital) is simply a means for purchasing real capital.

Entrepreneurial Ability Finally, there is the special human resource, distinct from labor, called **entrepreneurial ability**. The entrepreneur performs several functions:

- The entrepreneur takes the initiative in combining the resources of land, labor, and capital to produce a good or a service. Both a spark plug and a catalyst, the entrepreneur is the driving force behind production and the agent who combines the other resources in what is hoped will be a successful business venture.
- The entrepreneur makes the strategic business decisions that set the course of an enterprise.
- The entrepreneur is an innovator. He or she commercializes new products, new production techniques, or even new forms of business organization.
- The entrepreneur is a risk bearer. The entrepreneur has no guarantee of profit. The reward for the entrepreneur's time, efforts, and abilities may be profits or losses. The entrepreneur risks not only his or her invested funds but those of associates and stockholders as well.

capital

Human-made resources (buildings, machinery, and equipment) used to produce goods and services.

investment

The purchase of capital resources.

entrepreneurial ability

The human talent that combines the other resources to produce a product, make strategic decisions, and bear risks.

factors of production

Economic resources: land, labor, capital, and entrepreneurial ability.



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Photo Op Economic Resources

Land, labor, capital, and entrepreneurial ability all contribute to producing goods and services.

Because land, labor, capital, and entrepreneurial ability are combined to produce goods and services, they are called the **factors of production** or simply inputs.

consumer goods

Products and services that directly satisfy consumer wants.

capital goods

Items that are used to produce other goods and therefore do not directly satisfy consumer wants.

Production Possibilities Model

Society uses its scarce resources to produce goods and services. The alternatives and choices it faces can best be understood through a macroeconomic model of production possibilities. To keep things simple, we assume:

- *Full employment* The economy is employing all its available resources.
- Fixed resources The quantity and quality of the factors of production are fixed.
- *Fixed technology* The state of technology (the methods used to produce output) is constant.
- *Two goods* The economy is producing only two goods: food products and manufacturing equipment. Food products symbolize **consumer goods**, products that satisfy our wants directly; manufacturing equipment symbolizes **capital goods**, products that satisfy our wants indirectly by making possible more efficient production of consumer goods.

Production Possibilities Table

A production possibilities table lists the different combinations of two products that can be produced with a specific set of resources, assuming full employment. Figure 1.2 contains such a table for a simple economy that is producing food products and manufacturing equipment; the data are, of course, hypothetical. At alternative A, this economy would be devoting all its available resources to the production of manufacturing equipment (capital goods); at alternative E, all resources would go to food-product production (consumer goods). Those alternatives are unrealistic extremes; an economy typically produces both capital goods and consumer goods, as in B, C, and D. As we move from alternative A to E, we increase the production of food products at the expense of the production of manufacturing equipment.

Because consumer goods satisfy our wants directly, any movement toward E looks tempting. In producing more food products, society increases the current satisfaction

FIGURE 1.2 The production possibilities curve. Each point on the production possibilities curve represents some maximum combination of two products that can be produced if resources are fully and efficiently employed. When an economy is operating on the curve, more manufacturing equipment means less food products, and vice versa. Limited resources and a fixed technology make any combination of manufacturing equipment and food products lying outside the curve (such as at *W*) unattainable. Points inside the curve are attainable, but they indicate that full employment is not being realized.

	Pro	Production Alternatives				
Type of Product	Α	В	С	D	Е	
Food products (hundred thousands)	0	I	2	3	4	
Manufacturing equipment (thousands)	10	9	7	4	0	



of its wants. But there is a cost: More food products mean less manufacturing equipment. This shift of resources to consumer goods catches up with society over time because the stock of capital goods does not expand at the current rate, with the result that some potential for greater future production is lost. By moving toward alternative E, society chooses "more now" at the expense of "much more later."

By moving toward A, society chooses to forgo current consumption, thereby freeing up resources that can be used to increase the production of capital goods. By building up its stock of capital this way, society will have greater future production and, therefore, greater future consumption. By moving toward A, society is choosing "more later" at the cost of "less now."

Generalization: At any point in time, a fully employed economy must sacrifice some of one good to obtain more of another good. Scarce resources prohibit such an economy from having more of both goods. Society must choose among alternatives. There is no such thing as a free bag of groceries or a free manufacturing machine. Having more of one thing means having less of something else.

Production Possibilities Curve

The data presented in a production possibilities table can also be shown graphically. We arbitrarily represent the economy's output of capital goods (here, manufacturing equipment) on the vertical axis and the output of consumer goods (here, food products) on the horizontal axis, as shown in Figure 1.2.

Each point on the **production possibilities curve** represents some maximum output of the two products. The curve is a "constraint" because it shows the limit of attainable outputs. Points on the curve are attainable as long as the economy uses all its available resources. Points lying inside the curve are also attainable, but they reflect less total output and therefore are not as desirable as points on the curve. Points inside the curve imply that the economy could have more of both manufacturing equipment and food products if it achieved full employment. Points lying beyond the production possibilities curve, like *W*, would represent a greater output than the output at any point on the curve. Such points, however, are unattainable with the current availability of resources and technology.

Law of Increasing Opportunity Costs

Figure 1.2 clearly shows that more food products mean less manufacturing equipment. The number of units of manufacturing equipment that must be given up to obtain another unit of food products, of course, is the opportunity cost of that unit of food products.

In moving from alternative A to alternative B in the table in Figure 1.2, the cost of 1 additional unit of food products is 1 less unit of manufacturing equipment. But when additional units are considered—B to C, C to D, and D to E—an important economic principle is revealed: The opportunity cost of each additional unit of food products is greater than the opportunity cost of the preceding one. When we move from A to B, just 1 unit of manufacturing equipment is sacrificed for 1 more unit of food products; but in going from B to C, we sacrifice 2 additional units of manufacturing equipment for 1 more unit of food products; then 3 more of manufacturing equipment for 1 more of food products; and finally 4 for 1. Conversely, confirm that as we move from E to A, the cost of an additional unit of manufacturing equipment (on average) is 1/4, 1/3, 1/2, and 1 unit of food products, respectively, for the four successive moves.

Our example illustrates the **law of increasing opportunity costs:** The more of a product that society produces, the greater is the opportunity cost of obtaining an extra unit.

INTERACTIVE GRAPHS

G I.I

Production possibilities curve

production possibilities curve

A curve showing the different combinations of goods and services that can be produced in a fully employed economy, assuming the available supplies of resources and technology are fixed.

law of increasing opportunity costs

The principle that as the production of a good increases, the opportunity cost of producing an additional unit rises.

WORKED PROBLEMS

W 1.2 Production possibilities **Shape of the Curve** The law of increasing opportunity costs is reflected in the shape of the production possibilities curve: The curve is bowed out from the origin of the graph. Figure 1.2 shows that when the economy moves from *A* to *E*, it must give up successively larger amounts of manufacturing equipment (1, 2, 3, and 4) to acquire equal increments of food products (1, 1, 1, and 1). This is shown in the slope of the production possibilities curve, which becomes steeper as we move from *A* to *E*.

Economic Rationale The economic rationale for the law of increasing opportunity costs is that economic resources are not completely adaptable to alternative uses. Many resources are better at producing one type of good than at producing others. Some land is highly suited to growing the ingredients necessary for pizza production, but as pizza production expands, society has to start using land that is less bountiful for farming. Other land is rich in mineral deposits and therefore well-suited to producing the materials needed to make manufacturing equipment. As society steps up the production of manufacturing equipment, it must push resources that are less and less adaptable to making that equipment into its production.

If we start at A and move to B in Figure 1.2, we can shift resources whose productivity is relatively high in food production and low in manufacturing equipment. But as we move from B to C, C to D, and so on, resources highly productive of food products become increasingly scarce. To get more food products, resources whose productivity in manufacturing equipment is relatively great will be needed. It will take increasingly more of such resources, and hence greater sacrifices of manufacturing equipment, to achieve each 1-unit increase in food products. This lack of perfect flexibility, or interchangeability, on the part of resources is the cause of increasing opportunity costs for society.

Optimal Allocation

Of all the attainable combinations of food products and manufacturing equipment on the curve in Figure 1.2, which is optimal (best)? That is, what specific quantities of resources should be allocated to food products and what specific quantities to manufacturing equipment in order to maximize satisfaction?

Recall that economic decisions center on comparisons of marginal benefits (MB) and marginal costs (MC). Any economic activity should be expanded as long as marginal benefit exceeds marginal cost and should be reduced if marginal cost exceeds marginal benefit. The optimal amount of the activity occurs where MB = MC. Society needs to make a similar assessment about its production decision.

Consider food products. We already know from the law of increasing opportunity costs that the marginal costs of additional units of food products will rise as more units are produced. At the same time, we need to recognize that the extra or marginal benefits that come from producing and consuming food products decline with each successive unit of food products. Consequently, each successive unit of food products brings with it both increasing marginal costs and decreasing marginal benefits.

The optimal quantity of food production is indicated by the intersection of the MB and MC curves: 200,000 units in Figure 1.3. Why is this amount the optimal quantity? If only 100,000 units of food products were produced, the marginal benefit of an extra unit of them would exceed its marginal cost. In money terms, MB is \$15, while MC is only \$5. When society gains something worth \$15 at a marginal cost of only \$5, it is better off. In Figure 1.3, net gains of decreasing amounts can be realized until food-product production has been increased to 200,000.

In contrast, the production of 300,000 units of food products is excessive. There the MC of an added unit is \$15 and its MB is only \$5. This means that 1 unit of food



FIGURE 1.3 Optimal output: MB = MC. Achieving the optimal

output requires the expansion of a good's output until its marginal benefit (MB) and marginal cost (MC) are equal. No resources beyond that point should be allocated to the product. Here, optimal output occurs when 200,000 units of food products are produced.

products is worth only \$5 to society but costs it \$15 to obtain. This is a losing proposition for society!

So resources are being efficiently allocated to any product when the marginal benefit and marginal cost of its output are equal (MB = MC). Suppose that by applying the above analysis to manufacturing equipment, we find its optimal (MB = MC) output is 7000. This would mean that alternative C (200,000 units of food products and 7000 units of manufacturing equipment) on the production possibilities curve in Figure 1.2 would be optimal for this economy.

The Economics of War

Production possibilities analysis is helpful in assessing the costs and benefits of waging the war on terrorism, including the wars in Afghanistan and Iraq. At the end of 2007, the estimated cost of these efforts exceeded \$400 billion.

If we categorize all of U.S. production as either "defense goods" or "civilian goods," we can measure them on the axes of a production possibilities diagram such as that shown in Figure 1.2. The opportunity cost of using more resources for defense goods is the civilian goods sacrificed. In a fully employed economy, more defense goods are achieved at the opportunity cost of fewer civilian goods—health care, education, pollution control, personal computers, houses, and so on. The cost of waging war is the other goods forgone. The benefits of these activities are numerous and diverse but clearly include the gains from protecting against future loss of American lives, assets, income, and well-being.

Society must assess the marginal benefit (MB) and marginal cost (MC) of additional defense goods to determine their optimal amounts—where to locate on the defense goods–civilian goods production possibilities curve. Although estimating marginal benefits and marginal costs is an imprecise art, the MB-MC APPLYING THE ANALYSIS framework is a useful way of approaching choices. Allocative efficiency requires that society expand production of defense goods until MB = MC.

The events of September 11, 2001, and the future threats they posed increased the perceived marginal benefits of defense goods. If we label the horizontal axis in Figure 1.3 "defense goods," and draw in a rightward shift of the MB curve, you will see that the optimal quantity of defense goods rises. In view of the concerns relating to September 11, the United States allocated more of its resources to defense. But the MB-MC analysis also reminds us we can spend too much on defense, as well as too little. The United States should not expand defense goods beyond the point where MB = MC. If it does, it will be sacrificing civilian goods of greater value than the defense goods obtained.

Question:

Would society's costs of war be lower if it drafted soldiers at low pay rather than attracted them voluntarily to the military through market pay?

Unemployment, Growth, and the Future

In the depths of the Great Depression of the 1930s, one-quarter of U.S. workers were unemployed and one-third of U.S. production capacity was idle. The United States has suffered a number of much milder downturns since then, the latest beginning in December 2007 and still occuring (as of the end of 2008).

Almost all nations have experienced widespread unemployment and unused production capacity from business downturns at one time or another. Since 1995, for example, several nations—including Argentina, Japan, Mexico, Germany, and South Korea—have had economic downturns and unemployment.

How do these realities relate to the production possibilities model? Our analysis and conclusions change if we relax the assumption that all available resources are fully employed. The five alternatives in the table of Figure 1.2 represent maximum outputs; they illustrate the combinations of food products and manufacturing equipment that can be produced when the economy is operating at full employment. With unemployment, this economy would produce less than each alternative shown in the table.

Graphically, we represent situations of unemployment by points inside the original production possibilities curve (reproduced in Figure 1.4). Point U is one such point. Here the economy is falling short of the various maximum combinations of food products and manufacturing equipment represented by the points on the production possibilities curve. The arrows in Figure 1.4 indicate three possible paths back to full employment. A move toward full employment would yield a greater output of one or both products.

A Growing Economy

When we drop the assumptions that the quantity and quality of resources and technology are fixed, the production possibilities curve shifts positions, and the potential maximum output of the economy changes.

Increases in Resource Supplies Although resource supplies are fixed at any specific moment, they change over time. For example, a nation's growing population brings about increases in the supplies of labor and entrepreneurial ability. Also, labor


FIGURE 1.4 Unemployment and the production possibilities curve. Any point inside the production possibilities curve, such as *U*, represents unemployment or a failure to achieve full employment. The arrows indicate that, by realizing full employment, the economy could operate on the curve. This means it could produce more of one or both products than it is producing at point *U*.

quality usually improves over time. Historically, the economy's stock of capital has increased at a significant, though unsteady, rate. And although some of our energy and mineral resources are being depleted, new sources are also being discovered. The development of irrigation programs, for example, adds to the supply of arable land.

The net result of these increased supplies of the factors of production is the ability to produce more of both consumer goods and capital goods. Thus 20 years from now, the production possibilities in Figure 1.5 may supersede those shown in Figure 1.2. The

FIGURE 1.5 Economic growth and the production possibilities curve. The increase in supplies of resources, the improvements in resource quality, and the technological advances that occur in a dynamic economy move the production possibilities curve outward and to the right, allowing the economy to have larger quantities of both types of goods.

	Pro	Production Alternatives			
Type of Product	Α′	B ′	C ′	D'	Ε′
Food products (hundred thousands)	0	2	4	6	8
Manufacturing equipment (thousands)	14	12	9	5	0



economic growth

An outward shift of the production possibilities curve that results from an increase in resource supplies or quality or an improvement in technology. greater abundance of resources will result in a greater potential output of one or both products at each alternative. The economy will have achieved economic growth in the form of expanded potential output. Thus, when an increase in the quantity or quality of resources occurs, the production possibilities curve shifts outward and to the right, as illustrated by the move from the inner curve to curve A' B' C' D' E' in Figure 1.5. This sort of shift represents growth of economic capacity, which, when used, means **economic growth:** a larger total output.

Advances in Technology An advancing technology brings both new and better goods and improved ways of producing them. For now, let's think of technological advance as being only improvements in the methods of production, for example, the introduction of computerized systems to manage inventories and schedule production. These advances alter our previous discussion of the economic problem by allowing society to produce more goods with available resources. As with increases in resource supplies, technological advances make possible the production of more manufacturing equipment and more food products.

APPLYING THE ANALYSIS

Information Technology and Biotechnology

A real-world example of improved technology is the recent surge of new technologies relating to computers, communications, and biotechnology. Technological advances have dropped the prices of computers and greatly increased their speed. Improved software has greatly increased the everyday usefulness of computers. Cellular phones and the Internet have increased communications capacity, enhancing production and improving the efficiency of markets. Advances in biotechnology have resulted in important agricultural and medical discoveries. These and other new and improved technologies have contributed to U.S. economic growth (outward shifts of the nation's production possibilities curve).

Question:

How have technological advances in medicine helped expand production possibilities in the United States?

Conclusion: Economic growth is the result of (1) increases in supplies of resources, (2) improvements in resource quality, and (3) technological advances. The consequence of growth is that a full-employment economy can enjoy a greater output of both consumption goods and capital goods. While static, no-growth economies must sacrifice some of one good to obtain more of another, dynamic, growing economies can have larger quantities of both goods.

Present Choices and Future Possibilities

An economy's current choice of positions on its production possibilities curve helps determine the future location of that curve. Let's designate the two axes of the production possibilities curve as "goods for the future" and "goods for the present," as in Figure 1.6. Goods for the future are such things as capital goods, research and education, and FIGURE 1.6 Present choices and future locations of production possibilities curves. A nation's current choice favoring "present goods," as made by Presentville in (a), will cause a modest outward shift of the production possibilities curve in the future. A nation's current choice favoring "future goods," as made by Futureville in (b), will result in a greater outward shift of the curve in the future.



preventive medicine. They increase the quantity and quality of property resources, enlarge the stock of technological information, and improve the quality of human resources. As we have already seen, goods for the future, such as capital goods, are the ingredients of economic growth. Goods for the present are consumer goods such as food, clothing, and entertainment.

Now suppose there are two hypothetical economies, Presentville and Futureville, which are initially identical in every respect except one: Presentville's current choice of positions on its production possibilities curve strongly favors present goods over future goods. Point P in Figure 1.6a indicates that choice. It is located quite far down the curve to the right, indicating a high priority for goods for the present, at the expense of fewer goods for the future. Futureville, in contrast, makes a current choice that stresses larger amounts of future goods and smaller amounts of present goods, as shown by point F in Figure 1.6b.

Now, other things equal, we can expect the future production possibilities curve of Futureville to be farther to the right than Presentville's curve. By currently choosing an output more favorable to technological advances and to increases in the quantity and quality of resources, Futureville will achieve greater economic growth than Presentville. In terms of capital goods, Futureville is choosing to make larger current additions to its "national factory" by devoting more of its current output to capital than Presentville. The payoff from this choice for Futureville is greater future production capacity and economic growth. The opportunity cost is fewer consumer goods in the present for Futureville to enjoy.

Is Futureville's choice thus necessarily "better" than Presentville's? That, we cannot say. The different outcomes simply reflect different preferences and priorities in the two countries. But each country will have to live with the consequences of its choice.

INTERACTIVE GRAPHS

G I.2 Present choices and future possibilities

Summary

- Economics is the social science that studies how people, institutions, and society make choices under conditions of scarcity. Central to economics is the idea of opportunity cost: the value of the good, service, or time forgone to obtain something else.
- The economic perspective includes three elements: scarcity and choice, purposeful behavior, and marginalism. It sees individuals and institutions making rational decisions based on comparisons of marginal costs and marginal benefits.
- 3. Economists employ the scientific method, in which they form and test hypotheses of cause-and-effect relationships to generate theories, laws, and principles. Economists often combine theories into representations called models.
- 4. Microeconomics examines the decision making of specific economic units or institutions. Macroeconomics looks at the economy as a whole or its major aggregates.
- 5. Individuals face an economic problem. Because their wants exceed their incomes, they must decide what to purchase and what to forgo. Society also faces an economic problem. Societal wants exceed the available resources necessary to fulfill them. Society therefore must decide what to produce and what to forgo.
- 6. Graphically, a budget line (or budget constraint) illustrates the economic problem for individuals. The line shows the various combinations of two products that a consumer can purchase with a specific money income, given the prices of the two products.
- 7. Economic resources are inputs into the production process and can be classified as land, labor, capital, and entrepreneurial ability. Economic resources are also known as factors of production or inputs.

- 8. Society's economic problem can be illustrated through production possibilities analysis. Production possibilities tables and curves show the different combinations of goods and services that can be produced in a fully employed economy, assuming that resource quantity, resource quality, and technology are fixed.
- 9. An economy that is fully employed and thus operating on its production possibilities curve must sacrifice the output of some types of goods and services to increase the production of others. The gain of one type of good or service is always accompanied by an opportunity cost in the form of the loss of some of the other type.
- 10. Because resources are not equally productive in all possible uses, shifting resources from one use to another results in increasing opportunity costs. The production of additional units of one product requires the sacrifice of increasing amounts of the other product.
- 11. The optimal point on the production possibilities curve represents the most desirable mix of goods and is determined by expanding the production of each good until its marginal benefit (MB) equals its marginal cost (MC).
- 12. Over time, technological advances and increases in the quantity and quality of resources enable the economy to produce more of all goods and services, that is, to experience economic growth. Society's choice as to the mix of consumer goods and capital goods in current output is a major determinant of the future location of the production possibilities curve and thus of the extent of economic growth.

Terms and Concepts

economics
economic perspective
opportunity cost
utility
marginal analysis
scientific method
principles
other-things-equal assumption
microeconomics

macroeconomics aggregate economic problem budget line constant opportunity cost economic resources land labor capital investment entrepreneurial ability factors of production consumer goods capital goods production possibilities curve law of increasing opportunity costs economic growth

Study Questions Connect

- 1. Ralph Waldo Emerson once wrote: "Want is a growing giant whom the coat of have was never large enough to cover." How does this statement relate to the definition of economics? LOI
- "Buy 2, get 1 free." Explain why the "1 free" is free to the buyer but not to society. LOI
- **3.** Which of the following decisions would entail the greater opportunity cost: allocating a square block in the heart of

New York City for a surface parking lot or allocating a square block at the edge of a typical suburb for such a lot? Explain. **LOI**

- **4.** What is meant by the term "utility," and how does it relate to purposeful behavior? **LOI**
- 5. Cite three examples of recent decisions that you made in which you, at least implicitly, weighed marginal cost and marginal benefit. LOI
- 6. Indicate whether each of the following statements applies to microeconomics or macroeconomics: LO3
 - **a.** The unemployment rate in the United States was 5.0% in April 2008.
 - **b.** A U.S. software firm discharged 15 workers last month and transferred the work to India.
 - **c.** An unexpected freeze in central Florida reduced the citrus crop and caused the price of oranges to rise.
 - d. U.S. output, adjusted for inflation, grew by 2.2% in 2007.
 - e. Last week Wells Fargo Bank lowered its interest rate on business loans by one-half of 1 percentage point.
 - **f.** The consumer price index rose by 2.8% in 2007.
- 7. Suppose you won \$15 on a lotto ticket at the local 7-Eleven and decided to spend all the winnings on candy bars and bags of peanuts. The price of candy bars is \$.75 and the price of peanuts is \$1.50. LO4
 - **a.** Construct a table showing the alternative combinations of the two products that are available.
 - **b.** Plot the data in your table as a budget line in a graph. What is the slope of the budget line? What is the opportunity cost of one more candy bar? Of one more bag of peanuts? Do these opportunity costs rise, fall, or remain constant as each additional unit of the product is purchased?
 - **c.** How, in general, would you decide which of the available combinations of candy bars and bags of peanuts to buy?
 - **d.** Suppose that you had won \$30 on your ticket, not \$15. Show the \$30 budget line in your diagram. Why would this budget line be preferable to the old one?
- 8. What are economic resources? What categories do economists use to classify them? Why are resources also called factors of production? Why are they called inputs? LO4
- **9.** Why isn't money considered a capital resource in economics? Why is entrepreneurial ability considered a category of economic resource, distinct from labor? What are the major functions of the entrepreneur? **LO4**

10. Below is a production possibilities table for consumer goods (automobiles) and capital goods (forklifts): **LO5**

	P	Production Alternatives			
Type of Production	Α	В	С	D	Е
Automobiles	0	2	4	6	8
Forklifts	30	27	21	12	0

- **a.** Show these data graphically. Upon what specific assumptions is this production possibilities curve based?
- **b.** If the economy is at point *C*, what is the cost of one more automobile? Of one more forklift? Explain how the production possibilities curve reflects the law of increasing opportunity costs.
- **c.** If the economy characterized by this production possibilities table and curve were producing 3 automobiles and 20 forklifts, what could you conclude about its use of its available resources?
- **d.** What would production at a point outside the production possibilities curve indicate? What must occur before the economy can attain such a level of production?
- e. Suppose improvement occurs in the technology of producing forklifts but not in the technology of producing automobiles. Draw the new production possibilities curve. Now assume that a technological advance occurs in producing automobiles but not in producing forklifts. Draw the new production possibilities curve. Now draw a production possibilities curve that reflects technological improvement in the production of both goods.
- 11. Specify and explain the typical shapes of marginal-benefit and marginal-cost curves. How are these curves used to determine the optimal allocation of resources to a particular product? If current output is such that marginal cost exceeds marginal benefit, should more or fewer resources be allocated to this product? Explain. LOS
- 12. Explain how (if at all) each of the following events affects the location of a country's production possibilities curve: LO5a. The quality of education increases.
 - **b.** The number of unemployed workers increases.
 - c. A new technique improves the efficiency of extracting copper from ore.
 - **d.** A devastating earthquake destroys numerous production facilities.

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Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.

Chapter One Appendix

Graphs and Their Meaning

If you glance quickly through this text, you will find many graphs. These graphs are included to help you visualize and understand economic relationships. Most of our principles or models explain relationships between just two sets of economic data, which can be conveniently represented with two-dimensional graphs.

Construction of a Graph

A graph is a visual representation of the relationship between two variables. The table in Figure 1 is a hypothetical illustration showing the relationship between income and consumption for the economy as a whole. Because people tend to buy more goods and services when their incomes go up, it is not surprising to find in the table that total consumption in the economy increases as total income increases.

The information in the table is also expressed graphically in Figure 1. Here is how it is done: We want to show visually or graphically how consumption changes as income changes. Since income is the determining factor, we follow mathematical custom and represent it on the horizontal axis of the graph. And because consumption depends on income, it is represented on the vertical axis of the graph.

The vertical and horizontal scales of the graph reflect the ranges of values of consumption and income, marked in convenient increments. As you can see, the values on the scales cover all the values in the table. Because the graph has two dimensions, each point within it represents an income value and its associated consumption value. To find a point that represents one of the five income-consumption combinations in the table, we draw lines from the appropriate values on the vertical and horizontal axes. For example, to plot point c (the \$200 income-\$150 consumption point), lines are drawn up from the horizontal (income) axis at \$200 and across from the vertical (consumption) axis at \$150. These lines intersect at point c, which represents this particular income-consumption combination. You should verify that the other income-consumption combinations shown in the table in Figure 1 are properly located in the graph that is there.

Finally, by assuming that the same general relationship between income and consumption prevails for all other incomes, we draw a line or smooth curve to connect these points. That line or curve represents the income-consumption relationship.

If the graph is a straight line, as in Figure 1, the relationship is said to be *linear*.

Direct and Inverse Relationships

The line in Figure 1 slopes upward to the right, so it depicts a **direct relationship** between income and con-

sumption. A direct relationship, or positive relationship, means that two variables (here, consumption and income) change in the same direction. An increase in consump-

direct relationship The (positive) relationship between two variables that change in the same direction.

FIGURE 1 Graphing the direct relationship between consumption and income. Two sets of data that are positively or directly related, such as consumption and income, graph as an upsloping line.

Income per Week	Consumption per Week	Point
\$ 0	\$ 50	а
100	100	Ь
200	150	с
300	200	d
400	250	е



tion is associated with an increase in income; a decrease in consumption accompanies a decrease in income. When two sets of data are positively or directly related, they always graph as an upsloping line, as in Figure 1.

In contrast, two sets of data may be inversely related. Consider the table in Figure 2, which shows the relationship between the price of basketball tickets and game attendance for Big Time University (BTU). Here there is an **inverse relationship**, or negative relationship, because the two variables change in opposite directions. When ticket prices for the games decrease, attendance increases. When

ticket prices increase, attendance decreases. The six data points in the table are plotted in the graph in Figure 2. This inverse relationship graphs as a downsloping line.

inverse relationship The (negative) relationship between two variables that change in opposite directions.

Dependent and Independent Variables

Economists seek to determine which variable is the "cause" and which the "effect." Or, more formally, they seek the independent variable and the dependent variable. The **independent variable** is the cause or source; it is the variable that changes first. The **dependent variable** is the effect **independent**

or outcome; it is the variable that changes because of the change in the independent variable. As in our income-consumption exam-

variable The variable causing a change in some other (dependent) variable; the "causal variable." ple, income generally is the independent variable and consumption the dependent variable. Income causes consumption to be what it is rather than the other way around. Similarly, ticket prices (set in advance of the season and dependent variable The variable that changes as a result of a change in some other (independent) variable; the "outcome variable."

printed on the ticket) determine attendance at BTU basketball games; attendance at games does not determine the printed ticket prices for those games. Ticket price is the independent variable, and the quantity of tickets purchased is the dependent variable.

Mathematicians always put the independent variable (cause) on the horizontal axis and the dependent variable (effect) on the vertical axis. Economists are less tidy; their graphing of independent and dependent variables is more arbitrary. Their conventional graphing of the income-consumption relationship is consistent with mathematical presentation, but economists historically put price and cost data on the vertical axis of their graphs. Contemporary economists have followed the tradition. So economists' graphing of BTU's ticket price–attendance data differs from normal mathematical procedure. This does not present a problem, but we want you to be aware of this fact to avoid possible confusion.

Other Things Equal

Our simple two-variable graphs purposely ignore many other factors that might affect the amount of consumption

FIGURE 2 Graphing the inverse relationship between ticket prices and game attendance. Two sets of data that are negatively or inversely related, such as ticket price and the attendance at basketball games, graph as a downsloping line.

Ticket Price	Attendance, Thousands	Point
\$50	0	а
40	4	Ь
30	8	с
20	12	d
10	16	e
0	20	f



occurring at each income level or the number of people who attend BTU basketball games at each possible ticket price. When economists plot the relationship between any two variables, they employ the *ceteris paribus* (other-thingsequal) assumption. Thus, in Figure 1 all factors other than income that might affect the amount of consumption are presumed to be constant or unchanged. Similarly, in Figure 2 all factors other than ticket price that might influence attendance at BTU basketball games are assumed constant. In reality, "other things" are not equal; they often change, and when they do, the relationship represented in our two tables and graphs will change. Specifically, the lines we have plotted would shift to new locations.

Consider a stock market "crash." The dramatic drop in the value of stocks might cause people to feel less wealthy and therefore less willing to consume at each level of income. The result might be a downward shift of the consumption line. To see this, you should plot a new consumption line in Figure 1, assuming that consumption is, say, \$20 less at each income level. Note that the relationship remains direct; the line merely shifts downward to reflect less consumption spending at each income level.

Similarly, factors other than ticket prices might affect BTU game attendance. If BTU loses most of its games, attendance at BTU games might be less at each ticket price. To see this, redraw Figure 2, assuming that 2000 fewer fans attend BTU games at each ticket price.

Slope of a Line

Lines can be described in terms of their slopes. The **slope of a straight line** is the ratio of the vertical change (the rise or drop) to the horizontal change (the run) between any two points of the line.

slope (of a straight

line) The ratio of the vertical change (the rise or fall) to the horizontal change (the run) between any two points on a line.

Positive Slope Between point *b* and point *c* in the graph in Figure 1, the rise or vertical change (the change in consumption) is +\$50 and the run or horizontal change (the change in income) is +\$100. Therefore:

Slope =
$$\frac{\text{vertical change}}{\text{horizontal change}} = \frac{+50}{+100} = \frac{1}{2} = .5$$

Note that our slope of $\frac{1}{2}$ or .5 is positive because consumption and income change in the same direction; that is, consumption and income are directly or positively related.

Negative Slope Between any two of the identified points in the graph of Figure 2, say, point *c* and point *d*, the

vertical change is -10 (the drop) and the horizontal change is +4 (the run). Therefore:

Slope =
$$\frac{\text{vertical change}}{\text{horizontal change}} = \frac{-10}{+4} = -2\frac{1}{2} = -2.5$$

This slope is negative because ticket price and attendance have an inverse relationship.

Slopes and Marginal Analysis Economists are largely concerned with changes in values. The concept of slope is important in economics because it reflects marginal changes—those involving 1 more (or 1 less) unit. For example, in Figure 1 the .5 slope shows that \$.50 of extra or marginal consumption is associated with each \$1 change in income. In this example, people collectively will consume \$.50 of any \$1 increase in their incomes and reduce their consumption by \$.50 for each \$1 decline in income. Careful inspection of Figure 2 reveals that every \$1 increase in ticket price for BTU games will decrease game attendance by 400 people and every \$1 decrease in ticket price will increase game attendance by 400 people.

Infinite and Zero Slopes Many variables are unrelated or independent of one another. For example, the quantity of wristwatches purchased is not related to the price of bananas. In Figure 3a the price of bananas is measured on the vertical axis and the quantity of watches demanded on the horizontal axis. The graph of their relationship is the line parallel to the vertical axis, indicating that the same quantity of watches is purchased no matter what the price of bananas. The slope of such a line is infinite.

Similarly, aggregate consumption is completely unrelated to the nation's divorce rate. In Figure 3b we put consumption on the vertical axis and the divorce rate on the horizontal axis. The line parallel to the horizontal axis represents this lack of relatedness. This line has a slope of zero.

Slope of a Nonlinear Curve We now move from the simple world of linear relationships (straight lines) to the somewhat more complex world of nonlinear relationships. The slope of a straight line is the same at all its points. The slope of a line representing a nonlinear relationship changes from one point to another. Such lines are always referred to as *curves*.

Consider the downsloping curve in Figure 4. Its slope is negative throughout, but the curve flattens as we move down along it. Thus, its slope constantly changes; the curve has a different slope at each point. FIGURE 3 Infinite and zero slopes. (a) A line parallel to the vertical axis has an infinite slope. Here, purchases of watches remain the same no matter what happens to the price of bananas. (b) A line parallel to the horizontal axis has a slope of zero. In this case, total consumption remains the same no matter what happens to the divorce rate. In both (a) and (b), the two variables are totally unrelated to one another.



To measure the slope at a specific point, we draw a straight line tangent to the curve at that point. A line is tangent at a point if it touches, but does not intersect, the curve at that point. So line *aa* is tangent to the curve in Figure 4

FIGURE 4 Determining the slopes of curves. The slope of a nonlinear curve changes from point to point on the curve. The slope at any point (say, *B*) can be determined by drawing a straight line that is tangent to that point (line *bb*) and calculating the slope of that line.



at point *A*. The slope of the curve at that point is equal to the slope of the tangent line. Specifically, the total vertical change (drop) in the tangent line *aa* is -20 and the total horizontal change (run) is +5. Because the slope of the tangent line *aa* is -20/+5, or -4, the slope of the curve at point *A* is also -4.

Line *bb* in Figure 4 is tangent to the curve at point *B*. Using the same procedure, we find the slope at *B* to be -5/+15, or $-\frac{1}{3}$. Thus, in this flatter part of the curve, the slope is less negative.

Several of the Appendix questions are of a "workbook" variety, and we urge you to go through them carefully to check your understanding of graphs and slopes.

Appendix Summary

- 1. Graphs are a convenient and revealing way to represent economic relationships.
- 2. Two variables are positively or directly related when their values change in the same direction. The line (curve) representing two directly related variables slopes upward.
- 3. Two variables are negatively or inversely related when their values change in opposite directions. The curve representing two inversely related variables slopes downward.
- 4. The value of the dependent variable (the "effect") is determined by the value of the independent variable (the "cause").
- 5. When the "other factors" that might affect a two-variable relationship are allowed to change, the graph of the relationship will likely shift to a new location.
- 6. The slope of a straight line is the ratio of the vertical change to the horizontal change between any two points. The slope of an upsloping line is positive; the slope of a downsloping line is negative.

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- 7. The slope of a line or curve is especially relevant for economics because it measures marginal changes.
- 8. The slope of a horizontal line is zero; the slope of a vertical line is infinite.

Appendix Terms and Concepts

direct relationship inverse relationship

independent variable dependent variable 9. The slope of a curve at any point is determined by calculating the slope of a straight line tangent to the curve at that point.

slope of a straight line

Appendix Study Questions Connect

 Briefly explain the use of graphs as a way to represent economic relationships. What is an inverse relationship? How does it graph? What is a direct relationship? How does it graph? Graph and explain the relationships (other things equal) you would expect to find between (a) the number of inches of rainfall per month and the sale of umbrellas, (b) the price of bottled water and the number of bottles sold per year, and (c) the popularity of an entertainer and the price of her concert tickets.

In each case cite and explain how variables other than those specifically mentioned might upset the expected relationship. Is your graph in part b, above, consistent with the fact that, historically, the quantity and price of bottled water have both increased? If not, explain any difference. **LO6**

- Indicate how each of the following might affect the data shown in the table and graph in Figure 2 of this appendix: LO6
 - **a.** BTU's athletic director hires away the coach from a perennial champion.
 - **b.** An NBA team locates in the city where BTU plays.
 - c. BTU contracts to have all its home games televised.
- 3. The following table contains data on the relationship between saving and income. Rearrange these data into a meaningful order and graph them on the accompanying grid. What is the slope of the line? Interpret the meaning of the slope. What would you predict saving to be at the \$12,500 level of income? LO6

Income per Year	Saving per Year
\$15,000	\$1,000
0	-500
10,000	500
5,000	0
20,000	1,500



4. Construct a table from the data shown on the graph below. Which is the dependent variable and which the independent variable? LO6



 Suppose that when the price of gold is \$100 an ounce, gold producers find it unprofitable to sell gold. However, when the price is \$200 an ounce, 5000 ounces of output (production) is profitable. At \$300, a total of 10,000 ounces of output is profitable. Similarly, total production increases by 5000 ounces for each successive \$100 increase in the price of gold. Describe the relevant relationship between the price of gold and the production of gold in words, in a table, and on a graph. Put the price of gold on the vertical axis and the output of gold on the horizontal axis. Comment on the advantages and disadvantages of the verbal, tabular, and graphical forms of description. **LO6**

6. The accompanying graph shows curve *XX'* and tangents to the curve at points *A*, *B*, and *C*. Calculate the slope of the curve at each of these three points. **LO6**



7. In the accompanying graph, is the slope of curve AA' positive or negative? Does the slope increase or decrease as we move along the curve from A to A'? Answer the same two questions for curve BB'. LO6





IN THIS CHAPTER YOU WILL LEARN:

- I The difference between a command system and a market system.
- 2 The main characteristics of the market system.
- **3** How the market system answers four fundamental questions.
- 4 How the market system adjusts to change and promotes progress.
- **5** The mechanics of the circular flow model.

The Market System and the Circular Flow

You are at the mall. Suppose you were assigned to compile a list of all the individual goods and services there, including the different brands and variations of each type of product. That task would be daunting and the list would be long! And even though a single shopping mall contains a remarkable quantity and variety of goods, it is only a tiny part of the national economy.

Who decided that the particular goods and services available at the mall and in the broader economy should be produced? How did the producers determine which technology and types of resources to use in producing these particular goods? Who will obtain these products? What accounts for the new and improved products among these goods? This chapter will answer these questions.

Economic Systems

Every society needs to develop an **economic system**—a particular set of institutional arrangements and a coordinating mechanism—to respond to the economic problem. The economic system has to determine what goods are produced, how they are produced, who gets them, and how to promote technological progress.

Economic systems differ as to (1) who owns the factors of production and (2) the method used to motivate, coordinate, and direct economic activity. There are two general types of economic systems: the command system and the market system.

The Command System

The **command system** is also known as *socialism* or *communism*. In that system, government owns most property resources and economic decision making occurs through a central economic plan. A central planning board appointed by the government makes nearly all the major decisions concerning the use of resources, the composition and distribution of output, and the organization of production. The government owns most of the business firms, which produce according to government directives. The central planning board determines production goals for each enterprise and specifies the amount of resources to be allocated to each enterprise so that it can reach its production goals. The division of output between capital and consumer goods is centrally decided, and capital goods are allocated among industries on the basis of the central planning board's long-term priorities.

A pure command economy would rely exclusively on a central plan to allocate the government-owned property resources. But, in reality, even the preeminent command economy—the Soviet Union—tolerated some private ownership and incorporated some markets before its collapse in 1992. Recent reforms in Russia and most of the eastern European nations have to one degree or another transformed their command economies to capitalistic, market-oriented systems. China's reforms have not gone as far, but they have greatly reduced the reliance on central planning. Although there is still extensive government ownership of resources and capital in China, the nation has increasingly relied on free markets to organize and coordinate its economy. North Korea and Cuba are the last remaining examples of largely centrally planned economies. Global Snapshot 2.1 reveals how North Korea's centrally planned economy compares to the market economy of its neighbor, South Korea. Later in this chapter, we will explore the main reasons for the general demise of the command systems.

The Market System

The polar alternative to the command system is the **market system**, or *capitalism*. The system is characterized by the private ownership of resources and the use of markets and prices to coordinate and direct economic activity. Participants act in their own self-interest. Individuals and businesses seek to achieve their economic goals through their own decisions regarding work, consumption, or production. The system allows for the private ownership of capital, communicates through prices, and coordinates economic activity through *markets*—places where buyers and sellers come together. Goods and services are produced and resources are supplied by whoever is willing and able to do so. The result is competition among independently acting buyers and sellers of each product and resource. Thus, economic decision making is widely dispersed. Also, the high potential monetary rewards create powerful incentives for existing firms to innovate and entrepreneurs to pioneer new products and processes.

In *pure* capitalism—or *laissez-faire* capitalism—government's role would be limited to protecting private property and establishing an environment appropriate to the

economic system

A particular set of institutional arrangements and a coordinating mechanism for producing goods and services.

command system

An economic system in which most property resources are owned by the government and economic decisions are made by a central government body.

market system

An economic system in which property resources are privately owned and markets and prices are used to direct and coordinate economic activities.



GLOBAL SNAPSHOT 2.1

The Two Koreas

North Korea is one of the few command economies still standing. After the Second World War, Korea was divided into North Korea and South Korea. North Korea, under the influence of the Soviet Union, established a command economy that emphasized government ownership and central government planning. South Korea, protected by the United States, established a market economy based upon private ownership and the profit motive. Today, the differences in the economic outcomes of the two systems are striking:

	North Korea	South Korea
GDP	\$40 billion*	\$1.2 trillion*
GDP per capita	\$I,800*	\$24,500*
Exports	\$1.3 billion	\$326 billion
Imports	\$2.7 billion	\$309.3 billion
Agriculture as % of GDP	30 percent	3 percent

*Based on purchasing power equivalencies to the U.S. dollar. Source: CIA World Fact Book, www.cia.gov.

operation of the market system. The term "laissez-faire" means "let it be," that is, keep government from interfering with the economy. The idea is that such interference will disturb the efficient working of the market system.

But in the capitalism practiced in the United States and most other countries, government plays a substantial role in the economy. It not only provides the rules for economic activity but also promotes economic stability and growth, provides certain goods and services that would otherwise be underproduced or not produced at all, and modifies the distribution of income. The government, however, is not the dominant economic force in deciding what to produce, how to produce it, and who will get it. That force is the market.

Characteristics of the Market System

It will be very instructive to examine some of the key features of the market system in more detail.

Private Property

In a market system, private individuals and firms, not the government, own most of the property resources (land and capital). It is this extensive private ownership of capital that gives capitalism its name. This right of **private property**, coupled with the freedom to negotiate binding legal contracts, enables individuals and businesses to obtain, use, and dispose of property resources as they see fit. The right of property owners to designate who will receive their property when they die sustains the institution of private property.

private property

The right of persons and firms to obtain, own, control, employ, dispose of, and bequeath land, capital, and other property. Property rights encourage investment, innovation, exchange, maintenance of property, and economic growth. Why would anyone stock a store, build a factory, or clear land for farming if someone else, or the government itself, could take that property for his or her own benefit?

Property rights also extend to intellectual property through patents, copyrights, and trademarks. Such long-term protection encourages people to write books, music, and computer programs and to invent new products and production processes without fear that others will steal them and the rewards they may bring.

Moreover, property rights facilitate exchange. The title to an automobile or the deed to a cattle ranch assures the buyer that the seller is the legitimate owner. Also, property rights encourage owners to maintain or improve their property so as to preserve or increase its value. Finally, property rights enable people to use their time and resources to produce more goods and services, rather than using them to protect and retain the property they have already produced or acquired.

Freedom of Enterprise and Choice

Closely related to private ownership of property is freedom of enterprise and choice. The market system requires that various economic units make certain choices, which are expressed and implemented in the economy's markets:

- Freedom of enterprise ensures that entrepreneurs and private businesses are free to obtain and use economic resources to produce their choice of goods and services and to sell them in their chosen markets.
- Freedom of choice enables owners to employ or dispose of their property and money as they see fit. It also allows workers to enter any line of work for which they are qualified. Finally, it ensures that consumers are free to buy the goods and services that best satisfy their wants.

These choices are free only within broad legal limitations, of course. Illegal choices such as selling human organs or buying illicit drugs are punished through fines and imprisonment. (Global Snapshot 2.2 reveals that the degree of economic freedom varies greatly from nation to nation.)

Self-Interest

In the market system, **self-interest** is the motivating force of the various economic units as they express their free choices. Self-interest simply means that each economic unit tries to achieve its own particular goal, which usually requires delivering something of value to others. Entrepreneurs try to maximize profit or minimize loss. Property owners try to get the highest price for the sale or rent of their resources. Workers try to maximize their utility (satisfaction) by finding jobs that offer the best combination of wages, hours, fringe benefits, and working conditions. Consumers try to obtain the products they want at the lowest possible price and apportion their expenditures to maximize their utility. The motive of self-interest gives direction and consistency to what might otherwise be a chaotic economy.

Competition

The market system depends on **competition** among economic units. The basis of this competition is freedom of choice exercised in pursuit of a monetary return. Very broadly defined, competition requires:

- Independently acting sellers and buyers operating in a particular product or resource market.
- Freedom of sellers and buyers to enter or leave markets, on the basis of their economic self-interest.

freedom of enterprise

The freedom of firms to obtain economic resources, to use those resources to produce products of the firms' own choosing, and to sell their products in markets of their choice.

freedom of choice

The freedom of owners of resources to employ or dispose of them as they see fit, and the freedom of consumers to spend their incomes in a manner they think is appropriate.

self-interest

The most-advantageous outcome as viewed by each firm, property owner, worker, or consumer.

competition

The presence in a market of independent buyers and sellers vying with one another, and the freedom of buyers and sellers to enter and leave the market.

GLOBAL SNAPSHOT 2.2

Index of Economic Freedom, Selected Economies

The Index of Economic Freedom measures economic freedom using 10 broad categories such as trade policy, property rights, and government intervention, with each category containing more than 50 specific criteria. The index then ranks 157 economies according to their degree of economic freedom. A few selected rankings for 2008 are listed below.



ORIGIN OF THE IDEA 0 2.1 Self-interest Competition diffuses economic power within the businesses and households that make up the economy. When there are independently acting sellers and buyers in a market, no one buyer or seller is able to dictate the price of the product or resource because others can undercut that price.

Competition also implies that producers can enter or leave an industry; there are no insurmountable barriers to an industry's expanding or contracting. This freedom of an industry to expand or contract provides the economy with the flexibility needed to remain efficient over time. Freedom of entry and exit enables the economy to adjust to changes in consumer tastes, technology, and resource availability.

The diffusion of economic power inherent in competition limits the potential abuse of that power. A producer that charges more than the competitive market price will lose sales to other producers. An employer who pays less than the competitive market wage rate will lose workers to other employers. A firm that fails to exploit new technology will lose profits to firms that do. Competition is the basic regulatory force in the market system.

Markets and Prices

Markets and prices are key components of the market system. They give the system its ability to coordinate millions of daily economic decisions. A **market** is an institution or mechanism that brings buyers ("demanders") and sellers ("suppliers") into contact. A market system conveys the decisions made by buyers and sellers of products and resources. The decisions made on each side of the market determine a set of product and resource prices that guide resource owners, entrepreneurs, and consumers as they make and revise their choices and pursue their self-interest.

Just as competition is the regulatory mechanism of the market system, the market system itself is the organizing mechanism. It is an elaborate communication network through which innumerable individual free choices are recorded, summarized, and balanced. Those who respond to market signals and heed market dictates are rewarded with greater profit and income; those who do not respond to those signals and choose to ignore market dictates are penalized. Through this mechanism society decides what the economy should produce, how production can be organized efficiently, and how the fruits of production are to be distributed among the various units that make up the economy.

Technology and Capital Goods

In the market system, competition, freedom of choice, self-interest, and personal reward provide the opportunity and motivation for technological advance. The monetary rewards for new products or production techniques accrue directly to the innovator. The market system therefore encourages extensive use and rapid development of complex capital goods: tools, machinery, large-scale factories, and facilities for storage, communication, transportation, and marketing.

Advanced technology and capital goods are important because the most direct methods of production are often the least efficient. The only way to avoid that inefficiency is to rely on capital goods. It would be ridiculous for a farmer to go at production with bare hands. There are huge benefits to be derived from creating and using such capital equipment as plows, tractors, storage bins, and so on. The more efficient production means much more abundant outputs.

Specialization

The extent to which market economies rely on **specialization** is extraordinary. Specialization is the use of resources of an individual, region, or nation to produce one or a few goods or services rather than the entire range of goods and services. Those goods and services are then exchanged for a full range of desired products. The majority of consumers produce virtually none of the goods and services they consume, and they consume little or nothing of the items they produce. The person working nine to five installing windows in commercial aircraft may rarely fly. Many farmers sell their milk to the local dairy and then buy margarine at the local grocery store. Society learned long ago that self-sufficiency breeds inefficiency. The jack-of-all-trades may be a very colorful individual but is certainly not an efficient producer.

Division of Labor Human specialization—called the **division of labor**—contributes to a society's output in several ways:

• *Specialization makes use of differences in ability* Specialization enables individuals to take advantage of existing differences in their abilities and skills. If Peyton is strong, athletic, and good at throwing a football and Beyonce is beautiful, agile, and can sing, their distribution of talents can be most efficiently used if Peyton plays professional football and Beyonce records songs and gives concerts.

market

An institution or mechanism that brings buyers and sellers together.

specialization

The use of resources of an individual, region, or nation to produce one or a few goods and services rather than the entire range of goods and services.

division of labor

The separation of the work required to produce a product into a number of different tasks that are performed by different workers.



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Photo Op Peyton Manning and Beyoncé Knowles

It makes economic sense for Peyton Manning and Beyoncé Knowles to specialize in what they do best.

ORIGIN OF THE IDEA O 2.2 Specialization/division of labor

- *Specialization fosters learning by doing* Even if the abilities of two people are identical, specialization may still be advantageous. By devoting time to a single task rather than working at a number of different tasks, a person is more likely to develop the skills required and to improve techniques. You learn to be a good lawyer by studying and practicing law.
- *Specialization saves time* By devoting time to a single task, a person avoids the loss of time incurred in shifting from one job to another.

For all these reasons, specialization increases the total output society derives from limited resources.

Geographic Specialization Specialization also works on a regional and international basis. It is conceivable that oranges could be grown in Nebraska, but because of the unsuitability of the land, rainfall, and temperature, the costs would be very high. And it is conceivable that wheat could be grown in Florida, but such production would be costly for similar geographical reasons. So Nebraskans produce products—wheat in particular—for which their resources are best suited, and Floridians do the same, producing oranges and other citrus fruits. By specializing, both economies produce more than is needed locally. Then, very sensibly, Nebraskans and Floridians swap some of their surpluses—wheat for oranges, oranges for wheat.

Similarly, on an international scale, the United States specializes in producing such items as commercial aircraft and computers, which it sells abroad in exchange for video recorders from Japan, bananas from Honduras, and woven baskets from Thailand. Both human specialization and geographic specialization are needed to achieve efficiency in the use of limited resources.

Use of Money

A rather obvious characteristic of any economic system is the extensive use of money. Money performs several functions, but first and foremost it is a **medium of exchange**. It makes trade easier.

Specialization requires exchange. Exchange can, and sometimes does, occur through **barter**—swapping goods for goods, say, wheat for oranges. But barter poses serious problems because it requires a *coincidence of wants* between the buyer and the seller. In our example, we assumed that Nebraskans had excess wheat to trade and wanted oranges. And we assumed that Floridians had excess oranges to trade and wanted wheat. So an exchange occurred. But if such a coincidence of wants is missing, trade is stymied.

Suppose that Nebraska has no interest in Florida's oranges but wants potatoes from Idaho. And suppose that Idaho wants Florida's oranges but not Nebraska's wheat. And, to complicate matters, suppose that Florida wants some of Nebraska's wheat but none of Idaho's potatoes. We summarize the situation in Figure 2.1.

In none of the cases shown in the figure is there a coincidence of wants. Trade by barter clearly would be difficult. Instead, people in each state use **money**, which is simply a convenient social invention to facilitate exchanges of goods and services. Historically, people have used cattle, cigarettes, shells, stones, pieces of metal, and many other commodities, with varying degrees of success, as a medium of exchange. But to serve as money, an item needs to pass only one test: It must be generally acceptable to sellers in exchange for their goods and services. Money is socially defined; whatever society accepts as a medium of exchange *is* money.

Today, most economies use pieces of paper as money. The use of paper dollars (currency) as a medium of exchange is what enables Nebraska, Florida, and Idaho to overcome their trade stalemate, as demonstrated in Figure 2.1.

medium of exchange

Any item sellers generally accept and buyers generally use to pay for goods and services.

barter

The exchange of one good or service for another good or service.

money

Any item that is generally acceptable to sellers in exchange for goods and services.

FIGURE 2.1 Money facilitates trade when wants do not coincide. The use of money as a medium of exchange permits trade to be accomplished despite a noncoincidence of wants. (I) Nebraska trades the wheat that Florida wants for money from Floridians; (2) Nebraska trades the money it receives from Florida for the potatoes it wants from Idaho; (3) Idaho trades the money it receives from Nebraska for the oranges it wants from Florida.



On a global basis different nations have different currencies, and that complicates specialization and exchange. But markets in which currencies are bought and sold make it possible for U.S. residents, Japanese, Germans, Britons, and Mexicans, through the swapping of dollars, yen, euros, pounds, and pesos, one for another, to exchange goods and services without resorting to barter.

Active, but Limited, Government

An active, but limited, government is the final characteristic of market systems in reallife advanced industrial economies. Although a market system promotes a high degree of efficiency in the use of its resources, it has certain inherent shortcomings. We will discover in Chapter 5 that government can increase the overall effectiveness of the economic system in several ways.

Four Fundamental Questions

The key features of the market system help explain how market economies respond to four fundamental questions:

- What goods and services will be produced?
- How will the goods and services be produced?
- Who will get the goods and services?
- How will the system promote progress?

These four questions highlight the economic choices underlying the production possibilities curve discussed in Chapter 1. They reflect the reality of scarce resources in a world of unlimited wants. All economies, whether market or command, must address these four questions.

What Will Be Produced?

How will a market system decide on the specific types and quantities of goods to be produced? The simple answer is this: The goods and services produced at a continuing profit will be produced, and those produced at a continuing loss will not. Profits and losses are the difference between the total revenue (TR) a firm receives from the sale of its products and the total cost (TC) of producing those products. (For economists, economic costs include not only wage and salary payments to labor, and interest and rental payments for capital and land, but also payments to the entrepreneur for organizing and combining the other resources to produce a commodity.)

Continuing economic profit (TR > TC) in an industry results in expanded production and the movement of resources toward that industry. The industry expands. Continuing losses (TC > TR) in an industry leads to reduced production and the exit of resources from that industry. The industry contracts.

In the market system, consumers are sovereign (in command). **Consumer sovereignty** is crucial in determining the types and quantities of goods produced. Consumers spend their income on the goods they are most willing and able to buy. Through these "**dollar votes**" they register their wants in the market. If the dollar votes for a certain product are great enough to create a profit, businesses will produce that product and offer it for sale. In contrast, if the dollar votes do not create sufficient revenues to cover costs, businesses will not produce the product. So the consumers are sovereign. They collectively direct resources to industries that are meeting consumer wants and away from industries that are not meeting consumer wants.

consumer

sovereignty Determination by consumers of the types and quantities of goods and services that will be produced with the economy's scarce

dollar votes

resources.

The "votes" that consumers and entrepreneurs cast for the production of consumer and capital goods when they purchase them in product and resource markets.

McHits and McMisses

McDonald's has introduced several new menu items over the decades. Some have been profitable "hits," while others have been "misses." Ultimately, consumers decide whether a menu item is profitable and therefore whether it stays on the McDonald's menu.

- Hulaburger (1962)—McMiss
- Filet-O-Fish (1963)—McHit
- Strawberry shortcake (1966)—McMiss
- Big Mac (1968)—McHit
- Hot apple pie (1968)—McHit
- Egg McMuffin (1975)—McHit
- Drive-thru (1975)—McHit
- Chicken McNuggets (1983)—McHit
- Extra Value Meal (1991)-McHit
- McLean Deluxe (1991)—McMiss
- Arch Deluxe (1996)—McMiss
- 55-cent special (1997)—McMiss
- Big Xtra (1999)—McHit

Question:

Do you think McDonald's premium salads will be a lasting McHit, or do you think they eventually will become a McMiss?

Source: "Polishing the Golden Arches," Forbes, June 15, 1998, pp. 42-43, updated

The dollar votes of consumers determine not only which industries will continue to exist but also which products will survive or fail. Only profitable industries, firms, and products survive.

How Will the Goods and Services Be Produced?

What combinations of resources and technologies will be used to produce goods and services? How will the production be organized? The answer: In combinations and ways that minimize the cost per unit of output. Because competition eliminates high-cost producers, profitability requires that firms produce their output at minimum cost per unit. Achieving this least-cost production necessitates, for example, that firms use the right mix of labor and capital, given the prices and productivity of those resources. It also means locating production facilities optimally to hold down production and transportation expenses. Finally, it means using the most appropriate technology in producing and distributing output. In a competitive market economy, high-cost producers lose business to low-cost producers of equal-quality products.

Who Will Get the Output?

The market system enters the picture in two ways when determining the distribution of total output. Generally, any product will be distributed to consumers on the basis of

APPLYING THE ANALYSIS their ability and willingness to pay its existing market price. If the price of some product, say, a small sailboat, is \$3000, then buyers who are willing and able to pay that price will "sail, sail away." Consumers who are unwilling or unable to pay the price will "sit on the dock of the bay."

The ability to pay the prices for sailboats and other products depends on the amount of income that consumers have, along with the prices of, and preferences for, various goods. If consumers have sufficient income and want to spend their money on a particular good, they can have it. And the amount of income they have depends on (1) the quantities of the property and human resources they supply and (2) the prices those resources command in the resource market. Resource prices (wages, interest, rent, profit) are key in determining the size of each household's income and therefore each household's ability to buy part of the economy's output.

How Will the System Promote Progress?

Society desires economic growth (greater output) and higher standards of living (greater income per person). How does the market system promote technological improvements and capital accumulation, both of which contribute to a higher standard of living for society?

Technological Advance The market system provides a strong incentive for technological advance and enables better products and processes to supplant inferior ones. An entrepreneur or firm that introduces a popular new product will gain revenue and economic profit at the expense of rivals. Firms that are highly profitable one year may find they are in financial trouble just a few years later.

Technological advance also includes new and improved methods that reduce production or distribution costs. By passing part of its cost reduction on to the consumer through a lower product price, the firm can increase sales and obtain economic profit at the expense of rival firms.

Moreover, the market system promotes the *rapid spread* of technological advance throughout an industry. Rival firms must follow the lead of the most innovative firm or else suffer immediate losses and eventual failure. In some cases, the result is **creative destruction**: The creation of new products and production methods completely destroys the market positions of firms that are wedded to existing products and older ways of doing business. Example: The advent of compact discs largely demolished long-play vinyl records, and iPods and other digital technologies are now supplanting CDs.

Capital Accumulation Most technological advances require additional capital goods. The market system provides the resources necessary to produce those goods through increased dollar votes for capital goods. That is, the market system acknowledges dollar voting for capital goods as well as for consumer goods.

But who will register votes for capital goods? Answer: Entrepreneurs and owners of businesses. As receivers of profit income, they often use part of that income to purchase capital goods. Doing so yields even greater profit income in the future if the technological innovation is successful. Also, by paying interest or selling ownership shares, the entrepreneur and firm can attract some of the income of households to cast dollar votes for the production of more capital goods.

creative destruction

The idea that the creation of new products and production methods may simultaneously destroy the market power of existing firms.

The "Invisible Hand"

In his 1776 book *The Wealth of Nations*, Adam Smith first noted that the operation of a market system creates a curious unity between private interests and social interests. Firms and resource suppliers, seeking to further their own self-interest and operating within the framework of a highly competitive market system, will simultaneously, as though guided by an **"invisible hand,"** promote the public or social interest. For example, we have seen that in a competitive environment, businesses seek to build new and improved products to increase profits. Those enhanced products increase society's well-being. Businesses also use the least costly combination of resources to produce a specific output because it is in their self-interest to do so. To act otherwise would be to forgo profit or even to risk business failure. But, at the same time, to use scarce resources in the least costly way is clearly in the social interest as well. It "frees up" resources to produce something else that society desires.

Self-interest, awakened and guided by the competitive market system, is what induces responses appropriate to the changes in society's wants. Businesses seeking to make higher profits and to avoid losses, and resource suppliers pursuing greater monetary rewards, negotiate changes in the allocation of resources and end up with the output that society wants. Competition controls or guides self-interest such that self-interest automatically and quite unintentionally furthers the best interest of society. The invisible hand ensures that when firms maximize their profits and resource suppliers maximize their incomes, these groups also help maximize society's output and income.

Question:

Are "doing good for others" and "doing well for oneself" conflicting ideas, according to Adam Smith?

APPLYING THE ANALYSIS

"invisible hand"

The tendency of firms and resource suppliers that are seeking to further their own selfinterest in competitive markets to also promote the interest of society as a whole.

The Demise of the Command Systems

Now that you know how the market system answers the four fundamental questions, you can easily understand why command systems of the Soviet Union, eastern Europe, and prereform China failed. Those systems encountered two insurmountable problems.

The first difficulty was the *coordination problem*. The central planners had to coordinate the millions of individual decisions by consumers, resource suppliers, and businesses. Consider the setting up of a factory to produce tractors. The central planners had to establish a realistic annual production target, for example, 1000 tractors. They then had to make available all the necessary inputs—labor, machinery, electric power, steel, tires, glass, paint, transportation—for the production and delivery of those 1000 tractors.

Because the outputs of many industries serve as inputs to other industries, the failure of any single industry to achieve its output target caused a chain reaction APPLYING THE ANALYSIS of repercussions. For example, if iron mines, for want of machinery or labor or transportation, did not supply the steel industry with the required inputs of iron ore, the steel mills were unable to fulfill the input needs of the many industries that depended on steel. Those steel-using industries (such as tractor, automobile, and transportation) were unable to fulfill their planned production goals. Eventually the chain reaction spread to all firms that used steel as an input and from there to other input buyers or final consumers.

The coordination problem became more difficult as the economies expanded. Products and production processes grew more sophisticated, and the number of industries requiring planning increased. Planning techniques that worked for the simpler economy proved highly inadequate and inefficient for the larger economy. Bottlenecks and production stoppages became the norm, not the exception.

A lack of a reliable success indicator added to the coordination problem in the Soviet Union and prereform China. We have seen that market economies rely on profit as a success indicator. Profit depends on consumer demand, production efficiency, and product quality. In contrast, the major success indicator for the command economies usually was a quantitative production target that the central planners assigned. Production costs, product quality, and product mix were secondary considerations. Managers and workers often sacrificed product quality because they were being awarded bonuses for meeting quantitative, not qualitative, targets. If meeting production goals meant sloppy assembly work, so be it.

It was difficult at best for planners to assign quantitative production targets without unintentionally producing distortions in output. If the production target for an enterprise manufacturing nails was specified in terms of *weight* (tons of nails), the producer made only large nails. But if its target was specified as a *quantity* (thousands of nails), the producer made all small nails, and lots of them!

The command economies also faced an *incentive problem*. Central planners determined the output mix. When they misjudged how many automobiles, shoes, shirts, and chickens were wanted at the government-determined prices, persistent shortages and surpluses of those products arose. But as long as the managers who oversaw the production of those goods were rewarded for meeting their assigned production goals, they had no incentive to adjust production in response to the shortages and surpluses. And there were no fluctuations in prices and profitability to signal that more or less of certain products was desired. Thus, many products were unavailable or in short supply, while other products were overproduced and sat for months or years in warehouses.

The command systems of the Soviet Union and prereform China also lacked entrepreneurship. Central planning did not trigger the profit motive, nor did it reward innovation and enterprise. The route for getting ahead was through participation in the political hierarchy of the Communist Party. Moving up the hierarchy meant better housing, better access to health care, and the right to shop in special stores. Meeting production targets and maneuvering through the minefields of party politics were measures of success in "business." But a definition of business success based solely on political savvy is not conducive to technological advance, which is often disruptive to existing products, production methods, and organizational structures.

Question:

In market economies, firms rarely worry about the availability of inputs to produce their products, whereas in command economies input availability was a constant concern. Why the difference?



FIGURE 2.2 The circular flow

diagram. Products flow from businesses to households through the product market, and resources flow from households to businesses through the resource market. Opposite those real flows are monetary flows. Households receive income from businesses (their costs) through the resource market, and businesses receive revenue from households (their expenditures) through the product market.

The Circular Flow Model

The dynamic market economy creates continuous, repetitive flows of goods and services, resources, and money. The **circular flow diagram**, shown in Figure 2.2, illustrates those flows. Observe that in the diagram we group private decision makers into *businesses* and *households* and group markets into the *resource market* and the *product market*.

Resource Market

The upper part of the circular flow diagram represents the **resource market**: the place where resources or the services of resource suppliers are bought and sold. In the resource market, households sell resources and businesses buy them. Households (that is, people) own all economic resources either directly as workers or entrepreneurs or indirectly through their ownership of business corporations. They sell their resources to businesses, which buy them because they are necessary for producing goods and services. The funds that businesses pay for resources are costs to businesses but are flows of wage, rent, interest, and profit income to the households. Productive resources therefore flow from households to businesses, and money flows from businesses to households.

Product Market

Next consider the lower part of the diagram, which represents the **product market**: the place where goods and services produced by businesses are bought and sold. In the product market, businesses combine resources to produce and sell goods and services. Households use the (limited) income they have received from the sale of resources to buy goods and services. The monetary flow of consumer spending on goods and services yields sales revenues for businesses. Businesses compare those revenues to their costs in determining profitability and whether or not a particular good or service should continue to be produced.

circular flow diagram

The flow of resources from households to firms and of products from firms to households.

resource market

A market in which households sell and firms buy economic resources.

product market

A market in which goods and services (products) are sold by firms and bought by households.





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Photo Op Resource Markets and Product Markets

The sale of a grove of orange trees would be a transaction in the resource market; the sale of oranges to final consumers would be a transaction in the product market.

The circular flow model depicts a complex, interrelated web of decision making and economic activity involving businesses and households. For the economy, it is the circle of life. Businesses and households are both buyers and sellers. Businesses buy resources and sell products. Households buy products and sell resources. As shown in Figure 2.2, there is a counterclockwise *real flow* of economic resources and finished goods and services and a clockwise *money flow* of income and consumption expenditures.

APPLYING THE ANALYSIS

Some Facts about U.S. Businesses

Businesses constitute one part of the private sector. The business population is extremely diverse, ranging from giant corporations such as ExxonMobil, with 2007 sales of \$347 billion and thousands of employees, to neighborhood specialty shops with one or two employees and sales of only \$200 to \$300 per day. There are three major legal forms of businesses: sole proprietorships, partnerships, and corporations.

A *sole proprietorship* is a business owned and operated by one person. Usually, the proprietor (the owner) personally supervises its operation. In a *partnership*, two or more individuals (the partners) agree to own and operate a business together.

A *corporation* is a legal creation that can acquire resources, own assets, produce and sell products, incur debts, extend credit, sue and be sued, and perform the functions of any other type of enterprise. A corporation sells stocks (ownership shares) to raise funds but is legally distinct and separate from the individual stockholders.





The stockholders' legal and financial liability is limited to the loss of the value of their shares. Hired executives and managers operate corporations on a day-to-day basis.

Figure 2.3a shows how the business population is distributed among the three major legal forms. About 72% of firms are sole proprietorships, whereas only 20% are corporations. But as in Figure 2.3b indicates, corporations account for 84% of total sales revenue (and therefore total output) in the United States. Virtually all the nation's largest business enterprises are corporations. Global Snapshot 2.3 lists the world's largest corporations.

Question:

Why do you think sole proprietorships and partnerships typically incorporate (become corporations) when they experience rapid and sizable increases in their production, sales, and profits?



GLOBAL SNAPSHOT 2.3

The World's 10 Largest Corporations

Five of the world's ten largest corporations, based on dollar revenue in 2007, were headquartered in the United States.



Source: Fortune Global 500, 2007, www.fortune.com.

APPLYING THE ANALYSIS

Some Facts about U.S. Households

Households constitute the second part of the private sector. The U.S. economy currently has about 114 million households. These households consist of one or more persons occupying a housing unit and are both the ultimate suppliers of all economic resources *and* the major spenders in the economy.

The nation's earned income is apportioned among wages, rents, interest, and profits. *Wages* are paid to labor; *rents* and *interest* are paid to owners of property resources; and *profits* are paid to the owners of corporations and unincorporated businesses.

Figure 2.4a shows the categories of U.S. income earned in 2007. The largest source of income for households is the wages and salaries paid to workers. Notice that the bulk of total U.S. income goes to labor, not to capital. Proprietors' income—the income of doctors, lawyers, small-business owners, farmers, and owners of other unincorporated enterprises—also has a "wage" element. Some of this income is payment for one's own labor, and some of it is profit from one's own business.

FIGURE 2.4 Sources of U.S. income and the composition of spending. (a) Seventy-one percent of U.S. income is received as wages and salaries. Income to property owners—corporate profit, interest, and rents—accounts for about 20% of total income. (b) Consumers divide their spending among durable goods, nondurable goods, and services. Nearly 60% of consumer spending is for services; the rest is for goods.



The other three types of income are self-evident: Some households own corporate stock and receive dividend incomes as their share of corporate profits. Many households also own bonds and savings accounts that yield interest income. And some households receive rental income by providing buildings and natural resources (including land) to businesses and other individuals.

U.S. households use their income to buy (spend), save, and pay taxes. Figure 2.4b shows how households divide their spending among three broad categories of goods and services: *consumer durables* (goods such as cars, refrigerators, and personal computers that have expected lives of 3 years or longer), *nondurables* (goods such as food, clothing, and gasoline that have lives of less than 3 years), and *services* (the work done by people such as lawyers, physicians, and recreational workers). Observe that nearly 60% of consumer spending is on services. For this reason, the United States is known as a *service-oriented economy*.

Question:

Over the past several decades, the service share of spending in the United States has increased relative to the goods share. Why do you think that trend has occurred?





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Courtesy of Maytag Corporation.

Photo Op Durable Goods, Nondurable Goods, and Services

Consumers collectively spend their income on durable goods (such as the washer-dryer combo), nondurable goods (such as the pizza), and services (such as hair care).

Summary

- 1. The market system and the command system are the two broad types of economic systems used to address the economic problem. In the market system (or capitalism), private individuals own most resources, and markets coordinate most economic activity. In the command system (or socialism or communism), government owns most resources, and central planners coordinate most economic activity.
- 2. The market system is characterized by the private ownership of resources, including capital, and the freedom of individuals to engage in economic activities of their choice to advance their material well-being. Self-interest is the driving force of such an economy, and competition functions as a regulatory or control mechanism.
- 3. In the market system, markets, prices, and profits organize and make effective the many millions of individual economic decisions that occur daily.
- 4. Specialization, use of advanced technology, and the extensive use of capital goods are common features of market systems. Functioning as a medium of exchange, money eliminates the problems of bartering and permits easy trade and greater specialization, both domestically and internationally.
- 5. Every economy faces four fundamental questions: (a) What goods and services will be produced? (b) How will the goods and services be produced? (c) Who will get the goods and services? (d) How will the system promote progress?
- 6. The market system produces products whose production and sale yield total revenue sufficient to cover total cost. It does not produce products for which total revenue continuously falls short of total cost. Competition forces firms to use the lowest-cost production techniques.

- 7. Economic profit (total revenue minus total cost) indicates that an industry is prosperous and promotes its expansion. Losses signify that an industry is not prosperous and hasten its contraction.
- 8. Consumer sovereignty means that both businesses and resource suppliers are subject to the wants of consumers. Through their dollar votes, consumers decide on the composition of output.
- 9. The prices that a household receives for the resources it supplies to the economy determine that household's income. This income determines the household's claim on the economy's output. Those who have income to spend get the products produced in the market system.
- 10. The market system encourages technological advance and capital accumulation, both of which raise a nation's standard of living.
- 11. Competition, the primary mechanism of control in the market economy, promotes a unity of self-interest and social interests. As directed by an invisible hand, competition harnesses the self-interested motives of businesses and resource suppliers to further the social interest.
- 12. The circular flow model illustrates the flows of resources and products from households to businesses and from businesses to households, along with the corresponding monetary flows. Businesses are on the buying side of the resource market and the selling side of the product market. Households are on the selling side of the resource market and the buying side of the product market.

Terms and Concepts

economic system command system market system private property freedom of enterprise freedom of choice self-interest competition market specialization division of labor medium of exchange barter money

consumer sovereignty dollar votes creative destruction "invisible hand" circular flow diagram resource market product market

Study Questions Connect

- 1. Contrast how a market system and a command economy try to cope with economic scarcity. LOI
- How does self-interest help achieve society's economic goals? Why is there such a wide variety of desired goods and services in a market system? In what way are entrepreneurs

and businesses at the helm of the economy but commanded by consumers? **LO2**

3. Why is private property, and the protection of property rights, so critical to the success of the market system? LO2

- 4. What are the advantages of using capital in the production process? What is meant by the term "division of labor"? What are the advantages of specialization in the use of human and material resources? Explain why exchange is the necessary consequence of specialization. LO2
- 5. What problem does barter entail? Indicate the economic significance of money as a medium of exchange. What is meant by the statement "We want money only to part with it"? LO2
- 6. Evaluate and explain the following statements: LO2a. The market system is a profit-and-loss system.
 - **b.** Competition is the disciplinarian of the market economy.
- 7. In the 1990s thousands of "dot-com" companies emerged with great fanfare to take advantage of the Internet and new information technologies. A few, like Yahoo, eBay, and Amazon, have generally thrived and prospered, but many others struggled and eventually failed. Explain these varied outcomes in terms of how the market system answers the question "What goods and services will be produced?" LO3
- 8. With current technology, suppose a firm is producing 400 loaves of banana bread daily. Also, assume that the least-cost combination of resources in producing those loaves is 5 units of labor, 7 units of land, 2 units of capital, and 1 unit of entrepreneurial ability, selling at prices of \$40, \$60, \$60, and \$20, respectively. If the firm can sell these 400 loaves at \$2 per unit, will it continue to produce banana bread? If this firm's situation is typical for the other makers of banana bread, will resources flow to or away from this bakery good? LO3
- **9.** Some large hardware stores such as Home Depot boast of carrying as many as 20,000 different products in each store.

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. What motivated the producers of those individual products to make them and offer them for sale? How did the producers decide on the best combinations of resources to use? Who made those resources available, and why? Who decides whether these particular hardware products should continue to be produced and offered for sale? **LO3**

- 10. What is meant by the term "creative destruction"? How does the emergence of iPod technology relate to this idea? LO3
- **11.** In a sentence, describe the meaning of the phrase "invisible hand." **LO4**
- 12. Distinguish between the resource market and the product market in the circular flow model. In what way are businesses and households both sellers and buyers in this model? What are the flows in the circular flow model? LO5
- **13.** What are the major forms of household income? Contrast the wage and salary share to the profit share in terms of relative size. Distinguish between a durable consumer good and a nondurable consumer good. How does the combined spending on both types of consumer goods compare to the spending on services? **LO5**
- 14. What are the three major legal forms of business enterprises? Which form is the most prevalent in terms of numbers? Which form is dominant in terms of total sales revenues? LO5

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnellbriefmicrole.com

Also, you will find one or more Web-based questions that require information from the Internet to answer.



PARTTWO

Price, Quantity, and Efficiency

- 3 DEMAND, SUPPLY, AND MARKET EQUILIBRIUM
- 4 ELASTICITY OF DEMAND AND SUPPLY
- 5 PUBLIC GOODS AND EXTERNALITIES

IN THIS CHAPTER YOU WILL LEARN:

- I What demand is and what affects it.
- 2 What supply is and what affects it.
- 3 How supply and demand together determine market equilibrium.
- 4 How changes in supply and demand affect equilibrium prices and quantities.
- 5 What government-set prices are and how they can cause product surpluses and shortages.



3

Demand, Supply, and Market Equilibrium

According to an old joke, if you teach a parrot to say "demand and supply," you have an economist. There is an element of truth to this quip. The tools of demand and supply can take us far in understanding individual markets.

Markets bring together buyers ("demanders") and sellers ("suppliers") and exist in many forms. The corner gas station, an e-commerce site, the local music store, a farmer's roadside stand—all are familiar markets. The New York Stock Exchange and the Chicago Board of Trade are markets where buyers and sellers of stocks and bonds and farm commodities from all over the world communicate with one another to buy and sell. Auctioneers bring together potential buyers and sellers of art, livestock, used farm equipment, and, sometimes, real estate.

ORIGIN OF THE IDEA

O 3.1 Demand and supply Some markets are local, while 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. But all competitive markets involve demand and supply.

Demand

Demand is a schedule or a curve that shows the various amounts of a product that consumers will purchase at each of several possible prices during a specified period of time.¹ The table in Figure 3.1 is a hypothetical demand schedule for a *single consumer* purchasing a particular product, in this case, lattes. (For simplicity, we will categorize all espresso drinks as "lattes" and assume a highly competitive market.)

The table reveals that, if the price of lattes were \$5 each, Joe Java would buy 10 lattes per month; if it were \$4, he would buy 20 lattes per month; and so forth.

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

To be meaningful, the quantities demanded at each price must relate to a specific period—a day, a week, a month. Here that period is 1 month.

Law of Demand

A fundamental characteristic of demand is this: Other things equal, as price falls, the quantity demanded rises, and as price rises, the quantity demanded falls. In short, there

¹This definition obviously is worded to apply to product markets. To adjust it to apply to resource markets, substitute the word "resource" for "product" and the word "businesses" for "consumers."



Joe Java's Demand for Lattes				
Price per Latte	Quantity Demanded per Month			
\$5	10			
4	20			
3	35			
2	55			
I.	80			



demand

ORIGIN OF THE IDEA

O 3.2

Law of demand

A schedule or curve that shows the various amounts of a product that consumers will buy at each of a series of possible prices during a specific period. is an *inverse* relationship between price and quantity demanded. Economists call this inverse relationship the **law of demand**.

The other-things-equal assumption is critical here. Many factors other than the price of the product being considered affect the amount purchased. The quantity of lattes purchased will depend not only on the price of lattes but also on the prices of such substitutes as tea, soda, fruit juice, and bottled water. The law of demand in this case says that fewer lattes will be purchased if the price of lattes rises while the prices of tea, soda, fruit juice, and bottled water all remain constant.

The law of demand is consistent with both common sense and observation. People ordinarily *do* buy more of a product at a low price than at a high price. Price is an obstacle that deters consumers from buying. The higher that obstacle, the less of a product they will buy; the lower the obstacle, the more they will buy. The fact that businesses reduce prices to clear unsold goods is evidence of their belief in the law of demand.

The Demand Curve

The inverse relationship between price and quantity demanded for any product can be represented on a simple graph, in which, by convention, we measure *quantity demanded* on the horizontal axis and *price* on the vertical axis. In Figure 3.1 we have plotted the five price-quantity data points listed in the table and connected the points with a smooth curve, labeled *D*. This is a **demand curve**. Its downward slope reflects the law of demand: People buy more of a product, service, or resource as its price falls. They buy less as its price rises. There is an inverse relationship between price and quantity demanded.

The table and graph in Figure 3.1 contain exactly the same data and reflect the same inverse relationship between price and quantity demanded.

Market Demand

So far, we have concentrated on just one consumer, Joe Java. But competition requires that more than one buyer be present in each market. By adding the quantities demanded by all consumers at each of the various possible prices, we can get from *individual* demand to *market* demand. If there are just three buyers in the market (Joe Java, Sarah Coffee, and Mike Cappuccino), as represented by the table and graph in Figure 3.2, it is relatively easy to determine the total quantity demanded at each price. We simply sum the individual quantities demanded to obtain the total quantity demanded at each price. The particular price and the total quantity demanded are then plotted as one point on the market demand curve in Figure 3.2.

Competition, of course, ordinarily entails many more than three buyers of a product. To avoid hundreds or thousands of additions, let's simply suppose that the table and curve D_1 in Figure 3.3 show the amounts all the buyers in this market will purchase at each of the five prices.

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 economists know that other factors can and do affect purchases. These factors, called **determinants of demand**, are held constant when a demand curve like D_1 is drawn. They are the "other things equal" in the relationship between price and quantity demanded. When any of these determinants of demand are sometimes referred to as *demand shifters*.

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

law of demand

The principle that, other things equal, as price falls, the quantity demanded rises, and as price rises, the quantity demanded falls.

demand curve

A curve illustrating the inverse relationship between the price of a product and the quantity of it demanded, other things equal.

determinants of demand Factors other than price that locate the position of a demand curve. FIGURE 3.2 Market demand for lattes, three buyers. We establish the market demand curve D by adding horizontally the individual demand curves $(D_1, D_2, \text{ and } D_3)$ 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 lattes.



Market Demand for Lattes, Three Buyers							
Price	Quantity Demanded Total Quantit						Total Quantity
per Latte	Joe Java		Sarah Coffee		Mike Cappuccino		Demanded per Month
\$5	10	+	12	+	8	=	30
4	20	+	23	+	17	=	60
3	35	+	39	+	26	=	100
2	55	+	60	+	39	=	154
I	80	+	87	+	54	=	221

FIGURE 3.3 Changes in the demand for lattes. 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_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 Lattes (D ₁)				
(1)	(1) (2) Total			
Price	e Quantity			
per	Demanded			
Latte	per Month			
\$5	2,000			
4	4,000			
3	7,000			
2	11,000			
I.	16,000			
Changes in Demand

A change in one or more of the determinants of demand will change the underlying demand data (the demand schedule in the table) and therefore the location of the demand curve in Figure 3.3. 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 lattes at each possible price, that *increase in demand* is shown as a shift of the demand curve to the right, say, from D_1 to D_2 . Conversely, a *decrease in demand* occurs when consumers buy fewer lattes at each possible price. 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 means more of it will be demanded at each price. Demand will increase; the demand curve will shift rightward. For example, greater concern about the environment has increased the demand for hybrid cars and other "green" technologies. An unfavorable change in consumer preferences will decrease demand, shifting the demand curve to the left. For example, the recent popularity of low-carbohydrate diets has reduced the demand for bread and pasta.

Number of Buyers An increase in the number of buyers in a market increases product demand. For example, the rising number of older persons in the United States in recent years has increased the demand for motor homes and retirement communities. In contrast, the migration of people away from many small rural communities has reduced the demand for housing, home appliances, and auto repair in those towns.

Income The effect of changes in income on demand is more complex. For most products, a rise in income increases demand. Consumers collectively buy more airplane tickets, projection TVs, and gas grills as their incomes rise. Products whose demand increases or decreases *directly* with changes in income are called *superior goods*, or **normal goods**.

Although most products are normal goods, there are a few exceptions. As incomes increase beyond some point, the demand for used clothing, retread tires, and soy-enhanced hamburger may decline. Higher incomes enable consumers to buy new clothing, new tires, and higher-quality meats. Goods whose demand increases or decreases *inversely* with money income are called **inferior goods**. (This is an economic term; we are not making personal judgments on specific products.)

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.

Beef and chicken 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. For example, when the price of beef rises, consumers will buy less beef and increase their demand for chicken. So it is with other product pairs such as Nikes and Reeboks, Budweiser and Miller beer, or Colgate and Crest toothpaste. They are *substitutes in consumption*.

normal good

A good (or service) whose consumption rises when income increases and falls when income decreases.

inferior good

A good (or service) whose consumption declines when income rises and rises when income decreases.

substitute good

A good (or service) that can be used in place of some other good (or service).

complementary good

A good (or service) that is used in conjunction with some other good (or service).



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Photo Op Normal versus Inferior Goods

New television sets are normal goods. People buy more of them as their incomes rise. Handpushed lawn mowers are inferior goods. As incomes rise, people purchase gas-powered mowers instead.

Complementary goods (or, simply, *complements*) are products that are used together and thus are typically demanded jointly. Examples include computers and software, cell phones 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.

The vast majority of goods that are unrelated to one another are called *independent goods*. There is virtually no demand relationship between bacon and golf balls or pickles and ice cream. A change in the price of one will have virtually no effect on the demand for the other.

Expected Prices Changes in expected prices may shift demand. A newly formed expectation of a higher price in the future may cause consumers to buy now in order to "beat" the anticipated price rise, thus increasing current demand. For example, when freezing weather destroys much of Brazil's coffee crop, buyers may conclude that the price of coffee beans will rise. They may purchase large quantities now to stock up on beans. In contrast, a newly formed expectation of falling prices may decrease current demand for products.



Michael Newman/PhotoEdit



© John A. Rizzo/Getty Images

Photo Op Substitutes versus Complements

Different brands of soft drinks are substitute goods; goods consumed jointly such as hot dogs and mustard are complementary goods.

Changes in Quantity Demanded

Be sure not to confuse a *change in demand* with a *change in quantity demanded*. 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). It occurs because the consumer's state of mind about purchasing the product has been altered in response to a change in one or more of the determinants of demand. Recall that "demand" is a schedule or a curve; therefore, a "change in demand" means a change in the schedule and a shift of the curve.

In contrast, a **change in quantity demanded** is a movement from one point to another point—from one price-quantity combination to another—on a fixed demand schedule or demand curve. 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 lattes from \$5 to \$4 will increase the quantity of lattes demanded from 2000 to 4000.

In the graph 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, and it remains fixed in place.

Supply

Supply is a schedule or curve showing the amounts of a product that producers will make available for sale at each of a series of possible prices during a specific period.² The table in Figure 3.4 is a hypothetical supply schedule for Star Buck, a single supplier of lattes. Curve *S* incorporates the data in the table and is called a *supply curve*. The

change in demand

A change in the quantity demanded of a product at every price; a shift of the demand curve to the left or right.

change in quantity demanded

A movement from one point to another on a fixed demand curve.

supply

A schedule or curve that shows the amounts of a product that producers are willing to make available for sale at each of a series of possible prices during a specific period.

²This definition is worded to apply to product markets. To adjust it to apply to resource markets, substitute "resource" for "product" and "owners" for "producers."

FIGURE 3.4 Star Buck's supply of lattes. 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.

Star Buck's Supply of Lattes			
Price per Latte	Quantity Supplied per Month		
\$5	60		
4	50		
3	35		
2	20		
I	5		



schedule and curve show the quantities of lattes that will be supplied at various prices, other things equal.

Law of Supply

Figure 3.4 shows a positive or direct relationship that 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**. A supply schedule or curve reveals that, other things equal, firms will offer for sale more of their product at a high price than at a low price. This, again, is basically common sense.

Price is an obstacle from the standpoint of the consumer (for example, Joe Java), who is on the paying end. The higher the price, the less the consumer will buy. But the supplier (for example, Star Buck) is on the receiving end of the product's price. To a supplier, price represents *revenue*, which is needed to cover costs and earn a profit. Higher prices therefore create a profit incentive to produce and sell more of a product. The higher the price, the greater this incentive and the greater the quantity supplied.

Market Supply

Market supply is derived from individual supply in exactly the same way that market demand is derived from individual demand (Figure 3.2). We sum (not shown) the quantities supplied by each producer at each price. That is, we obtain the market **supply curve** by "horizontally adding" (also not shown) the supply curves of the individual producers. The price and quantity-supplied data in the table in Figure 3.5 are for an assumed 200 indentical producers in the market, each willing to supply lattes according to the supply schedule shown in Figure 3.4. Curve S_1 is a graph of the market supply data. Note that 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

law of supply

The principle that, other things equal, as price rises, the quantity supplied rises, and as price falls, the quantity supplied falls.

supply curve

A curve illustrating the direct relationship between the price of a product and the quantity of it supplied, other things equal. 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 (the "other things equal") can and do affect supply. The supply curve is drawn on the assumption that these other things are fixed and do not change. If one of them does change, a *change in supply* will occur, meaning that 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) expected price, 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 move 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.

determinants of supply Factors other than price that locate the position of the supply curve.

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 (other than changes in output itself) usually shifts the supply curve.

Resource Prices The prices of the resources used in the production process help determine the costs of production incurred by firms. Higher *resource* prices raise production costs and, assuming a particular *product* price, squeeze profits. That

FIGURE 3.5 Changes in the supply of lattes. 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 *a* to *b* on fixed supply curve S_1 .



reduction in profits reduces the incentive for firms to supply output at each product price. For example, an increase in the prices of coffee beans and milk will increase the cost of making lattes and therefore reduce their 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 prices of sand, gravel, and limestone will increase the supply of concrete.

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 flat-panel computer monitors have greatly reduced their cost. Thus, manufacturers will now offer more such monitors than previously at the various prices; the supply of flat-panel monitors has increased.

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

Prices of Other Goods Firms that produce a particular product, say, soccer balls, can usually use their plant and equipment to produce alternative goods, say, basketballs and volleyballs. The higher prices of these "other goods" may entice soccer ball producers to switch production to those other goods in order to increase profits. This *substitution in production* results in a decline in the supply of soccer balls. Alternatively, when basketballs and volleyballs decline in price relative to the price of soccer balls, firms will produce fewer of those products and more soccer balls, increasing the supply of soccer balls.

Expected Prices Changes in expectations about the future price of a product may affect the producer's current willingness to supply that product. It is difficult, however, to generalize about how a new expectation of higher prices affects the present supply of a 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 types of manufacturing industries, newly formed expectations that price will increase may induce firms to add another shift of workers or to expand their production facilities, causing current supply to increase.

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. This means that 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 Federal government has 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.

Changes in Quantity Supplied

The distinction between a *change in supply* and a *change in quantity supplied* parallels the distinction 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 on a fixed supply curve. The cause of such a movement is a change in the price of the specific product being considered. In Figure 3.5, a decline in the price of lattes from \$4 to \$3 decreases the quantity of lattes supplied per month from 10,000 to 7000. 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 lattes changes.

Market Equilibrium

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

Equilibrium Price and Quantity

We are looking for the equilibrium price and equilibrium quantity. The **equilibrium price** (or *market-clearing price*) is the price at which the intentions of buyers and sellers match. It is the price at which quantity demanded equals quantity supplied. The table in Figure 3.6 reveals that at \$3, *and only at that price*, the number of lattes that sellers wish to sell (7000) is identical to the number that consumers want to buy (also 7000). At \$3 and 7000 lattes, there is neither a shortage nor a surplus of lattes. So 7000 lattes is the **equilibrium quantity:** the quantity demanded and quantity supplied that occur at the equilibrium price in a competitive market.

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

To better understand the uniqueness of the equilibrium price, let's consider other prices. At any above-equilibrium price, quantity supplied exceeds quantity demanded. For example, at the \$4 price, sellers will offer 10,000 lattes, but buyers will purchase only 4000. The \$4 price encourages sellers to offer lots of lattes but discourages many consumers from buying them. The result is a **surplus** or *excess supply* of 6000 lattes. If latte sellers made them all, they would find themselves with 6000 unsold lattes.

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 stop in and take the surplus off their hands. As the price fell, the incentive to produce lattes would decline and the incentive for consumers to buy lattes would increase. As shown in Figure 3.6, the market would move to its equilibrium at \$3.

Any price below the \$3 equilibrium price would create a shortage; quantity demanded would exceed quantity supplied. Consider a \$2 price, for example. We see in column 4 of the table in Figure 3.6 that quantity demanded exceeds quantity

change in supply

A change in the quantity supplied of a product at every price; a shift of the supply curve to the left or right.

change in quantity supplied

A movement from one point to another on a fixed supply curve.

equilibrium price

The price in a competitive market at which the quantity demanded and quantity supplied of a product are equal.

equilibrium quantity

The quantity demanded and quantity supplied that occur at the equilibrium price in a competitive market.

surplus

The amount by which the quantity supplied of a product exceeds the quantity demanded at a specific (aboveequilibrium) price.

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 7000 lattes. The shortages of lattes at below-equilibrium prices (for example, 7000 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, 6000 lattes 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 lattes.



Market Supply of and Demand for Lattes						
(1)	(2)	(3)	(4)			
Total		Total				
Quantity	Price	Quantity	Surplus (+)			
Supplied	per	Demanded	or			
per Month	Latte	per Month	Shortage (–)*			
12,000	\$5	2,000	$+$ 10,000 \downarrow			
10,000	4	4,000	+6,000 \downarrow			
7,000	3	7,000	0			
4,000	2	11,000	-7,000 ↑			
1,000	I	16,000	−15,000 ↑			

*Arrows indicate the effect on price.

shortage

The amount by which the quantity demanded of a product exceeds the quantity supplied at a specific (belowequilibrium) price. supplied at that price. The result is a **shortage** or *excess demand* of 7000 lattes. The \$2 price discourages sellers from devoting resources to lattes and encourages consumers to desire more lattes than are available. The \$2 price cannot persist as the equilibrium price. Many consumers who want to buy lattes at this price will not obtain them. They will express a willingness to pay more than \$2 to get them. Competition among these buyers will drive up the price, eventually to the \$3 equilibrium level. Unless disrupted by supply or demand changes, this \$3 price of lattes will continue.

Rationing Function of Prices

The ability of the competitive forces of supply and demand to establish a price at which selling and buying decisions are consistent is called the *rationing function of prices*. In our case, the equilibrium price of \$3 clears the market, leaving no

burdensome surplus for sellers and no inconvenient shortage for potential buyers. And it is the combination of freely made individual decisions that sets this marketclearing price. In effect, the market outcome says that all buyers who are willing and able to pay \$3 for a latte will obtain one; all buyers who cannot or will not pay \$3 will go without one. Similarly, all producers who are willing and able to offer a latte for sale at \$3 will sell it; all producers who cannot or will not sell for \$3 will not sell their product.

INTERACTIVE GRAPHS G 3.1 Supply and demand

Ticket Scalping

Ticket prices for athletic events and musical concerts are usually set far in advance of the events. Sometimes the original ticket price is too low to be the equilibrium price. Lines form at the ticket window, and a severe shortage of tickets occurs at the printed price. What happens next? Buyers who are willing to pay more than the original price bid up the equilibrium price in resale ticket markets. The price rockets upward.

Tickets sometimes get resold for much greater amounts than the original price—market transactions known as "scalping." For example, an original buyer may resell a \$75 ticket to a concert for \$200, \$250, or more. The media sometimes denounce scalpers for "ripping off" buyers by charging "exorbitant" prices.

But is scalping really a rip-off? We must first recognize that such ticket resales are voluntary transactions. If both buyer and seller did not expect to gain from the exchange, it would not occur! The seller must value the \$200 more than seeing the event, and the buyer must value seeing the event at \$200 or more. So there are no losers or victims here: Both buyer and seller benefit from the transaction. The "scalping" market simply redistributes assets (game or concert tickets) from those who would rather have the money (other things) to those who would rather have the tickets.

Does scalping impose losses or injury on the sponsors of the event? If the sponsors are injured, it is because they initially priced tickets below the equilibrium level. Perhaps they did this to create a long waiting line and the attendant media publicity. Alternatively, they may have had a genuine desire to keep tickets affordable for lower-income, ardent fans. In either case, the event sponsors suffer an opportunity cost in the form of less ticket revenue than they might have otherwise received. But such losses are self-inflicted and quite separate and distinct from the fact that some tickets are later resold at a higher price.

So is ticket scalping undesirable? Not on economic grounds! It is an entirely voluntary activity that benefits both sellers and buyers.

Question:

Why do you suppose some professional sports teams are setting up legal "ticket exchanges" (at buyer- and seller-determined prices) at their Internet sites? (*Hint*: For the service, the teams charge a percentage of the transaction price of each resold ticket.)

APPLYING THE ANALYSIS

Changes in Demand, Supply, and Equilibrium

We know that prices can and do change in markets. For example, demand might change because of fluctuations in consumer tastes or incomes, changes in expected price, or variations in the prices of related goods. Supply might change in response to changes in resource prices, technology, or taxes. How will such changes in demand and supply affect equilibrium price and quantity?

Changes in Demand

Suppose that the supply of some good (for example, health care) is constant and the demand for the good 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.

Changes in Supply

What happens if the demand for some good (for example, cell phones) is constant but the 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, the equilibrium price rises while the equilibrium quantity declines.

Complex Cases

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

Supply Increase; Demand Decrease What effect will a supply increase for some good (for example, apples) and a demand decrease 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 about 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 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 equilibrium quantity is again 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. 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 decrease in supply from S_3 to S_4 in (d) increases equilibrium price and decreases equilibrium quantity. The to pright 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.



Supply Increase; Demand Increase What if supply and demand both increase for some good (for example, sushi)? 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. If the two changes are equal and cancel out, price will not change.

The effect on equilibrium quantity is certain: The increases in supply and in demand each raise 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. If the two changes are of the same size and cancel out, price will not change. Because decreases in supply and in demand each reduce equilibrium quantity, we can be sure that equilibrium quantity will fall.

Government-Set Prices

In most markets, prices are free to rise or fall with changes in supply or demand, no matter how high or low those prices might be. However, government occasionally concludes that changes in supply and demand have created prices that are unfairly high to buyers or unfairly low to sellers. Government may then place legal limits on how high or low a price or prices may go. Our previous analysis of shortages and surpluses helps us evaluate the wisdom of government-set prices.

APPLYING THE ANALYSIS

price ceiling A legally established maximum (belowequilibrium) price for a product.

Price Ceilings on Gasoline

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.

Figure 3.8 shows the effects of price ceilings graphically. Let's look at a hypothetical situation. Suppose that rapidly rising world income boosts the purchase of automobiles and increases the demand for gasoline so that the equilibrium or market price reaches \$3.50 per gallon. The rapidly rising price of gasoline greatly burdens low- and moderate-income households, which pressure government to "do something." To keep gasoline affordable for these households, the government imposes a ceiling price of \$3 per gallon. To impact the market, a price ceiling must be below the equilibrium price. A ceiling price of \$4, for example, would have had no immediate effect on the gasoline market.

What are the effects of this \$3 ceiling price? The rationing ability of the free market is rendered ineffective. Because the \$3 ceiling price is below the \$3.50 market-clearing price, there is a lasting shortage of gasoline. The quantity of gasoline demanded at \$3 is Q_d , and the quantity supplied is only Q_s ; a persistent excess demand or shortage of amount $Q_d - Q_s$ occurs.

The \$3 price ceiling 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 continue until the shortage disappeared at the equilibrium price and quantity, \$3.50 and Q_0 .

How will sellers apportion the available supply Q_s among buyers, who want the greater amount Q_d ? Should they distribute gasoline on a first-come, firstserved basis, that is, to those willing and able to get in line the soonest and stay in line? Or should gas stations distribute it on the basis of favoritism? Since 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



FIGURE 3.8 A

price ceiling. A price ceiling is a maximum legal price, such as \$3, that is below the equilibrium price. It results in a persistent product shortage, here shown by the distance between Q_d and Q_r .

fixed amount of gasoline per month. The rationing system might entail first the printing of coupons for Q_s gallons of gasoline and then the equal distribution of the coupons among consumers so that the wealthy family of four and the poor family of four both receive the same number of coupons.

But ration coupons would 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 \$3 ceiling price. And, of course, it is more profitable for gasoline stations to sell at prices above the ceiling. Thus, despite a sizable enforcement bureaucracy that would have to accompany the price controls, *black markets* in which gasoline is illegally bought and sold at prices above the legal limits will flourish. Counterfeiting of ration coupons will also be a problem. And since the price of gasoline is now "set by government," there might be political pressure on government to set the price even lower.

Question:

Why is it typically difficult to end price ceilings once they have been in place for a long time?

Rent Controls

About 200 cities in the United States, including New York City, Boston, and San Francisco, have at one time or another enacted price ceilings in the form of rent controls—maximum rents established by law—or, more recently, have set maximum rent increases for existing tenants. Such laws are well intended. Their goals are to protect low-income families from escalating rents caused by demand increases that outstrip supply increases. Rent controls are designed to alleviate perceived housing shortages and make housing more affordable.

What have been the actual economic effects? On the demand side, it is true that as long as rents are below equilibrium, more families are willing to consume

APPLYING THE ANALYSIS rental housing; the quantity of rental housing demanded increases at the lower price. 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 some 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 shortages, controls in fact are a primary cause of such shortages. For that reason, most American cities either have abandoned rent controls or are gradually phasing them out.

Question:

Why does maintenance tend to diminish in rent-controlled apartment buildings relative to maintenance in buildings where owners can charge market-determined rents?

APPLYING THE ANALYSIS

price floor A legally established

minimum (aboveequilibrium) price for a product.

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 free functioning of the market system has not provided a sufficient income for certain groups of resource suppliers or producers. Supported prices for agricultural products and current minimum wages are two examples of price (or wage) floors. Let's look at the former.

Suppose the demand for wheat declines relative to supply, pushing down the equilibrium price of wheat to \$2 per bushel. Because of that low price, many farmers have extremely low incomes. The government decides to help out by establishing a legal price floor (or "price support") of \$3 per bushel.

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 surplus of the product. Farmers will be willing to produce and offer for sale more wheat than private buyers are willing to buy at the \$3 price floor. As we saw with a price ceiling, an imposed legal price disrupts the rationing ability of the free market.

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 \$2 and Q_0 , respectively. If the government imposes a price floor of \$3, farmers will produce Q_s but private buyers will purchase only Q_d . The surplus is the excess of Q_s over Q_d .



FIGURE 3.9 A

price floor. A price floor is a minimum legal price, such as \$3, that results in a persistent product surplus, here shown by the distance between Q_i and Q_{dr} .

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

Price floors such as \$3 in Figure 3.9 not only disrupt the rationing ability of prices 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 scarce resources to wheat production and too few to producing other, more valuable, goods and services. It fails to achieve an optimal allocation of resources.

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. Also, the price floor causes potential environmental damage by encouraging wheat farmers to bring hilly, erosion-prone "marginal land" into production. The higher price also prompts imports of wheat. But, since such imports would increase the quantity of wheat supplied and thus undermine the price floor, the government needs to erect tariffs (taxes on imports) to keep the foreign wheat out. Such tariffs usually prompt other countries to retaliate with their own tariffs against U.S. agricultural or manufacturing exports.

Question:

To maintain price floors on milk, the U.S. government has at times bought out and destroyed entire dairy herds from dairy farmers. What's the economic logic of these actions? **INTERACTIVE GRAPHS**

G 3.2 Price floors and ceilings It is easy to see why economists "sound the alarm" when politicians advocate imposing price ceilings or price floors such as price controls, rent controls, interest-rate lids, or agricultural price supports. In all these cases, good intentions lead to bad economic outcomes. Government-controlled prices lead to shortages or surpluses, distort resource allocations, and cause negative side effects.

For additional examples of demand and supply, view the Chapter 3 Web appendix at www.mcconnellbriefmicro1e.com. There, you will find examples relating to such diverse products as lettuce, corn, salmon, gasoline, sushi, and Olympic tickets. Several of the examples depict simultaneous shifts in demand and supply curves—circumstances that often show up in exam questions!

Summary

- 1. Demand is a schedule or curve representing the willingness of buyers in a specific period to purchase a particular product at each of various prices. The law of demand implies 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 inverse and is graphed as a downsloping curve.
- 2. Market demand curves are found by adding horizontally the demand curves of the many individual consumers in the market.
- 3. Changes 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 expected prices) shift the market demand curve. A shift to the right is an increase in demand; a shift to the left is a decrease in demand. A change in demand is different from a change in the quantity demanded, the latter being a movement from one point to another point on a fixed demand curve because of a change in the product's price.
- 4. 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. 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, and supply is graphed as an upsloping curve.
- 5. The market supply curve is the horizontal summation of the supply curves of the individual producers of the product.
- 6. Changes in one or more of the determinants of supply (resource prices, production techniques, taxes or subsidies, the prices of other goods, expected prices, or the number of suppliers in the market) shift the supply curve of a product.

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 on a fixed supply curve.

- 7. 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.
- 8. 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.
- 9. Simultaneous changes in demand and supply affect equilibrium price and quantity in various ways, depending on their direction and relative magnitudes.
- 10. 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.
- 11. A price floor is a minimum price set by government and is designed to aid producers. 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.
- 12. Legally fixed prices stifle the rationing function of prices and distort the allocation of resources.

Terms and Concepts

demand law of demand demand curve determinants of demand normal good inferior good substitute good complementary good change in demand change in quantity demanded supply law of supply supply curve determinants of supply change in supply

Study Questions Connect

- 1. Explain the law of demand. Why does a demand curve slope downward? How is a market demand curve derived from individual demand curves? **LOI**
- 2. What are the determinants of demand? What happens to the demand curve when any of these determinants changes? Distinguish between a change in demand and a change in the quantity demanded, noting the cause(s) of each. LOI
- 3. What effect will each of the following have on the demand for small automobiles such as the Mini Cooper and Smart car? LOI
 - a. Small automobiles become more fashionable.
 - **b.** The price of large automobiles rises (with the price of small autos remaining the same).
 - c. Income declines and small autos are an inferior good.
 - **d.** Consumers anticipate that the price of small autos will greatly come down in the near future.
 - e. The price of gasoline substantially drops.
- 4. 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? LO2
- 5. What are the determinants of supply? What happens to the supply curve when any of these determinants changes? Distinguish between a change in supply and a change in the quantity supplied, noting the cause(s) of each. LO2
- 6. What effect will each of the following have on the supply of auto tires? **LO2**
 - **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 currently.
 - **e.** A decline in the price of the large tires used for semitrucks and earth-hauling rigs (with no change in the price of auto tires).

- change in quantity supplied equilibrium price equilibrium quantity surplus shortage price ceiling price floor
- 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.
- 7. "In the latte market, demand often exceeds supply and supply sometimes exceeds demand." "The price of a latte rises and falls in response to changes in supply and demand." In which of these two statements are the concepts of supply and demand used correctly? Explain. **LO4**
- **8.** Suppose the total demand for wheat and the total supply of wheat per month in the Kansas City grain market are as shown below: **LO3**

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	

- a. What is the equilibrium price? What is the equilibrium quantity? Fill in the surplus-shortage column, and use it to explain why your answers are correct.
- **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. Why will \$3.40 not be the equilibrium price in this market? Why not \$4.90? "Surpluses drive prices up; shortages drive them down." Do you agree?
- **d.** Suppose government establishes a price ceiling of \$3.70 for wheat. What might prompt it to establish this price ceiling? Explain carefully the main effects. Demonstrate your answer graphically.

- **e.** Suppose government establishes a price floor of \$4.60 for wheat. What will be the main effects of this price floor? Demonstrate your answer graphically.
- **9.** 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? Use supply and demand diagrams to verify your answers. **LO4**
 - 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.

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do.

- 10. 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 of its shares supplied. So, if this equality always occurs, why do the prices of stock shares ever change? LO4
- **11.** Critically evaluate: "In comparing the two equilibrium positions in Figure 3.7a, I see that a larger amount is actually purchased at a higher price. This refutes the law of demand." **LO4**

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnellbriefmicrole.com

Also, you will find one or more Web-based questions that require information from the Internet to answer.



IN THIS CHAPTER YOU WILL LEARN:

- I About price elasticity of demand and how it can be measured.
- 2 How price elasticity of demand affects total revenue.
- **3** About price elasticity of supply and how it can be measured.
- 4 How price elasticity of demand and supply can be applied to real-world situations.
- 5 About income elasticity of demand and crosselasticity of demand, and how they can be applied.

Elasticity of Demand and Supply

Why do buyers of some products respond to price increases by substantially reducing their purchases while buyers of other products respond by only slightly cutting back their purchases? Why do price hikes for some goods cause producers to greatly increase their output while price hikes on other products barely cause any output increase? Why does the demand for some products rise a great deal when household incomes increase while the demand for other products rises just a little? How can we tell whether a given pair of goods are complements, substitutes, or unrelated to each other?

The idea of elasticity (responsiveness) helps answer our questions. Let's explore this important topic.

ORIGIN OF THE IDEA 0 4.1

Price elasticity of demand

price elasticity of demand A measure of the responsiveness of the quantity of a product demanded by consumers when the product price changes.

WORKED PROBLEMS

W 4.1 Elasticity of demand

Price Elasticity of Demand

The law of demand tells us that, other things equal, consumers will buy more of a product when its price declines and less of it when its price increases. But how much more or less will they buy? The amount varies from product to product and over different price ranges for the same product. And such variations matter. For example, a firm contemplating a price hike will want to know how consumers will respond. If they remain highly loyal and continue to buy, the firm's revenue will rise. But if consumers defect en masse to other sellers or other products, its revenue will tumble.

The responsiveness of the quantity of a product demanded by consumers when the product price changes is measured by a product's **price elasticity of demand**. For some products (for example, restaurant meals) consumers are highly responsive to price changes. Modest price changes cause very large changes in the quantity purchased. Economists say that the demand for such products is *relatively elastic* or simply *elastic*.

For other products (for example, medical care) 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 of price elasticity or inelasticity of demand with the coefficient E_d , defined as

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

The percentage changes in the equation are calculated by dividing the *change* in quantity demanded by the original quantity demanded and by dividing the *change* in price by the original price. So we can restate the formula as

$$E_{d} = \frac{\text{change in quantity demanded of X}}{\text{original quantity demanded of X}} \div \frac{\text{change in price of X}}{\text{original price of X}}$$

Using Averages Unfortunately, an annoying problem arises in computing the price-elasticity coefficient. A price change from, say, \$4 to \$5 along a demand curve is a 25 percent (=\$1/\$4) increase, but the opposite price change from \$5 to \$4 along the same curve is a 20 percent (=\$1/\$5) decrease. Which percentage change in price should we use in the denominator to compute the price-elasticity coefficient? And when quantity changes, for example, from 10 to 20, it is a 100 percent (=10/10) increase. But when quantity falls from 20 to 10 along the identical demand curve, it is a 50 percent (=10/20) decrease. Should we use 100 percent or 50 percent in the numerator of the elasticity formula? Elasticity should be the same whether price rises or falls!

The simplest solution to the problem is to use the averages of the two prices and the two quantities as the reference points for computing the percentages. That is

$$E_d = \frac{\text{change in quantity}}{\text{sum of quantities/2}} \div \frac{\text{change in price}}{\text{sum of prices/2}}$$

For the same \$5–\$4 price range, the price reference is \$4.50 [= (\$5 + \$4)/2], and for the same 10–20 quantity range, the quantity reference is 15 units [= (10 + 20)/2]. The percentage change in price is now \$1/\$4.50, or about 22 percent, and the percentage change in quantity is 10/15, or about 67 percent. So E_d is about 3. This solution eliminates the "up versus down" problem. All the elasticity coefficients that follow are calculated using averages, also known as the *midpoints approach*.

Elimination of Minus Sign Because demand curves slope downward, the price-elasticity coefficient of demand E_d will always be a negative number. As an example, if price declines, quantity demanded will increase. This means that the numerator in our formula will be positive and the denominator negative, yielding a negative E_d . For an increase in price, the numerator will be negative but the denominator positive, again producing a negative E_d .

Economists usually ignore the minus sign and simply present the absolute value of the elasticity coefficient to avoid an ambiguity that might otherwise arise. It can be confusing to say that an E_d of -4 is greater than one of -2. This possible confusion is avoided when we say an E_d of 4 reveals greater elasticity than an E_d of 2. In what follows, we ignore the minus sign in the coefficient of price elasticity of demand and show only the absolute value.

Interpretations of E_d

We can interpret the coefficient of price elasticity of demand as follows.

Elastic Demand Demand is **elastic** if a specific percentage change in price results in a larger percentage change in quantity demanded. Then E_d will be greater than 1. Example: Suppose that a 2 percent decline in the price of cut flowers results in a 4 percent increase in quantity demanded. Then demand for cut flowers is elastic and

$$E_d = \frac{.04}{.02} = 2$$

Inelastic Demand If a specific percentage change in price produces a smaller percentage change in quantity demanded, demand is **inelastic.** Then E_d will be less than 1. Example: Suppose that a 2 percent decline in the price of tea leads to only a 1 percent increase in quantity demanded. Then demand is inelastic and

$$E_d = \frac{.01}{.02} = .5$$

Unit Elasticity The case separating elastic and inelastic demands occurs where a percentage change in price and the resulting percentage change in quantity demanded are the same. Example: Suppose that a 2 percent drop in the price of chocolate causes a 2 percent increase in quantity demanded. This special case is termed **unit elasticity** because E_d is exactly 1, or unity. In this example,

$$E_d = \frac{.02}{.02} = 1$$

Extreme Cases When we say demand is "inelastic," we do not mean that consumers are completely unresponsive to a price change. In that extreme situation, where a price change results in no change whatsoever in the quantity demanded,

elastic demand Product demand for which price changes cause relatively larger changes in quantity demanded.

inelastic demand Product demand for which price changes cause relatively smaller changes in quantity demanded.

unit elasticity Product demand for which relative price changes and changes in quantity demanded are equal.

perfectly inelastic demand

Product demand for which quantity demanded does not respond to a change in price. economists say that demand is **perfectly inelastic.** The price-elasticity coefficient is zero because there is no response to a change in price. Approximate examples include an acute diabetic's demand for insulin or an addict's demand for heroin. A line parallel to the vertical axis, such as D_1 in Figure 4.1a, shows perfectly inelastic demand graphically.



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Photo Op Elastic versus Inelastic Demand

The demand for expensive leisure activities such as cruise vacations is elastic; the demand for surgery or other nonelective medical care is inelastic.

perfectly elastic demand

Product demand for which quantity demanded can be any amount at a particular price. Conversely, when we say demand is "elastic," we do not mean that consumers are completely responsive to a price change. In that extreme situation, where a small price reduction causes buyers to increase their purchases from zero to all they can obtain, the elasticity coefficient is infinite (∞) and economists say demand is **perfectly elastic**. A line parallel to the horizontal axis, such as D_2 in Figure 4.1b, shows perfectly elastic demand. Such a demand curve, for example, faces wheat growers who can sell all or none of their wheat at the equilibrium market price.





A Bit of a Stretch

The following analogy might help you remember the distinction between "elastic" and "inelastic." Imagine two objects: (1) an Ace elastic bandage used to wrap injured joints and (2) a relatively firm rubber tie-down used for securing items for transport. The Ace bandage stretches a great deal when pulled with a particular force; the rubber tie-down stretches some, but not a lot.

Similar differences occur for the quantity demanded of various products when their prices change. For some products, a price change causes a substantial "stretch" of quantity demanded. When this stretch in percentage terms exceeds the percentage change in price, demand is elastic. For other products, quantity demanded stretches very little in response to the price change. When this stretch in percentage terms is less than the percentage change in price, demand is inelastic.

In summary:

- Elastic demand displays considerable "quantity stretch" (as with the Ace bandage).
- Inelastic demand displays relatively little "quantity stretch" (as with the rubber tie-down).

And through extension:

- Perfectly elastic demand has infinite quantity stretch.
- Perfectly inelastic demand has zero quantity stretch.

Question:

Which do you think has the most quantity stretch, given an equal percentage increase in price—toothpaste or townhouses?

The Total-Revenue Test

The importance of elasticity for firms relates to the effect of price changes on total revenue and thus on profits (total revenue minus total costs).

Total revenue (TR) is the total amount the seller receives from the sale of a product in a particular time period; it is calculated by multiplying the product price (P) by the quantity demanded and sold (Q). In equation form:

 $TR = P \times Q$

Graphically, total revenue is represented by the $P \times Q$ rectangle lying below a point on a demand curve. At point *a* in Figure 4.2a, for example, price is \$2 and quantity demanded is 10 units. So total revenue is \$20 (= $$2 \times 10$), shown by the rectangle composed of the blue and gold areas under the demand curve. We know from basic geometry that the area of a rectangle is found by multiplying one side by the other. Here, one side is "price" (\$2) and the other is "quantity demanded" (10 units).

Total revenue and the price elasticity of demand are related. In fact, the easiest way to infer whether demand is elastic or inelastic is to employ the **total-revenue test**.

total revenue (TR) The total number of dollars received by a firm from the sale of a product in a particular period.

total-revenue test

A test that determines elasticity by examining what happens to total revenue when price changes.

ILLUSTRATING THE IDEA

FIGURE 4.2 The total-revenue

test for price elasticity. (a) Price declines from \$2 to \$1, and total revenue increases from \$20 to \$40. So demand is elastic. The gain in revenue (tan area) exceeds the loss of revenue (blue area). (b) Price declines from \$4 to \$1, and total revenue falls from \$40 to \$20. So demand is inelastic. The gain in revenue (tan area) is less than the loss of revenue (blue area). (c) Price declines from \$3 to \$1, and total revenue does not change. Demand is unitelastic. The gain in revenue (tan area) equals the loss of revenue (blue area).



Here is the test: Note what happens to total revenue when price changes. If total revenue changes in the opposite direction from price, demand is elastic. If total revenue changes in the same direction as price, demand is inelastic. If total revenue does not change when price changes, demand is unit-elastic.

Elastic Demand If demand is elastic, a decrease in price will increase total revenue. Even though a lesser price is received per unit, enough additional units are sold to more than make up for the lower price. For an example, look at demand curve D_1 in Figure 4.2a. We have already established that at point *a*, total revenue is \$20 (= \$2 × 10), shown as the blue plus gold area.

If the price declines from \$2 to \$1 (point *b*), the quantity demanded becomes 40 units and total revenue is \$40 (= $$1 \times 40$). As a result of the price decline, total

WORKED PROBLEMS

W 4.2 Total revenue test revenue has increased from \$20 to \$40. Total revenue has increased in this case because the \$1 decline in price applies to 10 units, with a consequent revenue loss of \$10 (the blue area). But 30 more units are sold at \$1 each, resulting in a revenue gain of \$30 (the tan area). Visually, it is apparent that the gain of the tan area exceeds the loss of the blue area. As indicated, the overall result is a net increase in total revenue of \$20 (= \$30 - \$10).

The analysis is reversible: If demand is elastic, a price increase will reduce total revenue. The revenue gained on the higher-priced units will be more than offset by the revenue lost from the lower quantity sold. Bottom line: Other things equal, when price and total revenue move in opposite directions, demand is elastic. E_d is greater than 1, meaning the percentage change in quantity demanded is greater than the percentage change in price.

Inelastic Demand If demand is inelastic, a price decrease will reduce total revenue. The increase in sales will not fully offset the decline in revenue per unit, and total revenue will decline. To see this, look at demand curve D_2 in Figure 4.2b. At point *c* on the curve, price is \$4 and quantity demanded is 10. So total revenue is \$40, shown by the combined blue and gold rectangle. If the price drops to \$1 (point *d*), total revenue declines to \$20, which obviously is less than \$40. Total revenue has declined because the loss of revenue (the blue area) from the lower unit price is larger than the gain in revenue (the tan area) from the accompanying increase in sales. Price has fallen, and total revenue has also declined.

Our analysis is again reversible: If demand is inelastic, a price increase will increase total revenue. So, other things equal, when price and total revenue move in the same direction, demand is inelastic. E_d is less than 1, meaning the percentage change in quantity demanded is less than the percentage change in price.

Unit Elasticity In the special case of unit elasticity, an increase or a decrease in price leaves total revenue unchanged. The loss in revenue from a lower unit price is exactly offset by the gain in revenue from the accompanying increase in sales. Conversely, the gain in revenue from a higher unit price is exactly offset by the revenue loss associated with the accompanying decline in the amount demanded.

In Figure 4.2c (demand curve D_3) we find that at the \$3 price, 10 units will be sold, yielding total revenue of \$30. At the lower \$1 price, a total of 30 units will be sold, again resulting in \$30 of total revenue. The \$2 price reduction causes the loss of revenue shown by the blue area, but this is exactly offset by the revenue gain shown by the tan area. Total revenue does not change. In fact, that would be true for all price changes along this particular curve.

Other things equal, when price changes and total revenue remains constant, demand is unit-elastic (or unitary). E_d is 1, meaning the percentage change in quantity equals the percentage change in price.

Price Elasticity along a Linear Demand Curve

Now a major confession! Although the demand curves depicted in Figure 4.2 nicely illustrate the total-revenue test for elasticity, two of the graphs involve specific movements along linear (straight-line) demand curves. That presents no problem for explaining the total-revenue test. However, you need to know that elasticity typically varies over the different price ranges of the same demand curve. (The exception is the curve in Figure 4.2c. Elasticity is 1 along the entire curve.)

FIGURE 4.3 Price elasticity of demand along a linear demand curve as measured by the elasticity coefficient and the total-revenue test. Demand curve *D* is based on columns (1) and (2) of the table

and is labeled to show that the hypothetical weekly demand for movie tickets is elastic at higher price ranges and inelastic at lower price ranges. That fact is confirmed by the elasticity coefficients (column 3) as well as the total-revenue test (columns 4 and 5) in the table.





Consider columns 1 and 2 of the table in Figure 4.3, which shows hypothetical data for movie tickets. We plot these data as demand curve D in the accompanying graph. The notation above the curve correctly suggests that demand is more price-elastic toward the upper left (here, the \$5–\$8 price range of D) than toward the lower right (here, the \$4–\$1 price range of D). This fact is confirmed by the elasticity coefficients in column (3) of the table: The coefficients decline as price falls. Also, note from column (4) that total revenue first rises as price falls and then eventually declines as price falls further. Column (5) employs the total-revenue test to show that elasticity declines as price falls along a linear demand curve.

The demand curve in Figure 4.3 illustrates that the slope of a demand curve (its flatness or steepness) is an unreliable basis for judging elasticity. The slope of the curve is computed from *absolute* changes in price and quantity, while elasticity involves *relative*

INTERACTIVE GRAPHS G 4.1 Elasticity and revenue or *percentage* changes in price and quantity. The demand curve in Figure 4.3 is linear, which means its slope is constant throughout. But this linear curve is elastic in its high-price (\$8–\$5) range and inelastic in its low-price (\$4–\$1) range.

Determinants of Price Elasticity of Demand

We cannot say what will determine the price elasticity of demand in each individual situation, but the following generalizations are often helpful.

Substitutability Generally, the larger the number of substitute goods that are available, the greater is the price elasticity of demand. Mercedes, BMWs, and Lincolns are effective substitutes for Cadillacs, making the demand for Cadillacs elastic. At the other extreme, we saw earlier that the diabetic's demand for insulin is highly inelastic because there simply are no close substitutes.

The elasticity of demand for a product depends on how narrowly the product is defined. Demand for Reebok sneakers is more elastic than is the overall demand for shoes. Many other brands are readily substitutable for Reebok sneakers, but there are few, if any, good substitutes for shoes.

Proportion of Income Other things equal, the higher the price of a product relative to one's income, the greater the price elasticity of demand for it. A 10 percent increase in the price of low-priced pencils or chewing gum amounts to a very small portion of most people's incomes, and quantity demanded will probably decline only slightly. Thus, price elasticity for such low-priced items tends to be low. But a 10 percent increase in the price of relatively high-priced automobiles or houses means additional expenditures of perhaps \$3000 or \$20,000. That price increase is a significant fraction of the incomes and budgets of most families, and the number of units demanded will likely diminish significantly. Price elasticity for such items tends to be high.

Luxuries versus Necessities In general, the more that a good is considered to be a "luxury" rather than a "necessity," the greater is the price elasticity of demand. Electricity is generally regarded as a necessity; it is difficult to get along without it. A price increase will not significantly reduce the amount of lighting and power used in a household. (Note the very low price-elasticity coefficient of these goods in Table 4.1.) An extreme case: A person does not decline emergency heart bypass surgery because the physician's fee has just gone up by 10 percent.

On the other hand, vacation travel and jewelry are luxuries that can easily be forgone. If the prices of vacation travel and jewelry rise, a consumer need not buy them and will suffer no great hardship without them.

What about the demand for a common product like salt? It is highly inelastic on three counts: There are few good substitutes available; salt is a negligible item in the family budget; and it is a "necessity" rather than a luxury.

Time Generally, product demand is more elastic the longer the time period under consideration. Consumers often need time to adjust to changes in prices. For example, consumers may not immediately reduce their purchases very much when the price of beef rises by 10 percent, but in time they may shift to chicken, pork, or fish.

Another consideration is product durability. Studies show that "short-run" demand for gasoline is more inelastic ($E_d = .2$) than is "long-run" demand ($E_d = .7$). In the

TABLE 4.1 Selected Price Elasticities of Demand

Coefficient of Price Elasticity of Demand (<i>E</i> _d)	Product or Service	Coefficient of Price Elasticity of Demand (<i>E</i> _d)
.10	Milk	.63
.13	Household appliances	.63
.15	Liquor	.70
.23	Movies	.87
.25	Beer	.90
.26	Shoes	.91
.30	Motor vehicles	1.14
.31	Beef	1.27
.32	China, glassware, tableware	1.54
.37	Residential land	1.60
.40	Restaurant meals	2.27
.49	Lamb and mutton	2.65
.60	Fresh peas	2.83
	Coefficient of Price Elasticity of Demand (<i>E_d</i>) .10 .13 .15 .23 .25 .26 .30 .31 .32 .37 .40 .49 .60	Coefficient of Price Elasticity of Demand (Ed)Product or Service.10Milk.13Household appliances.15Liquor.23Movies.25Beer.26Shoes.30Motor vehicles.31Beef.32China, glassware, tableware.37Residential land.40Restaurant meals.49Lamb and mutton.60Fresh peas

Source: Compiled from numerous studies and sources reporting price elasticity of demand.

short run, people are "stuck" with their present cars and trucks, but with rising gasoline prices they eventually replace them with smaller, more fuel-efficient vehicles.

Table 4.1 shows estimated price-elasticity coefficients for a number of products. Each reflects some combination of the elasticity determinants just discussed.

APPLYING THE ANALYSIS

Price Elasticity of Demand and College Tuition

For some goods and services, for-profit firms or not-for-profit institutions may find it advantageous to determine differences in price elasticity of demand for different groups of customers and then charge different prices to the different groups. Price increases for groups that have inelastic demand will increase total revenue, as will price decreases for groups that have elastic demand.

It is relatively easy to observe differences between group elasticities. Consider tuition pricing by colleges and universities. Prospective students from low-income families generally have more elastic demands for higher education than similar students from high-income families. This is true because tuition is a much larger proportion of household income for a low-income student or family than for his or her high-income counterpart. Desiring a diverse student body, colleges charge different *net* prices (= tuition *minus* financial aid) to the two groups on the basis of elasticity of demand. High-income students pay full tuition, unless they receive merit-based scholarships. Low-income students receive considerable financial aid in addition to merit-based scholarships and, in effect, pay a lower *net* price.

It is common for colleges to announce a large tuition increase and immediately cushion the news by emphasizing that they also are increasing financial aid. In effect, the college is increasing the tuition for students who have inelastic demand by the full amount and raising the *net* tuition of those with elastic demand by some lesser amount or not at all. Through this strategy, colleges boost revenue to cover rising costs while maintaining affordability for a wide range of students.

Question:

What are some other examples of charging different prices to different groups of customers on the basis of differences in elasticity of demand? (*Hint*: Think of price discounts based on age or time of purchase.)

Decriminalization of Illegal Drugs

In recent years proposals to legalize drugs have been widely debated. Proponents contend that drugs should be treated like alcohol; they should be made legal for adults and regulated for purity and potency. The current war on drugs, it is argued, has been unsuccessful, and the associated costs—including enlarged police forces, the construction of more prisons, an overburdened court system, and untold human costs—have increased markedly. Legalization would allegedly reduce drug trafficking significantly by taking the profit out of it. Crack cocaine and heroin, for example, are cheap to produce and could be sold at low prices in legal markets. Because the demand of addicts is highly inelastic, the amounts consumed at the lower prices would increase only modestly. Addicts' total expenditures for cocaine and heroin would decline, and so would the street crime that finances those expenditures.

Opponents of legalization say that the overall demand for cocaine and heroin is far more elastic than proponents think. In addition to the inelastic demand of addicts, there is another market segment whose demand is relatively elastic. This segment consists of the occasional users or "dabblers," who use hard drugs when their prices are low but who abstain or substitute, say, alcohol when their prices are high. Thus, the lower prices associated with the legalization of hard drugs would increase consumption by dabblers. Also, removal of the legal prohibitions against using drugs might make drug use more socially acceptable, increasing the demand for cocaine and heroin.

Many economists predict that the legalization of cocaine and heroin would reduce street prices by up to 60 percent, depending on if and how much they were taxed. According to one study, price declines of that size would increase the number of occasional users of heroin by 54 percent and the number of occasional users of cocaine by 33 percent. The total quantity of heroin demanded would rise by an estimated 100 percent, and the quantity of cocaine demanded would rise APPLYING THE ANALYSIS by 50 percent.* Moreover, many existing and first-time dabblers might in time become addicts. The overall result, say the opponents of legalization, would be higher social costs, possibly including an increase in street crime.

Question:

In what ways do drug rehabilitation programs increase the elasticity of demand for illegal drugs?

*Henry Saffer and Frank Chaloupka, "The Demand for Illegal Drugs," Economic Inquiry, July 1999, pp. 401-411.

APPLYING THE ANALYSIS

Excise Taxes and Tax Revenue

The government pays attention to elasticity of demand when it selects goods and services on which to levy *excise taxes* (taxes levied on the production of a product or on the quantity of the product purchased). If a \$1 tax is levied on a product and 10,000 units are sold, tax revenue will be \$10,000 (= $$1 \times 10,000$ units sold). If the government raises the tax to \$1.50 but the higher price that results reduces sales (quantity demanded) to 4000 because demand is elastic, tax revenue will decline to \$6000 (= \$1.50 × 4000 units sold). So a higher tax on a product that has an elastic demand will bring in less tax revenue.

In contrast, if demand is inelastic, the tax increase from \$1 to \$1.50 will boost tax revenue. For example, if sales fall from 10,000 to 9000, tax revenue will rise from \$10,000 to \$13,500 (= $$1.50 \times 9000$ units). Little wonder that legislatures tend to seek out products such as liquor, gasoline, cigarettes, and phone service when levying and raising taxes. Those taxes yield high tax revenues.

Question:

Under what circumstance might a reduction of an excise tax actually produce more tax revenue?

APPLYING THE ANALYSIS

Fluctuating Farm Income

Inelastic demand for farm products and year-to-year changes in farm output combine to produce highly volatile farm prices and incomes. Let's see why.

In industrially advanced economies, the price elasticity of demand for agricultural products is low. For farm products in the aggregate, the elasticity coefficient is between .20 and .25. These figures suggest that the prices of agricultural products would have to fall by 40 to 50 percent for consumers to increase their purchases by a mere 10 percent. Consumers apparently put a low value on additional farm output compared with the value they put on additional units of alternative goods.

Why is this so? Recall that a basic determinant of elasticity of demand is substitutability. When the price of one product falls, the consumer tends to substitute that product for other products whose prices have not fallen. But in relatively wealthy societies this substitution is very modest for food. Although people may eat more, they do not switch from three meals a day to, say, five or six meals a day in response to a decline in the relative prices of farm products. Real biological factors constrain an individual's capacity to substitute food for other products.

Farm output tends to fluctuate from year to year, mainly because farmers have limited control over their output. Floods, droughts, unexpected frost, insect damage, and similar disasters can mean poor crops, while an excellent growing season means bumper crops (extraordinarily large crops). Such natural phenomena are beyond the control of farmers, yet those phenomena exert an important influence on output.

In addition to natural phenomena, the highly competitive nature of agriculture makes it difficult for farmers to form huge combinations to control production. If the thousands of widely scattered and independent producers happened to plant an unusually large or an abnormally small portion of their land one year, an extra-large or a very small farm output would result even if the growing season were normal.

Combining inelastic demand with the instability of output, we can see why farm prices and incomes are unstable. Even if the market demand for some crop such as barley remains fixed, its price inelasticity will magnify small changes in output into relatively large changes in farm prices and income. For example, suppose that a "normal" barley crop of 100 million bushels results in a "normal" price per bushel of \$3 and a "normal" farm income of \$300 million (= $$3 \times 100 \text{ million}$).

A bumper crop of barley will cause large deviations from these normal prices and incomes because of the inelasticity of demand. Suppose that a good growing season occurs and that the result is a large crop of 110 million bushels. As farmers watch their individual crops mature, little will they realize that their collectively large crop, when harvested, will drive the price per bushel down to, say, \$2.50. Their revenue will fall from \$300 million in the normal year to \$275 million (= $$2.50 \times 110$ million bushels) this year. When demand is inelastic, an increase in the quantity sold will be accompanied by a more-than-proportionate decline in price. The net result is that total revenue, that is, total farm income, will decline disproportionately.

Similarly, a small crop of 90 million bushels, perhaps caused by drought, might boost the price to \$3.50. Total farm income will rise to \$315 million (= $$3.50 \times 90$ million bushels) from the normal level of \$300 million. A decline in output will cause a more-than-proportionate increase in price and in income when demand is inelastic. Ironically, for farmers as a group, a poor crop may be a blessing and a bumper crop a hardship.

Question:

How might government programs to pay farmers to take land out of production in order to achieve conservation goals (such as erosion control and wildlife protection) increase crop prices and farm income? ORIGIN OF THE IDEA O 4.2 Price elasticity of supply

price elasticity of supply

A measure of the responsiveness of the quantity of a product supplied by sellers when the product price changes.

Price Elasticity of Supply

The concept of price elasticity also applies to supply. If the quantity supplied by producers is relatively responsive to price changes, supply is elastic. If it is relatively insensitive to price changes, supply is inelastic.

We measure the degree of price elasticity or inelasticity of supply with the coefficient E_s , defined almost like E_d except that we substitute "percentage change in quantity supplied" for "percentage change in quantity demanded":

 $E_s = \frac{\text{percentage change in quantity supplied of X}}{\text{percentage change in price of X}}$

For reasons explained earlier, the averages, or midpoints, of the before and after quantities supplied and the before and after prices are used as reference points for the percentage changes. Suppose an increase in the price of a good from \$4 to \$6 increases the quantity supplied from 10 units to 14 units. The percentage change in price would be 2/5, or 40 percent, and the percentage change in quantity would be 4/12, or 33 percent:

$$E_s = \frac{.33}{.40} = .83$$

In this case, supply is inelastic, since the price-elasticity coefficient is less than 1. If E_s is greater than 1, supply is elastic. If it is equal to 1, supply is unit-elastic. Also, E_s is never negative, since price and quantity supplied are directly related. Thus, there are no minus signs to drop, as was necessary with elasticity of demand.

The degree of **price elasticity of supply** depends mainly on how easily and quickly producers can shift resources between alternative uses to alter production of a good. The easier and more rapid the transfers of resources, the greater is the price elasticity of supply. Take the case of a producer of surfboards. The producer's



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Photo Op Elastic versus Inelastic Supply

The supply of automobiles is elastic, whereas the supply of Monet paintings is inelastic.

response to an increase in the price of surfboards depends on its ability to shift resources from the production of other products such as wakeboards, skateboards, and snowboards (whose prices we assume remain constant) to the production of surfboards. And shifting resources takes time: The longer the time, the greater the transferability of resources. So there will be a greater production response, and therefore greater elasticity of supply, the longer a firm has to adjust to a price change.

In analyzing the impact of time on elasticity, economists distinguish among the immediate market period, the short run, and the long run.

Price Elasticity of Supply: The Market Period

The **market period** is the period that occurs when the time immediately after a change in market price is too short for producers to respond with a change in the amount they supply. Suppose a farmer brings to market one truckload of tomatoes that is the entire season's output. The supply curve for the tomatoes is perfectly inelastic (vertical); the farmer will sell the truckload whether the price is high or low. Why? Because the farmer can offer only one truckload of tomatoes even if the price of tomatoes is much higher than anticipated. He or she might like to offer more tomatoes, but tomatoes cannot be produced overnight. Another full growing season is needed to respond to a higher-than-expected price by producing more than one truckload. Similarly, because the product is perishable, the farmer cannot withhold it from the market. If the price is lower than anticipated, he or she will still sell the entire truckload.

The farmer's costs of production, incidentally, will not enter into this decision to sell. Though the price of tomatoes may fall far short of production costs, the farmer will nevertheless sell out to avoid a total loss through spoilage. During the market period, our farmer's supply of tomatoes is fixed: Only one truckload is offered no matter how high or low the price.

Figure 4.4a shows the farmer's vertical supply curve during the market period. Supply is perfectly inelastic because the farmer does not have time to respond to a change in demand, say, from D_1 to D_2 . The resulting price increase from P_0 to P_m simply determines which buyers get the fixed quantity supplied; it elicits no increase in output.

However, not all supply curves need be perfectly inelastic immediately after a price change. If the product is not perishable and the price rises, producers may choose to increase quantity supplied by drawing down their inventories of unsold, stored goods. This will cause the market supply curve to attain some positive slope. For our tomato farmer, the market period may be a full growing season; for producers of goods that can be inexpensively stored, there may be no market period at all.

Price Elasticity of Supply: The Short Run

The **short run** in microeconomics is a period of time too short to change plant capacity but long enough to use the fixed-size plant more or less intensively. In the short run, our farmer's plant (land and farm machinery) is fixed. But he does have time in the short run to cultivate tomatoes more intensively by applying more labor and more fertilizer and pesticides to the crop. The result is a somewhat greater output in response to a presumed increase in demand; this greater output is reflected in a more elastic supply of tomatoes, as shown by S_s in Figure 4.4b. Note now that the increase in demand from D_1 to D_2 is met by an increase in quantity (from Q_0 to Q_s), so there is a

market period

A period in which producers of a product are unable to change the quantity produced in response to a change in price.

short run

A period in which producers are able to change the quantities of some but not all the resources they employ. **FIGURE 4.4** Time and the elasticity of supply. The greater the amount of time producers have to adjust to a change in demand, here from D_1 to D_2 , the greater will be their output response. In the immediate market period (a) there is insufficient time to change output, and so supply is perfectly inelastic. In the short run (b) plant capacity is fixed, but changing the intensity of its use can alter output; supply is therefore more elastic. In the long run (c) all desired adjustments, including changes in plant capacity, can be made, and supply becomes still more elastic.



smaller price adjustment (from P_0 to P_s) than would be the case in the market period. The equilibrium price is therefore lower in the short run than in the market period.

long run

A period long enough to enable producers of a product to change all the resources they employ.

Price Elasticity of Supply: The Long Run

The **long run** in microeconomics is a time period long enough for firms to adjust their plant sizes and for new firms to enter (or existing firms to leave) the industry. In the "to-mato industry," for example, our farmer has time to acquire additional land and buy more machinery and equipment. Furthermore, other farmers may, over time, be attracted to tomato farming by the increased demand and higher price. Such adjustments create a larger supply response, as represented by the more elastic supply curve S_L in Figure 4.4c. The outcome is a smaller price rise (P_0 to P_L) and a larger output increase (Q_0 to Q_L) in response to the increase in demand from D_1 to D_2 .

There is no total-revenue test for elasticity of supply. Supply shows a positive or direct relationship between price and amount supplied; the supply curve is upsloping. Regardless of the degree of elasticity or inelasticity, price and total revenue always move together.

APPLYING THE ANALYSIS

Antiques and Reproductions

The *Antiques Road Show* is a popular PBS television program in which people bring antiques to a central location for appraisal by experts. Some people are pleased to learn that their old piece of furniture or funky folk art is worth a large amount, say, \$30,000 or more.

The high price of a particular antique is due to strong demand and limited, highly inelastic supply. Because a genuine antique can no longer be reproduced,

its quantity supplied either does not rise or rises only slightly as its price goes up. The higher price might prompt the discovery of a few more of the remaining originals and thus add to the quantity available for sale, but this quantity response is usually quite small. So the supply of antiques and other collectibles tends to be inelastic. For one-of-a-kind antiques, the supply is perfectly inelastic.

Factors such as increased population, higher income, and greater enthusiasm for collecting antiques have increased the demand for antiques over time. Because the supply of antiques is limited and inelastic, those increases in demand have greatly boosted the prices of antiques.

Contrast the inelastic supply of original antiques with the elastic supply of modern "made-to-look-old" reproductions. Such faux antiques are quite popular and widely available at furniture stores and knickknack shops. When the demand for reproductions increases, the firms making them simply boost production. Because the supply of reproductions is highly elastic, increased demand raises their prices only slightly.

Question:

How does the reluctance to sell antiques add to their inelastic supply?

Volatile Gold Prices

The price of gold is quite volatile, sometimes rocketing upward one period and plummeting downward the next. The main sources of these fluctuations are shifts in demand and highly inelastic supply. Gold production is a costly and timeconsuming process of exploration, mining, and refining. Moreover, the physical availability of gold is highly limited. For both reasons, increases in gold prices do not elicit substantial increases in quantity supplied. Conversely, gold mining is costly to shut down, and existing gold bars are expensive to store. Price decreases therefore do not produce large drops in the quantity of gold supplied. In short, the supply of gold is inelastic.

The demand for gold is partly derived from the demand for its uses, such as for jewelry, dental fillings, and coins. But people also demand gold as a speculative financial investment. They increase their demand for gold when they fear general inflation or domestic or international turmoil that might undermine the value of currency and more traditional investments. They reduce their demand when events settle down. Because of the inelastic supply of gold, even relatively small changes in demand produce relatively large changes in price.

Question:

What is the current price of gold? (See www.goldprices.com.) What were the highest and the lowest prices over the last 12 months?

APPLYING THE ANALYSIS income elasticity of demand

A measure of the responsiveness of the quantity of a product demanded to changes in consumer income.

Income Elasticity of Demand

Income elasticity of demand measures the degree to which the quantity of a product demanded responds, positively or negatively, to a change in consumers' incomes. The coefficient of income elasticity of demand E_i is determined with the formula

 $E_i = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$

Normal Goods

For most goods, the income-elasticity coefficient E_i is positive, meaning that more of them are demanded as income rises. Such goods are called *normal* or *superior goods*, which we first described in Chapter 3. But the value of E_i varies greatly among normal goods. For example, income elasticity of demand for automobiles is about +3, while income elasticity for most farm products is only about +.20.

Inferior Goods

A negative income-elasticity coefficient designates an inferior good. Used mattresses, long-distance bus tickets, used clothing, and some frozen meals are likely candidates. Consumers decrease their purchases of inferior goods as their incomes rise.

APPLYING THE ANALYSIS

Which Consumer Products Suffer the Greatest Demand Decreases during Recessions?

Coefficients of income elasticity of demand provide insights into how recessions impact the sales of different consumer products. A recession is defined as two or more consecutive quarters (six months) of falling real output, and is typically characterized by rising unemployment rates, lower profits for business firms, falling consumer incomes, and weaker demand for products. In December 2007, the U.S. economy entered its tenth recession since 1950. Because of a worsening mortgage debt crisis, the recession continued through 2008 and into 2009. When recessions occur and incomes fall, coefficients of income elasticity of demand help predict which products will experience more rapid declines in demand than other products.

Products with relatively high income elasticity coefficients such as automobiles $(E_i = +3)$, housing $(E_i = +1.5)$, and restaurant meals $(E_i = +1.4)$ are generally hit hardest by recessions. Those with low or negative income elasticity coefficients are much less affected. For example, food products $(E_i = +.20)$ respond relatively little to income fluctuations. When incomes drop, purchases of food (and tooth-paste and toilet paper) drop little compared to purchases of movie tickets, luxury vacations, and wide-screen TVs. Products we view as essential tend to have lower income elasticity coefficients than products we view as luxuries. When our incomes fall, we cannot easily eliminate or postpone the purchase of essential products.

Question:

Why have discount clothing stores (such as Kohl's) suffered less than high-end clothing stores (such as Nordstrom) during the most recent U.S. recession?
Cross-Elasticity of Demand

Cross-elasticity of demand measures how the quantity of a product demanded (say, X) responds to a change in the price of some other product (say, Y). We calculate the coefficient of cross-elasticity of demand E_{xy} just as we do the coefficient of simple price elasticity, except that we relate the percentage change in the consumption of X to the percentage change in the price of Y:

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

This cross-elasticity (or cross-price-elasticity) concept allows us to quantify and more fully understand substitute and complementary goods, introduced in Chapter 3.

Substitute Goods

If cross-elasticity of demand is positive, meaning that sales of X move in the same direction as a change in the price of Y, then X and Y are substitute goods. An example is Evian water (X) and Dasani (Y). An increase in the price of Dasani causes consumers to buy more Evian, resulting in a positive cross-elasticity. The larger the positive crosselasticity coefficient, the greater is the substitutability between the two products.

Complementary Goods

When cross-elasticity is negative, we know that X and Y "go together"; an increase in the price of one decreases the demand for the other. This indicates that the two are complementary goods. For example, a decrease in the price of digital cameras will increase the number of memory sticks purchased. The larger the negative cross-elasticity coefficient, the greater is the complementarity between the two goods.

Independent Goods

A zero or near-zero cross-elasticity suggests that the two products being considered are unrelated or independent goods. An example is textbooks and plums: We would not expect a change in the price of textbooks to have any effect on purchases of plums, and vice versa.

Using Cross-Elasticity to Make Business and Regulatory Decisions

The degree of substitutability of products, measured by the cross-elasticity coefficient, is important to businesses and government. For example, suppose that Coca-Cola is considering whether or not to lower the price of its Sprite brand. Not only will it want to know something about the price elasticity of demand for Sprite (will the price cut increase or decrease total revenue?), but it also will be interested in knowing if the increased sales of Sprite will come at the expense of its Coke brand. How sensitive are the sales of one of its products (Coke) to a change in the price of another of its products (Sprite)? By how much will the APPLYING THE ANALYSIS

cross-elasticity of demand

A measure of the responsiveness of the quantity demanded of one product to a change in the price of another product. increased sales of Sprite "cannibalize" the sales of Coke? A low cross-elasticity would indicate that Coke and Sprite are weak substitutes for each other and that a lower price for Sprite would have little effect on Coke sales.

Government also implicitly uses the idea of cross-elasticity of demand in assessing whether a proposed merger between two large firms will substantially reduce competition and therefore violate the antitrust laws. For example, the cross-elasticity between Coke and Pepsi is high, making them strong substitutes for each other. Consequently, the government would likely block a merger between them because the merger would lessen competition. In contrast, the crosselasticity between cola and gasoline is low or zero. A merger between Coke and Shell would have a minimal effect on competition. So government would let that merger happen.

Question:

Prior to the recent recession, why did sales of sport utility vehicles (SUVs) decline dramatically, while sales of hybrid vehicles rose significantly? Relate your answer to crosselasticity of demand.

Summary

- 1. Price elasticity of demand measures the responsiveness of the quantity of a product demanded when the price changes. If consumers are relatively sensitive to price changes, demand is elastic. If they are relatively unresponsive to price changes, demand is inelastic.
- 2. The price-elasticity coefficient E_d measures the degree of elasticity or inelasticity of demand. The coefficient is found by the formula

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

Economists use the averages of prices and quantities under consideration as reference points in determining percentage changes in price and quantity. If E_d is greater than 1, demand is elastic. If E_d is less than 1, demand is inelastic. Unit elasticity is the special case in which E_d equals 1.

- 3. Perfectly inelastic demand is graphed as a line parallel to the vertical axis; perfectly elastic demand is shown by a line above and parallel to the horizontal axis.
- 4. Total revenue (TR) is the total number of dollars received by a firm from the sale of a product in a particular period. It is found by multiplying price times quantity. Graphically, TR is shown as the $P \times Q$ rectangle under a point on a demand curve.

- 5. If total revenue changes in the opposite direction from prices, demand is elastic. If price and total revenue change in the same direction, demand is inelastic. Where demand is of unit elasticity, a change in price leaves total revenue unchanged.
- 6. Elasticity varies at different price ranges on a demand curve, tending to be elastic in the upper-left segment and inelastic in the lower-right segment. Elasticity cannot be judged by the steepness or flatness of a demand curve.
- 7. The number of available substitutes, the size of an item's price relative to one's budget, whether the product is a luxury or a necessity, and the length of time to adjust are all determinants of elasticity of demand.
- 8. The elasticity concept also applies to supply. The coefficient of price elasticity of supply is found by the formula

$$E_s = \frac{\text{percentage change in quantity supplied of X}}{\text{percentage change in price of X}}$$

ŀ

The averages of the prices and quantities under consideration are used as reference points for computing percentage changes.

9. Elasticity of supply depends on the ease of shifting resources between alternative uses, which varies directly with the time producers have to adjust to a price change. 10. Income elasticity of demand indicates the responsiveness of consumer purchases to a change in income. The coefficient of income elasticity of demand is found by the formula

$$E_i = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

The coefficient is positive for normal goods and negative for inferior goods.

11. Cross-elasticity of demand indicates the responsiveness of consumer purchases of one product (X) to a change in the

price of some other product (Y). The coefficient of crosselasticity is found by the formula

$$E_{xy} = \frac{\begin{array}{c} \text{percentage change in quantity} \\ \text{demanded of product X} \\ \hline \text{percentage change in price} \\ \text{of product Y} \end{array}$$

The coefficient is positive if X and Y are substitute goods and negative if X and Y are complements.

Terms and Concepts

price elasticity of demand elastic demand inelastic demand unit elasticity perfectly inelastic demand

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perfectly elastic demand
total revenue (TR)
total-revenue test
price elasticity of supply
market period
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short run long run income elasticity of demand cross-elasticity of demand

Study Questions Connect

- 1. What is the formula for measuring price elasticity of demand? What does it mean (in terms of relative price and quantity changes) if the price-elasticity coefficient is less than 1? Equal to 1? Greater than 1? LOI
- Graph the accompanying demand data, and then use the price-elasticity formula (midpoints approach) for E_d to determine price elasticity of demand for each of the four possible \$1 price changes. What can you conclude about the relationship between the slope of a curve and its elasticity? LOI

Product Price	Quantity Demanded
\$5	1
4	2
3	3
2	4
L	5

- **3.** Calculate total-revenue data from the demand schedule in question 2. Referring to changes in price and total revenue, describe the total-revenue test for elasticity. **LO2**
- **4.** You are chairperson of a state tax commission responsible for establishing a program to raise new revenue through excise taxes. Why would elasticity of demand be important to

you in determining the products on which the taxes should be levied? **LO4**

- How would the following changes in price affect total revenue? That is, would total revenue increase, decline, or remain unchanged? LO2
 - a. Price falls and demand is inelastic.
 - **b.** Price rises and demand is elastic.
 - c. Price rises and supply is elastic.
 - d. Price rises and supply is inelastic.
 - e. Price rises and demand is inelastic.
 - f. Price falls and demand is elastic.
 - g. Price falls and demand is of unit elasticity.
- 6. What are the major determinants of price elasticity of demand? Use those determinants and your own reasoning in judging whether demand for each of the following products is probably elastic or inelastic: (a) bottled water; (b) toothpaste; (c) Crest toothpaste; (d) ketchup; (e) diamond bracelets; (f) Microsoft Windows operating system. LOI
- 7. What effect would a rule stating that university students must live in university dormitories have on the price elasticity of demand for dormitory space? What impact might this in turn have on room rates? **LOI**
- 8. What is the formula for measuring the price elasticity of supply? Suppose the price of apples goes up from \$20 to \$22 a box. In direct response, Goldsboro Farms supplies 1200

boxes of apples instead of 1000 boxes. Compute the coefficient of price elasticity (midpoints approach) for Goldsboro's supply. Is its supply elastic, or is it inelastic? **LO3**

- **9.** In May 2004 Pablo Picasso's 1905 painting *Boy with a Pipe* sold at auction for \$104 million. Portray this sale in a demand and supply diagram, and comment on the elasticity of supply. Comedian George Carlin once mused, "If a painting can be forged well enough to fool some experts, why is the original so valuable?" Provide an answer. **LO4**
- 10. Because of a legal settlement over state health care claims, in 1999 the U.S. tobacco companies had to raise the average price of a pack of cigarettes from \$1.95 to \$2.45. The decline in cigarette sales was estimated at 8 percent. What does this imply for the elasticity of demand for cigarettes? Explain. LO4
- 11. The income elasticities of demand for movies, dental services, and clothing have been estimated to be +3.4, +1 and +.5, respectively. Interpret these coefficients. What does it mean if an income-elasticity coefficient is negative? LO5
- 12. Suppose the cross-elasticity of demand for products A and B is +3.6, and for products C and D is -5.4. What can you conclude about how products A and B are related? Products C and D? LO5

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Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.



IN THIS CHAPTER YOU WILL LEARN:

- I How public goods are distinguished from private goods.
- 2 The method for determining the optimal quantity of a public good.
- **3** About externalities (spillover costs and benefits) and the methods to remedy them.
- 4 The difference between the benefits-received and ability-to-pay principles of taxation.
- 5 The differences between proportional, progressive, and regressive taxes.

Public Goods and Externalities

Competitive markets usually do a remarkable job of allocating society's scarce resources to their highestvalued uses. But markets have certain limitations. In some circumstances, economically desirable goods are not produced at all. In other situations, they are either overproduced or underproduced. This chapter examines **market failure**, which occurs when the competitive market system (1) does not allocate any resources whatsoever to the production of certain goods or (2) either underallocates or overallocates resources to the production of certain goods.

Where private markets fail, an economic role for government may arise. In this chapter, we will examine that role as it relates to public goods and so-called externalities. Then we want to see how the government uses taxation to reallocate resources away from the private sector to the public sector. We conclude the chapter by noting potential government inefficiencies that can hinder government's economic efforts.

market failure

The inability of a market to produce a desirable product or produce it in the "right" amount.

private goods

Goods that people individually buy and consume and that private firms can profitably provide because they keep people who do not pay from receiving the benefits.

Private Goods

Certain goods called **private goods** are produced through the competitive market system. Private goods encompass the full range of goods offered for sale in stores and shops. Examples include automobiles, clothing, personal computers, household appliances, and sporting goods. Private goods have two characteristics: rivalry and excludability.

- *Rivalry* (in consumption) means that when one person buys and consumes a product, it is not available for another person to buy and consume. When Adams purchases and drinks a bottle of mineral water, it is not available for Benson to purchase and consume.
- *Excludability* means that sellers can keep people who do not pay for a product from obtaining its benefits. Only people who are willing and able to pay the market price for bottles of water can obtain these drinks and the benefits they confer.

Profitable Provision

Consumers fully express their personal demands for private goods in the market. If Adams likes bottled mineral water, that fact will be known by her desire to purchase the product. Other things equal, the higher the price of bottled water, the fewer bottles she will buy. So Adams' demand for bottled water will reflect an inverse relationship between the price of bottled water and the quantity of it demanded. This is simply *individual* demand, as described in Chapter 3.

The *market* demand for a private good is the horizontal summation of the individual demand schedules (review Figure 3.2). Suppose there are just two consumers in the market for bottled water and the price is \$1 per bottle. If Adams will purchase 3 bottles and Benson will buy 2, the market demand will reflect that consumers demand 5 bottles at the \$1 price. Similar summations of quantities demanded at other prices will generate the market demand schedule and curve.

Suppose the equilibrium price of bottled water is \$1. Adams and Benson will buy a total of 5 bottles, and the sellers will obtain total revenue of \$5 (= $$1 \times 5$). If the sellers' cost per bottle is \$.80, their total cost will be \$4 (= $$.80 \times 5$). So sellers charging \$1 per bottle will obtain \$5 of total revenue, incur \$4 of total cost, and earn \$1 of profits for the 5 bottles sold.

Because firms can profitably "tap market demand" for private goods, they will produce and offer them for sale. Consumers demand private goods, and profit-seeking suppliers produce goods that satisfy the demand. Consumers willing to pay the market price obtain the goods; nonpayers go without.

Efficient Allocation

A competitive market not only makes private goods available to consumers but also allocates society's resources efficiently to the particular product. Competition among producers forces them to use the best technology and right mix of productive resources. Otherwise, lower-cost producers will drive them out of business. The result is **productive efficiency:** the production of any particular good in the least costly way. When society produces, say, bottled water, at the lowest achievable per-unit cost, it is expending the smallest amount of resources to produce that product and therefore is making available the largest amount of resources available. If it can produce a bottle of water using only \$1 of those resources, then it will have available \$99 of resources

productive efficiency

The production of a good in the least costly way.

to produce other goods. This is clearly better than producing the bottle of water for \$5 and having only \$95 of resources available for 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 high-quality mineral water to be used for bottled water, not for gigantic blocks of refrigeration ice. It wants MP3 players (such as iPods), not phonographs and 45-rpm records. Moreover, society does not want to devote all its resources to bottled water and MP3 players. It wants to assign some resources to automobiles and personal computers. Competitive markets make those proper assignments.

The equilibrium price and quantity in competitive markets usually produce an assignment of resources that is "right" from an economic perspective. Demand reflects the marginal benefit (MB) of the good, and supply reflects its marginal cost (MC). The market ensures that firms produce all units of goods 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. There is neither underproduction nor overproduction of the product.

Public Goods

Certain other goods and services called **public goods** have the opposite characteristics of private goods. Public goods are distinguished by nonrivalry and nonexcludability.

- *Nonrivalry* (in consumption) means that one person's consumption of a good does not preclude consumption of the good by others. Everyone can simultaneously obtain the benefit from a public good such as a global positioning system, national defense, street lighting, and environmental protection.
- *Nonexcludability* means there is no effective way of excluding individuals from the benefit of the good once it comes into existence.

These two characteristics create a **free-rider problem.** Once a producer has provided a public good, everyone including nonpayers can obtain the benefit. Most people do not voluntarily pay for something they can obtain for free!

With only free riders, the demand for a public good does not get expressed in the market. With no market demand, there is no potential for firms to "tap the demand" for revenues and profits. The free-rider problem makes it impossible for firms to gather together resources and profitably provide the good. If society wants a public good, society will have to direct government to provide it. We will soon see that government can finance the provision of such goods through taxation.

A significant example of a public good is homeland defense. The vast majority of Americans think this public good is economically justified because they perceive the benefits as exceeding the costs. Once homeland defense efforts are undertaken, however, the benefits accrue to all Americans (nonrivalry). And there is no practical way to exclude any American from receiving those benefits (nonexcludability).

No private firm will undertake overall homeland defense because the free-rider problem means that benefits cannot be profitably sold. So here we have a service that yields substantial net benefits but to which the market system will not allocate sufficient resources. Like national defense in general, homeland defense is a public good. Society signals its desire for such goods by voting for particular political candidates who support their provision. Because of the free-rider problem, government provides these goods and finances them through compulsory charges in the form of taxes. allocative efficiency

The production of the "right" mix of goods and services (minimumcost production assumed).

public goods

Goods that everyone can simultaneously consume and from which no one can be excluded, even if they do not pay.

free-rider problem

The inability of a firm to profitably provide a good because everyone, including nonpayers, can obtain the benefit.



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Photo Op Private versus Public Goods

Apples, distinguished by rivalry (in consumption) and excludability, are examples of private goods. In contrast, streetlights, distinguished by nonrivalry (in consumption) and nonexcludability, are examples of public goods.

ILLUSTRATING THE IDEA

Art for Art's Sake

Suppose an enterprising sculptor creates a piece of art costing \$600 and, with permission, places it in the town square. Also suppose that Jack gets \$300 of enjoyment from the art and Diane gets \$400. Sensing this enjoyment and hoping to make a profit, the sculptor approaches Jack for a donation equal to his satisfaction. Jack falsely says that, unfortunately, he does not particularly like the piece. The sculptor then tries Diane, hoping to get \$400 or so. Same deal: Diane professes not to like the piece either. Jack and Diane have become free riders. Although feeling a bit guilty, both reason that it makes no sense to pay for something when anyone can receive the benefits without paying for them. The artist is a quick learner; he vows never to try anything like that again.

Question:

What is the rationale for government funding for art placed in town squares and other public spaces?

Optimal Quantity of a Public Good

If consumers need not reveal their true demand for a public good in the marketplace, how can society determine the optimal amount of that good? The answer is that the government has to try to estimate the demand for a public good through surveys or public votes. It can then compare the marginal benefit of an added unit of the good against the government's marginal cost of providing it. Adhering to the MB = MC rule, it can provide the "right" amount of the public good.

Measuring Demand

Suppose that Adams and Benson are the only two people in the society and that their willingness to pay for a public good, this time the war on terrorism, is as shown in columns 1 and 2 and columns 1 and 3 in Table 5.1. Economists might have discovered these schedules through a survey asking hypothetical questions about how much each citizen was willing to pay for various types and amounts of public goods rather than go without them.

Notice that the schedules in the first four columns of Table 5.1 are price-quantity schedules, meaning they are demand schedules. Rather than depicting demand in the usual way—the quantity of a product someone is willing to buy at each possible price—these schedules show the price someone is willing to pay for the extra unit of each possible quantity. That is, Adams is willing to pay \$4 for the first unit of the public good, \$3 for the second, \$2 for the third, and so on.

Suppose the government produces 1 unit of this public good. Because of nonrivalry, Adams' consumption of the good does not preclude Benson from also consuming it, and vice versa. So both people consume the good, and neither volunteers to pay for it. But from Table 5.1 we can find the amount these two people would be willing to pay, together, rather than do without this 1 unit of the good. Columns 1 and 2 show that Adams would be willing to pay \$4 for the first unit of the public good, whereas columns 1 and 3 reveal that Benson would be willing to pay \$5 for it. Adams and Benson therefore are jointly willing to pay \$9 (= \$4 + \$5) for this first unit.

For the second unit of the public good, the collective price they are willing to pay is \$7 (= \$3 from Adams + \$4 from Benson); for the third unit they will pay \$5 (= \$2 + \$3); and so on. By finding the collective willingness to pay for each additional unit (column 4), we can construct a collective demand schedule (a willingness-to-pay schedule) for the public good. Here we are *not* adding the quantities demanded at each possible price, as with the market demand for a private good. Instead, we are adding the prices that people are willing to pay for the last unit of the public good at each possible quantity demanded.

What does it mean in columns 1 and 4 of Table 5.1 that, for example, Adams and Benson are collectively willing to pay \$7 for the second unit of the public good? It means

(I) Quantity of Public Good	(2) Adams' Willingness to Pay (Price)		(3) Benson's Willingness to Pay (Price)		(4) Collective Willingness to Pay (Price)	(5) Marginal Cost
I.	\$4	+	\$5	=	\$9	\$3
2	3	+	4	=	7	4
3	2	+	3	=	5	5
4	I	+	2	=	3	6
5	0	+	I.	=	I.	7

TABLE 5.1 Optimal Quantity of a Public Good, Two Individuals WORKED PROBLEMS

W 5.1

Optimal amount of a public good

that they jointly expect to receive \$7 of extra benefit or utility from that unit. Column 4, in effect, reveals the collective marginal benefit of each unit of the public good.

Comparing Marginal Benefit and Marginal Cost

Now let's suppose the marginal cost of providing the public good is as shown in column 5 of Table 5.1. As explained in Chapter 1, marginal cost tends to rise as more of a good is produced. In view of the marginal-cost data shown, how much of the good should government provide? The optimal amount occurs at the quantity where marginal benefit equals marginal cost. In Table 5.1 that quantity is 3 units, where the collective willingness to pay for the third unit—the \$5 marginal benefit—just matches that unit's \$5 marginal cost. As we saw in Chapter 1, equating marginal benefit and marginal cost efficiently allocates society's scarce resources.

APPLYING THE ANALYSIS

cost-benefit analysis The formal

comparison of marginal costs and marginal benefits of a government project to decide whether it is worth doing and to what extent resources should be devoted to it.

Cost-Benefit Analysis

The above example suggests a practical means, called **cost-benefit analysis**, for deciding whether to provide a particular public good and how much of it to provide. Like our example, cost-benefit analysis (or marginal-benefit–marginal-cost analysis) involves a comparison of marginal costs and marginal benefits.

Suppose the Federal government is contemplating a highway construction plan. Because the economy's resources are limited, any decision to use more resources in the public sector will mean fewer resources for the private sector. There will be both a cost and a benefit. The cost is the loss of satisfaction resulting from the accompanying decline in the production of private goods; the benefit is the extra satisfaction resulting from the output of more public goods. Should the needed resources be shifted from the private to the public sector? The answer is yes if the benefit from the extra public goods exceeds the cost that results from having fewer private goods. The answer is no if the cost of the forgone private goods is greater than the benefit associated with the extra public goods.

Cost-benefit analysis, however, can indicate more than whether a public program is worth doing. It can also help the government decide on the extent to which a project should be pursued. Real economic questions cannot usually be answered simply by "yes" or "no" but, rather, involve questions such as "how much" or "how little."

Although private toll roads exist, highways clearly have public goods characteristics because the benefits are widely diffused and highway use is relatively difficult to price. Should the Federal government expand the Federal highway system? If so, what is the proper size or scope for the overall project?

Table 5.2 lists a series of increasingly ambitious and increasingly costly highway projects: widening existing two-lane highways; building new two-lane highways; building new four-lane highways; building new six-lane highways. The extent to which government should undertake highway construction depends on the costs and benefits. The costs are largely the costs of constructing and maintaining the highways; the benefits are improved flows of people and goods throughout the nation.

TABLE 5.2

Cost-Benefit Analysis for a National Highway Construction Project (in Billions)

(I) Plan	(2) Total Cost of Project	(3) Marginal Cost	(4) Total Benefit	(5) Marginal Benefit	(6) Net Benefit (4) - (2)
No new construction	\$0 ₁	¢ /	\$ 0 ₁	¢۲.	\$ 0
A: Widen existing highways	4	т ф — С	5		L
B: New 2-lane highways	101	g	13		3
C: New 4-lane highways	18	10	23	7	5
D: New 6-lane highways	28		26	5	-2

The table shows that total annual benefit (column 4) exceeds total annual cost (column 2) for plans A, B, and C, indicating that some highway construction is economically justifiable. We see this directly in column 6, where total costs (column 2) are subtracted from total annual benefits (column 4). Net benefits are positive for plans A, B, and C. Plan D is not economically justifiable because net benefits are negative.

But the question of optimal size or scope for this project remains. Comparing the marginal cost (the change in total cost) and the marginal benefit (the change in total benefit) relating to each plan determines the answer. The guideline is well known to you from previous discussions: Increase an activity, project, or output as long as the marginal benefit (column 5) exceeds the marginal cost (column 3). Stop the activity at, or as close as possible to, the point at which the marginal benefit equals the marginal cost. Do not undertake a project for which marginal cost exceeds marginal benefit.

In this case plan C (building new four-lane highways) is the best plan. Plans A and B are too modest; the marginal benefits exceed the marginal costs. Plan D's marginal cost (\$10 billion) exceeds the marginal benefit (\$3 billion) and therefore cannot be justified; it overallocates resources to the project. Plan C is closest to the theoretical optimum because its marginal benefit (\$10 billion) still exceeds marginal cost (\$8 billion) but approaches the MB = MC (or MC = MB) ideal.

This marginal-cost-marginal-benefit rule tells government which plan provides the maximum excess of total benefits over total costs or, in other words, the plan that provides society with the maximum net benefit. You can confirm directly in column 6 that the maximum net benefit (\$5 billion) is associated with plan C.

Question:

Do you think it is generally easier to measure the costs of public goods or their benefits? Explain your reasoning.

Externalities

When we say that competitive markets automatically bring about allocative efficiency, we assume that all the benefits and costs for each product are fully reflected in the market demand and supply curves. That is not always the case. In some markets certain benefits or costs may escape the buyer or seller.

negative externalities Spillover production or consumption costs imposed on third parties without compensation to them.

INTERACTIVE GRAPHS

G 5.1 Externalities An *externality* occurs when some of the costs or the benefits of a good are passed on, or "spill over," to someone other than the immediate buyer or seller. Externalities are benefits or costs that accrue to some third party that is external to the market transaction.

Negative Externalities

Production or consumption costs inflicted on a third party without compensation are called **negative externalities** or *spillover costs*. Environmental pollution is an example. When a chemical manufacturer or a meatpacking plant dumps its wastes into a lake or river, water users such as swimmers, fishers, and boaters suffer negative externalities. When a petroleum refinery pollutes the air with smoke or a paper mill creates obnoxious odors, the community experiences negative externalities for which it is not compensated.

Figure 5.1a illustrates how negative externalities affect the allocation of resources. When producers shift some of their costs onto the community as spillover costs, producers' marginal costs are lower than otherwise. So their supply curves do not include or "capture" all the costs legitimately associated with the production of their goods. A supply curve such as *S* in Figure 5.1a therefore understates the total cost of production for a polluting firm. Its supply curve lies to the right of (or below) the full-cost supply curve *S*_{*r*}, which would include the negative externality. Through polluting and thus transferring cost to society, the firm enjoys lower production costs and has the supply curve *S*.

The resource allocation outcome is shown in Figure 5.1a, where equilibrium output Q_e is larger than the optimal output Q_o . This is a market failure because resources are *overallocated* to the production of this commodity; too many units of it are produced.

Positive Externalities

Sometimes spillovers appear as external benefits. The production or consumption of certain goods and services may confer spillover or external benefits on third parties or on the community at large without compensating payment. Immunization against measles and polio results in direct benefits to the immediate consumer of

FIGURE 5.1 Negative externalities and positive externalities. (a) With negative externalities (spillover costs) borne by society, the producers' supply curve *S* is to the right of (below) the full-cost curve S_t . Consequently, the equilibrium output Q_e is greater than the optimal output Q_o . (b) When positive externalities (spillover benefits) accrue to society, the market demand curve *D* is to the left of (below) the full-benefit demand curve D_t . As a result, the equilibrium output Q_e is less than the optimal output Q_o .



those vaccines. But it also results in widespread substantial positive externalities to the entire community.

Education is another example of **positive externalities.** Education benefits individual consumers: Better-educated people generally achieve higher incomes than lesswell-educated people. But education also benefits society through a more versatile and more productive labor force, on the one hand, and smaller outlays for crime prevention, law enforcement, and welfare programs, on the other.

Figure 5.1b shows the impact of positive externalities on resource allocation. When positive externalities occur, the market demand curve D lies to the left of (or below) the full-benefits demand curve. That is, D does not include the positive externalities of the product, whereas D_t does. Consider inoculations against a communicable disease. Alvarez and Anderson benefit when they get vaccinated, but so do their associates Bronson and Berkshire, who are less likely to contract the disease from them. The market demand curve reflects only the direct, private benefits to Alvarez and Anderson. It does not reflect the positive externalities—the spillover benefits—to Bronson and Berkshire, which are included in D_r .

The outcome, as shown in Figure 5.1b, is that the equilibrium output Q_e is less than the optimal output Q_o . The market fails to produce enough vaccinations, and resources are *underallocated* to this product.

Economists have explored several approaches to the problems of negative and positive externalities. Let's first look at situations where government intervention is not needed and then at some possible government solutions.

positive externalities

Spillover production or consumption benefits conferred on third parties without compensation from them.

> ORIGIN OF THE IDEA 0 5.1 Externalities



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Photo Op Positive and Negative Consumption Externalities

Homeowners create positive externalities when they put up nice holiday lighting displays. Not only does the homeowner benefit from consuming the sight, but so do people who pass by the house. In contrast, when people consume roads (drive) during rush hour, it creates a negative externality. This takes the form of traffic congestion, imposing time and fuel costs on other drivers.

Coase theorem

The idea that externality problems can be resolved through private negotiations by the affected parties when property rights are clearly established.

Individual Bargaining: Coase Theorem

In the **Coase theorem**, conceived decades ago by economist Ronald Coase at the University of Chicago, government is not needed to remedy negative or positive externalities where (1) property ownership is clearly defined, (2) the number of people involved is small, and (3) bargaining costs are negligible. Under these circumstances, the government should confine its role to encouraging bargaining between affected individuals or groups. Property rights place a price tag on an externality, creating opportunity costs for all parties. Because the economic self-interests of the parties are at stake, bargaining will enable them to find a mutually acceptable solution to the externality problem.

ILLUSTRATING THE IDEA

A Forest Tale

Suppose the owner of a large parcel of forestland is considering a plan to clear-cut (totally level) thousands of acres of mature fir trees. The complication is that the forest surrounds a lake with a popular resort on its shore. The resort is on land owned by the resort. The unspoiled beauty of the general area attracts vacationers from all over the nation to the resort, and the resort owner is against the clear-cutting. Should state or local government intervene to allow or prevent the tree cutting?

According to the Coase theorem, the forest owner and the resort owner can resolve this situation without government intervention. As long as one of the parties to the dispute has property rights to what is at issue, an incentive will exist for both parties to negotiate a solution acceptable to each. In our example, the owner of the timberland holds the property rights to the land to be logged and thus has the right to clear-cut it. The owner of the resort therefore has an economic incentive to negotiate with the forest owner to reduce the logging impact. Excessive logging of the forest surrounding the resort will reduce tourism and revenues to the resort owner.

But less clear is the reason why the forest owner has an incentive to negotiate with the resort owner. The rationale draws directly on the idea of opportunity cost. One cost to the forest owner incurred in logging the forest is the forgone payment that he or she could obtain from the resort owner for agreeing not to clear-cut the fir trees. The resort owner might be willing to make a lump-sum or annual payment to the owner of the forest to avoid or minimize the negative externality. Or perhaps the resort owner might be willing to buy the forested land to prevent the logging. As viewed by the forest owner, a payment for not clearcutting or a purchase price above the prior market value of the land is an opportunity cost of logging the land.

Both parties would probably regard a negotiated agreement as better than clear-cutting the firs.

Question:

Suppose the resort, not the timber company, owned the surrounding forest. Why would there still be an incentive for both to negotiate about the type and degree of logging in the forest?

Unfortunately, many externalities involve huge numbers of affected parties, high bargaining costs, and community property such as air and water. In such situations private bargaining cannot be used as a remedy. As an example, the climate change problem affects millions of people in many nations. The vast number of affected parties could not individually negotiate an agreement to reduce the greenhouse gases that contribute to climate change. Instead, they must rely on their governments to represent the millions of affected parties and find an acceptable solution.

Liability Rules and Lawsuits

Although private negotiation may not be a realistic solution to many externality problems, clearly established property rights may help in another way. The government has erected a framework of laws that define private property and protect it from damage done by other parties. Those laws, and the damage recovery system to which they give rise, permit parties suffering negative externalities to sue for compensation.

Suppose the Ajax Degreaser Company regularly dumps leaky barrels containing solvents into a nearby canyon owned by Bar Q Ranch. Bar Q eventually discovers this dump site and, after tracing the drums to Ajax, immediately contacts its lawyer. Soon after, Bar Q sues Ajax. If Ajax loses the case, it will have to pay for the cleanup and may also have to pay Bar Q additional damages for ruining its property.

Clearly defined property rights and government liability laws thus help remedy some externality problems. They do so directly by forcing the perpetrator of the harmful externality to pay damages to those injured. They do so indirectly by discouraging firms and individuals from generating negative externalities for fear of being sued. It is not surprising, then, that many spillovers do not involve private property but rather property held in common by society. It is the public bodies of water, the public lands, and the public air, where ownership is less clear, that often bear the brunt of spillovers.

Caveat: Like private negotiations, private lawsuits to resolve externalities have their own limitations. Large legal fees and major time delays in the court system are commonplace. Also, the uncertainty associated with the court outcome reduces the effectiveness of this approach. Will the court accept your claim that your emphysema has resulted from the smoke emitted by the factory next door, or will it conclude that your ailment is unrelated to the plant's pollution? Can you prove that a specific firm in the area is the source of the contamination of your well? What happens to Bar Q's suit if Ajax Degreaser goes out of business during the litigation?

Government Intervention

Government intervention may be needed to achieve economic efficiency when externalities affect large numbers of people or when community interests are at stake. Government can use direct controls and taxes to counter negative externalities (spillover costs); it may provide subsidies or public goods to deal with positive externalities (spillover benefits).

Direct Controls The direct way to reduce negative externalities from a certain activity is to pass legislation limiting that activity. Such direct controls force the offending firms to incur the actual costs of the offending activity. To date, this approach has dominated public policy in the United States. Clean-air legislation has created uniform emission standards—limits on allowable pollution—and has forced factories and businesses to install "maximum achievable control technology" ORIGIN OF THE IDEA 0 5.2 Coase theorem **FIGURE 5.2 Correcting for negative externalities.** (a) Negative externalities (spillover costs) result in an overallocation of resources. (b) Government can correct this overallocation in two ways: (1) using direct controls, which would shift the supply curve from S to S_t and reduce output from Q_e to Q_o or (2) imposing a specific tax T, which would also shift the supply curve from S to S_t , eliminating the overallocation of resources.



to reduce emissions of toxic chemicals. It has also mandated reductions in (1) tailpipe emissions from automobiles, (2) use of chlorofluorocarbons (CFCs) that deplete the ozone layer, and (3) emissions of sulfur dioxide by coal-burning utilities to prevent the acid-rain destruction of lakes and forests. Also, clean-water legislation has limited the amounts of heavy metals and detergents that firms can discharge into rivers and bays. Toxic-waste laws dictate special procedures and dump sites for disposing of contaminated soil and solvents. Violating these laws means fines and, in some cases, imprisonment.

Direct controls raise the marginal cost of production because the firms must operate and maintain pollution-control equipment. The supply curve S in Figure 5.2b, which does not reflect the negative externalities, shifts leftward (upward) to the full-cost supply curve, S_t . Product price increases, equilibrium output falls from Q_e to Q_o , and the initial overallocation of resources shown in Figure 5.2a is corrected.

Specific Taxes A second policy approach to negative externalities is for government to levy taxes or charges specifically on the related good. For example, the government has placed a manufacturing excise tax on CFCs, which deplete the stratospheric ozone layer protecting the earth from excessive solar ultraviolet radiation. Facing such an excise tax, manufacturers must decide whether to pay the tax or expend additional funds to purchase or develop substitute products. In either case, the tax raises the marginal cost of producing CFCs, shifting the private supply curve for this product leftward (or upward).

In Figure 5.2b, a tax equal to T per unit increases the firm's marginal cost, shifting the supply curve from S to S_t . The equilibrium price rises, and the equilibrium output declines from Q_e to the economically efficient level Q_o . The tax thus eliminates the initial overallocation of resources associated with the negative externality.

FIGURE 5.3 Correcting for positive externalities. (a) Positive externalities (spillover benefits) result in an underallocation of resources. (b) Government can correct this underallocation through a subsidy to consumers, which shifts market demand from D to D_t and increases output from Q_e to Q_o . (c) Alternatively, government can eliminate the underallocation by giving producers a subsidy of U, which shifts their supply curve from S_t to S'_t , increasing output from Q_e to Q_o .



Subsidies and Government Provision What policies might be useful in dealing with *positive* externalities? Where positive externalities are large and diffuse, as in our earlier example of inoculations, government has three options for correcting the underallocation of resources:

- Subsidies to buyers Figure 5.3a again shows the supply-demand situation for positive externalities. Government could correct the underallocation of resources, for example, to inoculations, by subsidizing consumers of the product. It could give each new mother in the United States a discount coupon to be used to obtain a series of inoculations for her child. The coupon would reduce the "price" to the mother by, say, 50 percent. As shown in Figure 5.3b, this program would shift the demand curve for inoculations from too low *D* to the appropriate D_r . The number of inoculations would rise from Q_e to the economically optimal Q_o , eliminating the underallocation of resources shown in Figure 5.3a.
- Subsidies to producers A subsidy to producers is a specific tax in reverse. Taxes impose an extra cost on producers, while subsidies reduce producers' costs. As shown in Figure 5.3c, a subsidy of U per inoculation to physicians and medical clinics would reduce their marginal costs and shift their supply curve rightward from S_t to S'_t . The output of inoculations would increase from Q_t to the optimal level Q_{ov} correcting the underallocation of resources shown in Figure 5.3a.
- *Government provision* Finally, where positive externalities are extremely large, the government may decide to provide the product for free or for a minimal charge. Government provides many goods that could be produced and delivered in such a way that exclusion would be possible. Such goods, called **quasi-public goods**, include education, streets and highways, police and fire protection, libraries and museums, preventive medicine, and sewage disposal. They could all be priced and provided by private firms through the market system because the free-rider problem would be minimal. But, because spillover benefits extend well beyond the individual buyer, the market system may underproduce them. Therefore, government often provides quasi-public goods.

quasi-public goods

Goods for which exclusion could occur but which government provides because of perceived widespread and diffuse benefits.

APPLYING THE ANALYSIS

Lojack: A Case of Positive Externalities

Economists Ayres and Levitt point out that some forms of private crime prevention simply redistribute crime rather than reduce it. For example, car alarm systems that have red blinking warning lights may simply divert professional auto thieves to vehicles that do not have such lights and alarms. The owner of a car with such an alarm system benefits through reduced likelihood of theft but imposes a cost on other car owners who do not have such alarms. Their cars are more likely to be targeted for theft by thieves because other cars have visible security systems.

In contrast, some private crime prevention measures actually reduce crime, rather than simply redistribute it. One such measure is installation of a Lojack (or some similar) car retrieval system. Lojack is a tiny radio transmitter that is hidden in one of many possible places within the car. When an owner reports a stolen car, the police can remotely activate the transmitter. Police then can determine the car's precise location and track its subsequent movements.

The owner of the car benefits because the 95 percent retrieval rate on cars with the Lojack system is higher than the 60 percent retrieval rate for cars without the system. But, according to a study by Ayres and Levitt, the benefit to the car owner is only 10 percent of the total benefit. Ninety percent of the total benefit is external; it is a spillover benefit to other car owners in the community.

There are two sources of this positive externality. First, the presence of the Lojack device sometimes enables police to intercept the car while the thief is still driving it. For example, in California the arrest rate for cars with Lojack was three times greater than that for cars without it. The arrest puts the car thief out of commission for a time and thus reduces subsequent car thefts in the community. Second, and far more important, the device enables police to trace cars to "chop shops," where crooks disassemble cars for resale of the parts. When police raid the chop shop, they put the entire theft ring out of business. In Los Angeles alone, Lojack has eliminated 45 chop shops in just a few years. The purging of the chop shop and theft ring reduces auto theft in the community. So auto owners who do not have Lojack devices in their cars benefit from car owners who do. Ayres and Levitt estimate the *marginal social benefit* of Lojack—the marginal benefit to the Lojack car owner *plus* the spillover benefit to other car owners—is 15 times greater than the marginal cost of the device.

We saw in Figure 5.3a that the existence of positive externalities causes an insufficient quantity of a product and thus an underallocation of scarce resources to its production. The two general ways to correct the outcome are to subsidize the consumer, as shown in Figure 5.3b, or to subsidize the producer, as shown in Figure 5.3c. Currently, there is only one form of government intervention in place: statemandated insurance discounts for people who install auto retrieval systems such as Lojack. In effect, those discounts on insurance premiums subsidize the consumer by lowering the "price" of the system to consumers. The lower price raises the number of systems installed. But, on the basis of their research, Ayres and Levitt contend that the current levels of insurance discounts are far too small to correct the underallocation that results from the positive externalities created by Lojack.

Question:

Other than mandating lower insurance premiums for Lojack users, what might government do to increase the use of Lojack devices in automobiles?

Source: Based on Ian Ayres and Steven D. Levitt, "Measuring Positive Externalities from Unobservable Victim Precaution: An Empirical Analysis of Lojack," *Quarterly Journal of Economics*, February 1998, pp. 43–77. The authors point out that Lojack did not fund their work; nor do they have any financial stake in Lojack.

A Market-Based Approach

One novel approach to negative externalities involves only limited government action. The idea is to create a market for externality rights.

Operation of the Market In this market-based approach—commonly called a cap-and-trade program—an appropriate pollution-control agency determines the amount of pollutants that firms can discharge into the water or air of a specific region annually while maintaining the water or air quality at some acceptable level. Suppose the agency ascertains that 500 tons of pollutants can be discharged into Metropolitan Lake and "recycled" by nature each year. Then 500 pollution rights, each entitling the owner to dump 1 ton of pollutants into the lake in 1 year, are made available for sale to producers each year. The supply of these pollution rights is fixed and therefore perfectly inelastic, as shown in Figure 5.4.

The demand for pollution rights, represented by D_{2008} in the figure, takes the same downsloping form as the demand for any other input. At higher prices there is less pollution, as polluters either stop polluting or pollute less by acquiring pollution-abatement equipment. An equilibrium market price for pollution rights, here \$100, will be determined at which the environment-preserving quantity of pollution rights is rationed to polluters. Figure 5.4 shows that if the use of the lake as a dump site for pollutants were instead free, 750 tons of pollutants would be discharged into the lake; it would be "overconsumed," or polluted, in the amount of 250 tons.

Over time, as human and business populations expand, demand will increase, as from D_{2008} to D_{2018} . Without a market for pollution rights, pollution in 2018 would be 1000 tons, 500 tons beyond what can be assimilated by nature. With the market for pollution rights, the price would rise from \$100 to \$200, and the amount of pollutants would remain at 500 tons—the amount that the lake can recycle.

Advantages This scheme has several advantages over direct controls. Most important, it reduces society's costs by allowing pollution rights to be bought and sold.

FIGURE 5.4 A market for pollution rights. The supply of pollution rights *S* is set by the government, which determines that a specific body of water can safely recycle 500 tons of waste. In 2008, the demand for pollution rights is D_{2008} and the 1-ton price is \$100. The quantity of pollution is 500 tons, not the 750 tons it would have been without the pollution rights. Over time, the demand for pollution rights increases to D_{2018} and the 1-ton price rises to \$200. But the amount of pollution stays at 500 tons, rather than rising to 1000 tons.



This trading of pollution rights is the "trade" portion of the "cap-and-trade" terminology given to this type of scheme. Let's see how this cost reduction works. Assume that the present equilibrium price of pollution rights is \$100, as shown by the intersection of the supply curve and demand curve (2008) in Figure 5.4. Next, suppose that the pollution in question is some specific noxious discharge into Metropolitan Lake. Suppose that it costs Acme Pulp Mill \$20 a year to reduce this pollution by 1 ton while it costs Zemo Chemicals \$800 a year to accomplish the same 1-ton reduction. Also assume that Zemo wants to expand production but doing so will increase its pollution discharge by 1 ton.

Without a market for pollution rights, Zemo would have to use \$800 of society's scarce resources to keep the 1-ton pollution discharge from occurring. But with a market for pollution rights, Zemo has a better option: It buys 1 ton of pollution rights for the \$100 price shown in Figure 5.4. Acme is willing to sell Zemo 1 ton of pollution rights for \$100 because that amount is more than Acme's \$20 cost of reducing its pollution by 1 ton. Zemo increases its discharge by 1 ton; Acme reduces its discharge by 1 ton. Zemo benefits by paying \$100 for something that would otherwise cost \$800. Acme benefits by selling something for \$100 that costs only \$20 to "produce." Society saves \$780. Rather than using \$800 of its scarce resources to hold the discharge at the specified level, society uses only \$20 of those resources.

Market-based plans have other advantages. Potential polluters have a monetary incentive not to pollute because they must pay for the right to discharge effluent. Conservation groups can fight pollution by buying up and withholding pollution rights, thereby reducing pollution below governmentally determined standards. As the demand for pollution rights increases over time, the growing revenue from the sale of a fixed quantity of pollution rights could be devoted to environmental improvement. At the same time, the rising price of pollution rights should stimulate the search for improved pollution-control techniques.

APPLYING THE ANALYSIS

Reducing Greenhouse Gases

Climate change, to the extent it is caused by human-generated greenhouse gases, is a negative externality problem. Suggested policies to reduce carbon emissions, a major greenhouse gas, include carbon taxes and a cap-and-trade program.

A tax imposed on each ton of carbon emitted would increase the marginal cost of production to all firms that release carbon into the air through their production processes. Because of the added marginal cost, the supply curves within affected markets would shift to the left (as illustrated by the move from S to S_t in Figure 5.1). The reduced market supply would increase equilibrium price and reduce equilibrium quantity. With the lower output, carbon, emissions in these industries would fall.

A carbon tax would require minimum government interference in the economy once the tax was in place. The Federal government could direct the revenues from the tax to research on cleaner production technologies or simply use the new revenues to reduce other taxes. But there would be no free lunch here: According to a 2007 study, a proposed \$15 tax per ton of carbon emitted would add an estimated 14 cents to a gallon of gasoline, \$1.63 to a kilowatt hour of electricity, \$28.50 to a ton of coal, and \$6.48 to a barrel of crude oil.

An alternative approach is a cap-and-trade program, based on the concepts embodied within Figure 5.4. As it currently does with sulfur dioxide emissions, the Federal government could place a cap or lid on total carbon emissions and then either hand out emission rights or auction them off. In ways previously discussed, the cap-and-trade program would reduce society's overall cost of lowering carbon emissions. In that regard, it would be more efficient than direct controls requiring each producer of greenhouse gas to reduce emissions by a fixed percentage amount. Existing cap-and-trade programs—including current European markets for carbon certificates—prove that this program can work. But such programs require considerable government oversight and enforcement of the rules.

Question:

Why would rising prices of emission rights increase the incentive for firms to use cleaner production methods?

Financing the Public Sector: Taxation

How are resources reallocated from the production of private goods to the production of public goods (and quasi-public goods)? How are government programs to deal with externalities funded? If the resources of the economy are fully employed, government must free up resources from the production of private goods and make them available for producing public and quasi-public goods. It does so by reducing the demand for private goods. And it does that by levying taxes on households and businesses, taking some of their income out of the circular flow. With lower incomes and therefore reduced purchasing power, households and businesses must curtail their spending.

As a result, the private demand for goods and services declines, as does the private demand for resources. So by diverting purchasing power from private spenders to government, taxes remove resources from private use.

Government then spends the tax proceeds to provide public and quasi-public goods and services. Taxation releases resources from the production of private consumer goods (food, clothing, television sets) and private investment goods (printing presses, boxcars, warehouses). Government shifts those resources to the production of public and quasi-public goods (post offices, submarines, parks), changing the composition of the economy's total output.

Apportioning the Tax Burden

Once government has decided on the total tax revenue it needs to finance its activities, including the provision of public and quasi-public goods, it must determine how to apportion the tax burden among the citizens. (By "tax burden" we mean the total cost of taxes imposed on society.) This apportionment question affects each of us. The overall level of taxes is important, but the average citizen is much more concerned with his or her share of taxes.

benefits-received principle

The idea that people who receive the benefits from governmentprovided goods and services should pay the taxes required to finance them.

ability-to-pay principle

The idea that people who have greater income should pay a greater proportion of it as taxes than those who have less income.

Benefits Received versus Ability to Pay

Two basic philosophies coexist on how the economy's tax burden should be assigned.

Benefits-Received The **benefits-received principle** of taxation states that households and businesses should purchase the goods and services of government in the same way they buy other commodities. Those who benefit most from government-supplied goods or services should pay the taxes necessary to finance them. A few public goods are now financed on this basis. For example, money collected as gasoline taxes is typically used to finance highway construction and repairs. Thus people who benefit from good roads pay the cost of those roads. Difficulties immediately arise, however, when we consider widespread application of the benefits-received principle:

- How will the government determine the benefits that individual households and businesses receive from national defense, education, the court system, and police and fire protection? Recall that public goods are characterized by nonrivalry and nonexcludability. So benefits from public goods are especially widespread and diffuse. Even in the seemingly straightforward case of highway financing it is difficult to measure benefits. Good roads benefit the owners of cars in different degrees. But others also benefit. For example, businesses benefit because good roads bring them workers and customers.
- Government cannot logically apply the benefits-received principle to some government programs such as "safety net" programs. It would be absurd to ask poor families to pay the taxes needed to finance their welfare payments. It would be ridiculous to think of taxing only unemployed workers to finance the unemployment compensation payments they receive.

Ability to Pay The **ability-to-pay principle** of taxation states that government should apportion the tax burden according to taxpayers' income. In the United States this means that individuals and businesses with larger incomes should pay more taxes in both absolute and relative terms than those with smaller incomes.

The rationale of ability-to-pay taxation is the proposition that each additional dollar of income received by a household yields a smaller amount of satisfaction or marginal utility when it is spent. Because consumers act rationally, the first dollars of income received in any time period will be spent on high-urgency goods that yield the greatest marginal utility. Successive dollars of income will go for less urgently needed goods and finally for trivial goods and services. This means that a dollar taken through taxes from a poor person who has few dollars represents a greater utility sacrifice than a dollar taken through taxes from a rich person who has many dollars. To balance the sacrifices that taxes impose on income receivers, taxes should be apportioned according to the amount of income a taxpayer receives.

This argument is appealing, but application problems arise here too. Although we might agree that the household earning \$100,000 per year has a greater ability to pay taxes than a household receiving \$10,000, we don't know exactly how much more ability to pay the first family has. Should the wealthier family pay the same percentage of its larger income, and hence a larger absolute amount, as taxes? Or should it be made to pay a larger fraction of its income as taxes? And how much larger should that fraction be? Who is to decide?

There is no scientific way of making utility comparisons among individuals and thus of measuring someone's relative ability to pay taxes. That is the main problem. In practice, the solution hinges on guesswork, expediency, the tax views of the political party in power, and how urgently the government needs revenue.

Progressive, Proportional, and Regressive Taxes

Any discussion of taxation leads ultimately to the question of tax rates. The **marginal tax rate** is the rate paid on each additional dollar of income (or purchases). The **average tax rate** is the total tax paid as a percentage of income.

Taxes are classified as progressive, regressive, or proportional taxes, depending on the relationship between average tax rates and taxpayer incomes. We focus on incomes because all taxes, whether on income or on a product or a building or a parcel of land, are ultimately paid out of someone's income.

- A tax is **progressive** if its average rate increases as income increases. Such a tax claims not only a larger absolute (dollar) amount but also a larger percentage of income as income increases.
- A tax is **regressive** if its average rate declines as income increases. Such a tax takes a smaller proportion of income as income increases. A regressive tax may or may not take a larger absolute amount of income as income increases. (You may want to derive an example to substantiate this conclusion.)
- A tax is proportional if its average rate remains the same regardless of the size of income.

We can illustrate these ideas with the personal income tax. Suppose tax rates are such that a household pays 10 percent of its income in taxes regardless of the size of its income. This is a proportional income tax. Now suppose the rate structure is such that a household with an annual taxable income of less than \$10,000 pays 5 percent in income taxes; a household with an income of \$10,000 to \$19,999 pays 10 percent; one with a \$20,000 to \$29,999 income pays 15 percent; and so forth. This is a progressive income tax. Finally, suppose the rate declines as taxable income rises: You pay 15 percent if you earn less than \$10,000; 10 percent if you earn \$10,000 to \$19,999; 5 percent if you earn \$20,000 to \$29,999; and so forth. This is a regressive income tax.

In general, progressive taxes are those that fall relatively more heavily on people with high incomes; regressive taxes are those that fall relatively more heavily on the poor.

Tax Progressivity in the United States

The progressivity or regressivity of taxes varies by type of tax in the United States. As shown in Table 5.3, the Federal *personal income tax* is progressive. Marginal tax rates (column 2)—those assessed on additional income—ranged from 10 to 35 percent in 2008. Rules that allow individuals to deduct from income interest on home mortgages

(l) Total Taxable Income	(2) Marginal Tax Rate, %	(3) Total Tax on Highest Income in Bracket	(4) Average Tax Rate on Highest Income in Bracket, % (3) ÷ (1)
\$1-\$16,050	10.0	\$ 1610	10
\$16,051-\$65,100	15.0	8963	14
\$65,101-\$131,450	25.0	25,550	19
\$131,451-\$200,300	28.0	44,828	22
\$200,301-\$375,700	33.0	96,770	27
Over \$375,700	35.0		

* For a married couple filing a joint return.

marginal tax rate

The tax rate paid on each additional dollar of income.

average tax rate

The total tax paid divided by total taxable income, as a percentage.

progressive tax

A tax whose average tax rate increases as the taxpayer's income increases.

regressive tax

A tax whose average tax rate decreases as the taxpayer's income increases.

proportional tax

A tax whose average tax rate remains constant as the taxpayer's income increases.

TABLE 5.3

Federal Personal Income Tax Rates, 2008* and property taxes and that exempt interest on state and local bonds from taxation tend to make the tax less progressive than these marginal rates suggest. Nevertheless, average tax rates (column 4) rise with income.

At first thought, a *general sales tax* with, for example, a 5 percent rate would seem to be proportional. But in fact it is regressive with respect to income (rather than purchases). A larger portion of a low-income person's income is exposed to the tax than is the case for a high-income person; the rich pay no tax on the part of income that is saved, whereas the poor are unable to save. Example: "Low-income" Smith has an income of \$15,000 and spends it all. "High-income" Jones has an income of \$300,000 but spends only \$200,000 and saves the rest. Assuming a 5 percent sales tax applies to all expenditures of each individual, we find that Smith pays \$750 (= 5 percent of \$15,000) in sales taxes and Jones pays \$10,000 (= 5 percent of \$200,000). But Smith pays \$750/\$15,000, or 5 percent of income, as sales taxes, while Jones pays \$10,000/\$300,000, or 3.3 percent of income. The general sales tax therefore is regressive.

The Federal *corporate income tax* is essentially a proportional tax with a flat 35 percent tax rate. In the short run, the corporate owners (shareholders) bear the tax through lower dividends and share values. In the long run, workers may bear some of the tax since it reduces the return on investment and therefore slows capital accumulation. It also causes corporations to relocate to other countries that have lower tax rates. With less capital per worker, U.S. labor productivity may decline and wages may fall. To the extent this happens, the corporate income tax may be somewhat regressive.

Payroll taxes (Social Security and Medicare) are regressive because the Social Security tax applies to only a fixed amount of income. For example, in 2008 the Social Security tax rate was 6.2 percent, but only of the first \$102,000 of a person's wage income. The Medicare tax was 1.45 percent of all wage income. Someone earning exactly \$102,000 would pay \$7803, or 7.65 percent (6.2 percent + 1.45 percent) of his or her income. Someone with twice that wage income, or \$204,000, would pay \$9282 (= \$7803 on the first \$102,000 + \$1479 on the second \$102,000), which is only 5 percent of his or her wage income. So the average payroll tax falls as income rises, confirming that the payroll tax is regressive.

Most economists conclude that *property taxes* on buildings are regressive for the same reasons as are sales taxes. First, property owners add the tax to the rents they charge tenants. Second, property taxes, as a percentage of income, are higher for low-income families than for high-income families because the poor must spend a larger proportion of their incomes for housing. This alleged regressivity of property taxes may be increased by differences in property-tax rates from locality to locality. In general, property-tax rates are higher in poorer areas, to make up for lower property values.

Is the overall U.S. tax structure—Federal, state, and local taxes combined progressive, proportional, or regressive? This question is difficult to answer. Estimates of the distribution of the total tax burden depend on the extent to which the various taxes are shifted to others, and who bears the ultimate burden is subject to dispute. But the majority view of economists is as follows:

• The Federal tax system is progressive. In 2005 (the latest year for which data have been compiled), the 20 percent of households with the lowest income paid an average Federal tax rate (on Federal income, payroll, and excise taxes) of 4.3 percent. The 20 percent with the highest income paid a 25.5 percent average rate; the top 10 percent paid 27.4 percent; and the top 1 percent paid 31.2 percent.¹

¹*Historical Effective Federal Tax Rates, 1979–2005,* Congressional Budget Office, December 2007.

- The state and local tax structures are largely regressive. As a percentage of income, property taxes and sales taxes fall as income rises. Also, state income taxes are generally less progressive than the Federal income tax.
- The overall U.S. tax system is slightly progressive. Higher-income people carry a slightly larger tax burden, as a percentage of their income, than do lower-income people.

Government's Role: A Qualification

Along with providing public goods and correcting externalities, government's economic role includes setting the rules and regulations for the economy, redistributing income when desirable, and taking macroeconomic actions to stabilize the economy.

Government does not have an easy task in performing its economic functions. In a democracy, government undertakes its economic role in the context of politics. To serve the public, politicians need to get elected. To stay elected, officials (presidents, senators, representatives, mayors, council members, school board members) need to satisfy their particular constituencies. At best, the political realities complicate government's role in the economy; at worst, they sometimes produce undesirable economic outcomes.

In the political context, some public goods and quasi-public goods may get produced not because their benefits exceed their costs but because their benefits accrue to firms located in states served by powerful elected officials. Inefficiency can easily creep into government activities because of the lack of a profit incentive to hold down costs. Indeed, the failure of programs to achieve their goals may simply lead to calls for more funding for the failed programs. Policies to correct negative externalities can be politically blocked by the very parties that are producing the spillovers. Overregulation can occur in some cases; underregulation, in others. Income can be redistributed to such an extent that incentives to work, save, and invest suffer. In short, the economic role of government, although critical to a well-functioning economy, is not always perfectly carried out.

Summary

- 1. Private goods are distinguished by rivalry (in consumption) and excludability. One person's purchase and consumption of a private good precludes others from also buying and consuming it. Producers can exclude nonpayers (free riders) from receiving the benefits. Competitive markets usually ensure that private goods are (a) available, (b) produced at minimum average cost, and (c) produced and sold in the "right" amounts.
- 2. Public goods are distinguished by nonrivalry (in consumption) and nonexcludability. Public goods are not profitable to private firms because nonpayers (free riders) can obtain and consume those goods. Only government is willing to provide desirable public goods.
- 3. The collective demand schedule for a particular public good is found by summing the prices that each individual is willing to pay for an additional unit. The optimal quantity of a public good occurs where the society's willingness to pay for

the last unit—the marginal benefit of the good—equals the marginal cost of the good.

- 4. Cost-benefit analysis can provide guidance as to the economic desirability and optimal scope of public goods output.
- 5. Externalities cause the equilibrium output of certain goods to vary from their optimal output. Negative externalities (spillover costs) result in an overallocation of resources, which society can correct through private bargaining, legislation, or specific taxes. Positive externalities (spillover benefits) are accompanied by an underallocation of resources, which society can correct through private bargaining, subsidies to consumers, subsidies to producers, or government provision.
- 6. The Coase theorem holds that private bargaining is capable of solving potential externality problems where (a) the property rights are clearly defined, (b) the number of people involved is small, and (c) bargaining costs are negligible.

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- Price, Quantity, and Efficiency
 - 7. Clearly established property rights and liability rules enable private lawsuits that can prevent or remedy some negative externalities. Lawsuits, however, can be costly, time-consuming, and of uncertain result.
 - 8. Direct controls and specific taxes can improve resource allocation in situations where negative externalities affect many people and community resources. Both direct controls (for example, smokestack emission standards) and specific taxes (for example, taxes on firms producing toxic chemicals) increase production costs and raise product price. As product price rises, the externality declines because less of the output is produced and purchased.
 - 9. Markets for pollution rights, where firms can buy and sell the right to discharge a fixed amount of pollution, put a price on pollution and encourage firms to reduce or eliminate it. Markets for such rights (or "tradable credits") currently exist under terms of U.S. antipollution laws.

- 10. Government reallocates resources from the private sector to the public sector through taxation, which decreases after-tax income and therefore reduces the demand for private goods. Government then uses the tax revenues to finance the provision of public goods and quasi-public goods.
- 11. The benefits-received principle of taxation states that those who receive the benefits of goods and services provided by government should pay the taxes required to finance them. The ability-to-pay principle states that those who have greater income should be taxed more, absolutely and relatively, than those who have less income.
- 12. The Federal income tax is progressive (average tax rate rises as income rises). The corporate income tax is roughly proportional (average tax rate remains constant as income rises). General sales, excise, payroll, and property taxes are regressive (average tax rate falls as income rises). Overall, the U.S. tax system is slightly progressive.

Terms and Concepts

market failure
private goods
productive efficiency
allocative efficiency
public goods
free-rider problem

cost-benefit analysis negative externalities positive externalities Coase theorem quasi-public goods benefits-received principle ability-to-pay principle marginal tax rate average tax rate progressive tax regressive tax proportional tax

Study Questions Economics

- 1. Use the characteristics of private goods to explain why firms can profitably offer them for sale. Why do competitive firms tend to produce private goods at minimum average cost? What do economists mean when they say that private goods tend to be produced in the "right" amounts? LOI
- Contrast the characteristics of public goods with those of private goods. Why won't private firms produce public goods? LOI
- 3. The accompanying table relating to a public good provides information on the prices Young and Zorn are willing to pay for various quantities of that public good. These two people are the only members of society. Determine the price that society is willing to pay for the public good at each quantity of output. If the government's marginal cost of providing this public good is constant at \$7, how many units of the public good should government provide? Why not less? Why not more? LO2

ung	Zo	orn	Socie	ty
Qd	Р	Qd	Р	Qd
0	\$8	I.	\$	L
0	7	2		2
0	6	3		3
I.	5	4		4
2	4	5		5
3	3	6		6
4	2	7		7
5	I.	8		8
	2 0 0 0 1 2 3 4 5	ung Zo Qa P 0 \$8 0 7 0 6 1 5 2 4 3 3 4 2 5 I	Zorn Qd P Qd 0 \$8 1 0 7 2 0 6 3 1 5 4 2 4 5 3 3 6 4 2 7 5 1 8	Zorn Socie Q _d P Q _d P 0 \$8 1 \$ 0 7 2 0 6 3 1 5 4 2 4 5 3 3 6 4 2 7 5 1 8

4. The table below shows the total costs and total benefits in billions for four different antipollution programs of increasing scope. Use cost-benefit analysis to determine which program should be undertaken. Explain. **LO2**

Program	Total Cost	Total Benefit	
А	\$ 3	\$ 7	
В	7	12	
С	12	16	
D	18	19	

- 5. Why are negative externalities and positive externalities also called spillover costs and spillover benefits? Show graphically how a tax can correct for a negative externality and how a subsidy to producers can correct for a positive externality. How does a subsidy to consumers differ from a subsidy to producers in correcting for a positive externality? LO3
- **6.** An apple grower's orchard provides nectar to a neighbor's bees, while the beekeeper's bees help the apple grower by pollinating the apple blossoms. Use Figure 5.1b to explain why this situation of dual positive externalities might lead to an underallocation of resources to apple growing and to beekeeping. How might this underallocation get resolved via the means suggested by the Coase theorem? **LO3**
- 7. Explain: "Without a market for pollution rights, dumping pollutants into the air or water is costless; in the presence of the right to buy and sell pollution rights, dumping pollutants creates an opportunity cost for the polluter." What is the significance of this opportunity cost to the search for better technology to reduce pollution? LO3
- 8. Explain the following statement, using cost-benefit analysis: "The optimal amount of pollution abatement for some substances, say, water from storm drains, is very low; the

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. optimal amount of abatement for other substances, say, cyanide poison, is close to 100 percent." **LO3**

- **9.** Explain how marketable emission credits add to overall economic efficiency, compared to across-the-board limitations on maximum discharges of air pollutants by firms. **LO3**
- 10. Contrast the benefits-received and ability-to-pay principles of taxation. Which of the following taxes mainly adhere to the benefits-received principle? Which mainly to the ability-to-pay principle? LO4
 - **a.** An admission tax on tickets to sporting events at public stadiums.
 - **b.** The Federal personal income tax.
 - **c.** A sales tax applied only to certain luxury goods such as expensive automobiles, yachts, and private airplanes.
 - **d.** A toll charge required for driving on a public highway.
 - e. The Federal and state gasoline tax.
- 11. Suppose in Fiscalville there is no tax on the first \$10,000 of income, but a 20 percent tax on earnings between \$10,001 and \$20,000 and a 30 percent tax on income between \$20,001 and \$30,000. Any income above \$30,000 is taxed at 40 percent. If your income is \$50,000, how much will you pay in taxes? Determine your marginal and average tax rates. Is this a progressive tax? Explain. LO5

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Also, you will find one or more Web-based questions that require information from the Internet to answer.



PART THREE Product Markets

- **6 BUSINESSES AND THEIR COSTS**
- 7 PURE COMPETITION
- 8 PURE MONOPOLY
- 9 MONOPOLISTIC COMPETITION AND OLIGOPOLY



IN THIS CHAPTER YOU WILL LEARN:

- I The features of the corporate form of business organization that have made it so dominant.
- 2 Why economic costs include both explicit (revealed and expressed) costs and implicit (present but not obvious) costs.
- 3 How the law of diminishing returns relates to a firm's short-run production costs.
- 4 The distinctions between fixed and variable costs and among total, average, and marginal costs.
- 5 The link between a firm's size and its average costs in the long run.

Businesses and Their Costs

In market economies, a wide variety of businesses produce an even greater variety of goods and services. Each of those businesses needs economic resources in order to produce its product. In obtaining and using resources, a business makes monetary payments to resource owners (for example, workers) and incurs opportunity costs when using resources that it already owns (for example, entrepreneurial talent). Those payments and opportunity costs constitute the firm's *costs of production*.

This chapter describes the U.S. business population and identifies the costs faced by firms in producing products. Then, in the next several chapters, we bring demand, product price, and revenue into the analysis and explain how businesses compare revenues and costs to decide how much to produce. Our ultimate purpose is to show how those comparisons relate to profits, losses, and allocative efficiency.

The Business Population

Like households, businesses are a major element in the circular flow diagram that we discussed in Chapter 2. In discussing businesses, it will be useful to distinguish among a plant, a firm, and an industry:

- A *plant* is an establishment—a factory, farm, mine, store, Web site, or warehouse—that performs one or more functions in fabricating and distributing goods and services.
- A *firm* is an organization that employs resources to produce goods and services for profit and operates one or more plants.
- An *industry* is a group of firms that produce the same, or similar, products.

The organizational structures of firms are often complex and varied. *Multiplant firms* may be organized horizontally, with several plants performing much the same function. Examples are the multiple bottling plants of Coca-Cola and the many individual Wal-Mart stores. Firms also may be *vertically integrated*, meaning they own plants that perform different functions in the various stages of the production process. For example, oil companies such as Shell own oil fields, refineries, and retail gasoline stations. Some firms are *conglomerates*, so named because they have plants that produce products in several separate industries. For example, Pfizer makes prescription medicines (Lipitor, Viagra) but also chewing gum (Trident, Dentyne), razors (Schick), cough drops (Halls), breath mints (Clorets, Certs), and antacids (Rolaids).

The business population ranges from giant corporations such as Wal-Mart, Exxon, and IBM, with hundreds of thousands of employees and billions of dollars of annual sales, to neighborhood specialty shops with one or two employees and daily sales of only a few hundred dollars. As shown in Figure 2.3 (page 45), only 20 percent of U.S. firms are corporations, yet they account for 84 percent of all sales (output).

Advantages of Corporations

Certain advantages of the corporate form of business enterprise have catapulted it into a dominant sales and profit position in the United States. The corporation is by far the most effective form of business organization for raising money to finance the expansion of its facilities and capabilities. The corporation employs unique methods of finance the selling of stocks and bonds—that enable it to pool the financial resources of large numbers of people.

A common **stock** represents a share in the ownership of a corporation. The purchaser of a stock certificate has the right to vote for corporate officers and to share in dividends. If you buy 1000 of the 100,000 shares issued by OutTell, Inc., (OT) then you own 1 percent of the company, are entitled to 1 percent of any dividends declared by the board of directors, and control 1 percent of the votes in the annual election of corporate officials.

In contrast, a corporate **bond** does not bestow any corporate ownership on the purchaser. A bond purchaser is simply lending money to a corporation. A bond is an IOU, in acknowledgment of a loan, whereby the corporation promises to pay the holder a fixed amount set forth on the bond at some specified future date and other fixed amounts (interest payments) every year up to the bond's maturity date. For example, you might purchase a 10-year OutTell bond with a face value of \$1000 and a 5 percent rate of interest. This means that, in exchange for your \$1000, OT promises you a \$50 interest payment for each of the next 10 years and then repays your \$1000 principal at the end of that period.

Financing through sales of stocks and bonds also provides other advantages to those who purchase these *corporate securities*. An individual investor can spread risks by buying the securities of several corporations. And it is usually easy for holders of corporate securities to sell their holdings. Organized stock exchanges and bond markets simplify the transfer of securities from sellers to buyers. This "ease of sale" increases the willingness

stocks

Ownership shares of a corporation.

bonds

Certificates indicating obligations to pay the principal and interest on loans at a specific time in the future. of savers to make financial investments in corporate securities. Besides, corporations have easier access to bank credit than do other types of business organizations. Corporations are better risks and are more likely to become profitable clients of banks.

Corporations provide **limited liability** to owners (stockholders), who risk only what they paid for their stock. Their personal assets are not at stake if the corporation defaults on its debts. Creditors can sue the corporation as a legal entity but cannot sue the owners of the corporation as individuals.

Because of their ability to attract financial capital, successful corporations can easily expand the scope of their operations and realize the benefits of expansion. For example, they can take advantage of mass-production technologies and division of labor. A corporation can hire specialists in production, accounting, and marketing functions and thus improve efficiency.

As a legal entity, the corporation has a life independent of its owners and its officers. Legally, at least, corporations are immortal. The transfer of corporate ownership through inheritance or the sale of stock does not disrupt the continuity of the corporation. Corporations have permanence that lends itself to long-range planning and growth.

The Principal-Agent Problem

Many of the world's corporations are extremely large. In 2007, 351 of the world's corporations had annual sales of more than \$20 billion, 121 firms had sales exceeding \$50 billion, and 30 firms had sales greater than \$100 billion. U.S.-based Wal-Mart alone had sales of \$351 billion in 2007.

But large size creates a potential problem. In sole proprietorships and partnerships, the owners of the real and financial assets of the firm enjoy direct control of those assets. But ownership of large corporations is spread over tens or hundreds of thousands of stockholders. The owners of a corporation usually do not manage it they hire others to do so.

That practice can create a **principal-agent problem.** The *principals* are the stockholders who own the corporation and who hire executives as their *agents* to run the business on their behalf. But the interests of these managers (the agents) and the wishes of the owners (the principals) do not always coincide. The owners typically want maximum company profit and stock price. However, the agents may want the power, prestige, and pay that often accompany control over a large enterprise, independent of its profitability and stock price.

So a conflict of interest may develop. For example, executives may build expensive office buildings, enjoy excessive perks such as corporate jets, and pay too much to acquire other corporations. Consequently, the firm's costs will be excessive, and the firm will fail to maximize profits and stock prices for its owners. limited liability

Restriction of the maximum loss to a shareholder to the amount paid for the stock.

ORIGIN OF THE IDEA

O 6.1 Principal-agent problem

principal-agent problem

A conflict of interest that occurs when agents (managers) pursue their own objectives to the detriment of the principals' (stockholders') goals.

Unprincipled Agents

In the 1990s many corporations addressed the principal-agent problem by providing a substantial part of executive pay either as shares of the firm's stock or as stock options. *Stock options* are contracts that allow executives or other key employees to buy shares of their employers' stock at fixed, lower prices when the APPLYING THE ANALYSIS stock prices rise. The idea was to align the interest of the executives and other key employees more closely with those of the broader corporate owners. By pursuing high profits and share prices, the executives would enhance their own wealth as well as that of all the stockholders.

This "solution" to the principal-agent problem had an unexpected negative side effect. It prompted a few unscrupulous executives to inflate their firm's share prices by hiding costs, overstating revenues, engaging in deceptive transactions, and, in general, exaggerating profits. These executives then sold large quantities of their inflated stock, making quick personal fortunes. In some cases, "independent" outside auditing firms turned out to be "not so independent" because they held valuable consulting contracts with the firms being audited.

When the stock market bubble of the late 1990s burst, many instances of business manipulations and fraudulent accounting were exposed. Several executives of large U.S. firms were indicted, and a few large firms collapsed, among them Enron (energy trading), WorldCom (communications), and Arthur Andersen (business consulting). General stockholders of those firms were left holding severely depressed or even worthless stock.

In 2002 Congress strengthened the laws and penalties against executive misconduct. Also, corporations have improved their accounting and auditing procedures. But the revelations of recent wrongdoings make it clear that the principal-agent problem is not an easy problem to solve.

Question:

Why are accurate accounting and independent auditing so crucial in reducing the principalagent problem?

Economic Costs

Costs exist because resources are scarce and productive and have alternative uses. When society uses a specific combination of resources to produce some product, it forgoes all alternative opportunities to use those resources for other purposes. The measure of the economic cost, or opportunity cost, of any resource is the value or worth it would have in its best alternative use. We stressed this view of costs in our analysis of production possibilities in Chapter 1, where we found that the opportunity cost of producing more food products is the manufacturing equipment that must be forgone. Similarly, the paper used for printing economics textbooks is not available for printing encyclopedias or romance novels. And if an assembly-line worker is capable of assembling personal computers or washing machines, then the cost to society of employing that worker in a computer plant is the contribution he or she would otherwise have made in producing washing machines.

Explicit and Implicit Costs

Now let's consider costs from the viewpoint of a typical firm. Keeping opportunity costs in mind, we can say that *economic costs are the payments a firm must make*, or the incomes it must provide, to attract the resources it needs away from alternative production opportunities. Those payments to resource suppliers are explicit (revealed and expressed) or implicit (present but not obvious). So in producing products firms incur explicit costs and implicit costs.

- A firm's **explicit costs** are the monetary payments (or cash expenditures) it makes to those who supply labor services, materials, fuel, transportation services, and the like. Such money payments are for the use of resources owned by others.
- A firm's **implicit costs** are the opportunity costs of using its self-owned, self-employed resources. To the firm, implicit costs are the money payments that self-employed resources could have earned in their best alternative use.

Example: Suppose you are earning \$22,000 a year as a sales representative for a T-shirt manufacturer. At some point you decide to open a retail store of your own to sell T-shirts. You invest \$20,000 of savings that have been earning you \$1000 per year. And you decide that your new firm will occupy a small store that you own and have been renting out for \$5000 per year. You hire one clerk to help you in the store, paying her \$18,000 annually.

A year after you open the store, you total up your accounts and find the following:

Total sales revenue	\$120,000
Cost of T-shirts	\$40,000
Clerk's salary	
Utilities	
Total (explicit) costs	
Accounting profit	

explicit costs

The monetary payments a firm must make to an outsider to obtain a resource.

implicit costs

The monetary income a firm sacrifices when it uses a resource it owns rather than supplying the resource in the market.

It looks good. You have an accounting profit of \$57,000. A firm's accounting profit is what remains after it has paid individuals and other firms for the materials, capital, and labor they have supplied. But unfortunately your \$57,000 accounting profit ignores your implicit costs and thus overstates the economic success of your venture. By providing your own financial capital, building, and labor, you incur implicit costs (forgone incomes) of \$1000 of interest, \$5000 of rent, and \$22,000 of wages. If your entrepreneurial talent is worth, say, \$5000 annually in other business endeavors of similar scope, you have also ignored that implicit cost. So:

Accounting profit	\$57,000
Forgone interest	\$ 1,000
Forgone rent	5,000
Forgone wages	
Forgone entrepreneurial income	5,000
Total implicit costs	
Economic profit	\$24,000

Normal Profit as a Cost

The \$5000 implicit cost of your entrepreneurial talent in the above example is a **normal profit.** As is true of the forgone rent and forgone wages, the payment you could otherwise receive for performing entrepreneurial functions is indeed an implicit cost. If you did not realize at least this minimum, or normal, payment for your effort, you could withdraw from this line of business and shift to a more attractive endeavor. So a normal profit is a cost of doing business.

The economist includes as costs of production all the costs—explicit and implicit, including a normal profit—required to attract and retain resources in a specific line of production. For economists, a firm's economic costs are the opportunity costs of the resources used, whether those resources are owned by others or by the firm. In our example, economic costs are \$96,000 (=\$63,000 of explicit costs + \$33,000 of implicit costs).

Economic Profit (or Pure Profit)

Obviously, then, economists use the term "profit" differently from the way accountants use it. To the accountant, profit is the firm's total revenue less its explicit costs

normal profit

A payment that must be made by a firm to obtain and retain entrepreneurial ability.

economic profit

A firm's total revenue less its total cost (= explicit cost + implicit cost).

WORKED PROBLEMS

W 6.1 Economic profit

(or accounting costs). To the economist, **economic profit** is total revenue less economic costs (explicit and implicit costs, the latter including a normal profit to the entrepreneur). So when an economist says a certain firm is earning only enough revenue to cover its costs, this means it is meeting all explicit and implicit costs and the entrepreneur is receiving a payment just large enough to retain his or her talents in the present line of production.

If a firm's total revenue exceeds all its economic costs (explicit + implicit), any residual goes to the entrepreneur. That residual is called an *economic*, or *pure*, *profit*. In short:

Economic profit = total revenue – economic cost

In our example, economic profit is \$24,000, found by subtracting the \$96,000 of economic cost from the \$120,000 of revenue. An *economic* profit is not a cost, because it is a return in excess of the normal profit that is required to retain the entrepreneur in this particular line of production. Even if the economic profit is zero, the entrepreneur is still covering all explicit and implicit costs, including a normal profit. In our example, as long as accounting profit is \$33,000 or more (so economic profit is zero or more), you will be earning a \$5000 normal profit and will therefore continue to operate your T-shirt store.

Figure 6.1 shows the relationship among the various cost and profit concepts that we have just discussed. To test yourself, you might want to enter cost data from our example in the appropriate blocks.

Short Run and Long Run

When the demand for a firm's product changes, the firm's profitability may depend on how quickly it can adjust the amounts of the various resources it employs. It can easily and quickly adjust the quantities employed of many resources such as hourly labor, raw materials, fuel, and power. It needs much more time, however, to adjust its *plant capacity*—the size of the factory building, the amount of machinery and equipment, and other capital resources. In some heavy industries such as aircraft manufacturing, a firm may need several years to alter plant capacity. Because of these differences in adjustment time, economists find it useful to distinguish between two conceptual periods: the short run and the long run. We will discover that costs differ in these two time periods.

short run

A time period in which producers are able to change the quantities of some but not all of the resources they employ. **Short Run: Fixed Plant** The **short run** is a period too brief for a firm to alter its plant capacity yet long enough to permit a change in the degree to which the fixed plant is used. The firm's plant capacity is fixed in the short run. However, the firm can vary its output by applying larger or smaller amounts of labor, materials, and other resources to that plant. It can use its existing plant capacity more or less intensively in the short run.

FIGURE 6.1 Economic profit versus accounting profit. Economic profit is equal to total revenue less economic costs. Economic costs are the sum of explicit and implicit costs and include a normal profit to the entrepreneur. Accounting profit is equal to total revenue less accounting (explicit) costs.



If Boeing hires 1000 extra workers for one of its commercial airline plants or adds an entire shift of workers, we are speaking of the short run. Both are *short-run adjustments*.

Long Run: Variable Plant From the viewpoint of an existing firm, the **long run** is a period long enough for it to adjust the quantities of all the resources that it employs, including plant capacity. From the industry's viewpoint, the long run also includes enough time for existing firms to dissolve and leave the industry or for new firms to be created and enter the industry. While the short run is a "fixed-plant" period, the long run is a "variable-plant" period. If Boeing adds a new production facility or merges with a supplier, we are referring to the long run. Both are *long-run adjustments*.

long run

A time period sufficiently long to enable producers to change the quantities of all the resources they employ.



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Photo Op Long-Run Adjustments by Firms

An apparel manufacturer can make long-run adjustments to add production capacity in a matter of days by leasing another building and ordering and installing extra sewing machines. In contrast, an oil firm may need 2 to 3 years to construct a new refinery to increase its production capacity.

The short run and the long run are conceptual periods rather than calendar time periods. As indicated in the Photo Op, light-manufacturing industries can accomplish changes in plant capacity almost overnight. But for heavy industry the long run is a different matter. A firm may require several years to construct a new facility.

Short-Run Production Relationships

A firm's costs of producing a specific output depend on the prices of the needed resources and the quantities of those resources (inputs) needed to produce that output. Resource supply and demand determine resource prices. The technological aspects of production, specifically the relationships between inputs and output, determine the quantities of resources needed. Our focus will be on the *labor*-output relationship, given a fixed plant capacity. But before examining that relationship, we need to define three terms:

- Total product (TP) is the total quantity, or total output, of a particular good or service produced.
- Marginal product (MP) is the extra output or added product associated with adding a unit of a variable resource, in this case labor, to the production process. Thus,

Marginal product = $\frac{\text{change in total product}}{\text{change in labor input}}$

total product (TP)

The total output of a particular good or service produced by a firm.

marginal product (MP)

The extra output or added product associated with adding a unit of a variable resource (labor) to the production process.

average product (AP)

The total output divided by the quantity of the resource employed (labor).

law of diminishing returns

The principle that as successive units of a variable resource are added to a fixed resource, the marginal product of the variable resource will eventually decline.

ORIGIN OF THE IDEA 0 6.2 Law of diminishing returns

ILLUSTRATING THE IDEA

• Average product (AP), also called labor productivity, is output per unit of labor input:

Average product = $\frac{\text{total product}}{\text{units of labor}}$

In the short run, a firm for a time can increase its output by adding units of labor to its fixed plant. But by how much will output rise when it adds the labor? Why do we say "for a time"?

Law of Diminishing Returns

The answers are provided in general terms by the **law of diminishing returns.** This law assumes that technology is fixed and thus the techniques of production do not change. It states that as successive units of a variable resource (say, labor) are added to a fixed resource (say, capital or land), beyond some point the extra, or marginal, product that can be attributed to each additional unit of the variable resource will decline. For example, if additional workers are hired to work with a constant amount of capital equipment, output will eventually rise by smaller and smaller amounts as more workers are hired. Diminishing returns will eventually occur.

Relevancy for Firms

The law of diminishing returns is highly relevant for production within firms. As producers add successive units of a variable input such as labor to a fixed input such as capital, the marginal product of labor eventually declines. Diminishing returns will occur sooner or later. Total product eventually will rise at a diminishing rate, then reach a maximum, and finally decline.

Diminishing Returns from Study

The following noneconomic example of a relationship between "inputs" and "output" may help you better understand the idea. Suppose for an individual that

Total course learning = *f*(intelligence, quality of course materials, instructor effectiveness, class time, and study time)

where f means "function of" or "depends on." So this relationship supposes that total course learning depends on intelligence (however defined), the quality of course materials such as the textbook, the effectiveness of the instructor, the amount of class time, and the amount of personal study time outside the class.

For analytical purposes, let's assume that one's intelligence, the quality of course materials, the effectiveness of the instructor, and the amount of class time are *fixed*—meaning they do not change over the length of the course. Now let's add units of study time per day over the length of the course to "produce" greater course learning. The first hour of study time per day increases total course learning. Will the second hour enhance course learning by as much as the first? By how much will the third, fourth, fifth, . . . or fifteenth hour of study per day contribute to total course learning relative to the *immediate previous hour?*
We think you will agree that eventually diminishing returns to course learning will set in as successive hours of study are added each day. At some point the marginal product of an extra hour of study time will decline and, at some further point, become zero.

Question:

Given diminishing returns to study time, why devote any extra time to study?

What is true for study time is true for producers. Suppose a farmer has a fixed resource—80 acres of land—planted in corn. If the farmer does not cultivate the corn-fields (clear the weeds) at all, the yield will be 40 bushels per acre. If he cultivates the land once, output may rise to 50 bushels per acre. A second cultivation may increase output to 57 bushels per acre, a third to 61, and a fourth to 63. Succeeding cultivations will add less and less to the land's yield. If this were not so, the world's needs for corn could be fulfilled by extremely intense cultivation of this single 80-acre plot of land. Indeed, if diminishing returns did not occur, the world could be fed out of a flowerpot. Why not? Just keep adding more seed, fertilizer, and harvesters!

The law of diminishing returns also holds true in nonagricultural industries. Assume a wood shop is manufacturing furniture frames. It has a specific amount of equipment such as lathes, planers, saws, and sanders. If this shop hired just one or two workers, total output and productivity (output per worker) would be very low. The workers would have to perform many different jobs, and the advantages of specialization would not be realized. Time would be lost in switching from one job to another, and machines would stand idle much of the time. In short, the plant would be understaffed, and production would be inefficient because there would be too much capital relative to the amount of labor.

The shop could eliminate those difficulties by hiring more workers. Then the equipment would be more fully used, and workers could specialize in doing a single job. Time would no longer be lost switching from job to job. As more workers were added, production would become more efficient and the marginal product of each succeeding worker would rise.

But the rise could not go on indefinitely. If still more workers were added, beyond a certain point, overcrowding would set in. Since workers would then have to wait in line to use the machinery, they would be underused. Total output would increase at a diminishing rate because, given the fixed size of the plant, each worker would have less capital equipment to work with as more and more labor was hired. The marginal product of additional workers would decline because there would be more labor in proportion to the fixed amount of capital. Eventually, adding still more workers would cause so much congestion that marginal product would become negative and total product would decline. At the extreme, the addition of more and more labor would exhaust all the standing room, and total product would fall to zero.

Note that the law of diminishing returns assumes that all units of labor are of equal quality. Each successive worker is presumed to have the same innate ability, motor coordination, education, training, and work experience. Less-skilled or less-energetic workers are not the cause of diminishing returns. Rather, marginal product ultimately diminishes because more workers are being used relative to the amount of plant and equipment available.

Tabular and Graphical Representations

The table at the top of Figure 6.2 is a numerical illustration of the law of diminishing returns. Column 2 shows the total product, or total output, resulting from combining

FIGURE 6.2 The law of diminishing returns. (a) As a variable resource (labor) is added to fixed amounts of other resources (land or capital), the total product that results will eventually increase by diminishing amounts, reach a maximum, and then decline. (b) Marginal product is the change in total product associated with each new unit of labor. Average product is simply output per labor unit. Note that marginal product intersects average product at the maximum average product.

(I) Units of the Variable Resource (Labor)	(2) Total Product (TP)	(3) Marginal Product (MP), Change in (2)/ Change in (1)	(4) Average Product (AP), (2)/(1)
0	0 _	10	_
I	10	Increasing	10.00
2	25	\sim 15 returns	12.50
3	45 -	15	15.00
4	60	Diminishing	15.00
5	70	returns	14.00
6	75 -	Negative	12.50
7	75 _	marginal	10.71
8	70	returns	8.75





each level of a variable input (labor) in column 1 with a fixed amount of capital, using the existing technology.

Column 3 shows the marginal product (MP), the change in total product associated with each additional unit of labor. Note that with no labor input, total product is zero; a plant with no workers will produce no output. The first 3 units of labor reflect increasing marginal returns, with marginal products of 10, 15, and 20 units, respectively. But beginning with the fourth unit of labor, marginal product diminishes continuously, becoming zero with the seventh unit of labor and negative with the eighth.

Average product, or output per labor unit, is shown in column 4. It is calculated by dividing total product (column 2) by the number of labor units needed to produce it (column 1). At 5 units of labor, for example, AP is 14 (=70/5).

Figure 6.2 also shows the diminishing-returns data graphically and further clarifies the relationships between total, marginal, and average products. (Marginal product in Figure 6.2b is plotted halfway between the units of labor, since it applies to the addition of each labor unit.)

Note first in Figure 6.2a that total product, TP, goes through three phases: It rises initially at an increasing rate; then it increases, but at a diminishing rate; finally, after reaching a maximum, it declines.

Geometrically, marginal product—shown by the MP curve in Figure 6.2b—is the slope of the total-product curve. Marginal product measures the change in total product associated with each succeeding unit of labor. Thus, the three phases of total product are also reflected in marginal product. Where total product is increasing at an increasing rate, marginal product is rising. Here, extra units of labor are adding larger and larger amounts to total product. Similarly, where total product is increasing but at a decreasing rate, marginal product is positive but falling. Each additional unit of labor adds less to total product than did the previous unit. When total product is at a maximum, marginal product is zero. When total product declines, marginal product becomes negative.

Average product, AP (Figure 6.2b), displays the same tendencies as marginal product. It increases, reaches a maximum, and then decreases as more and more units of labor are added to the fixed plant. But note the relationship between marginal product and average product: Where marginal product exceeds average product, average product rises. And where marginal product is less than average product, average product declines. It follows that marginal product intersects average product where average product is at a maximum. WORKED PROBLEMS

W 6.2 Total, marginal, and average product

ORIGIN OF THE IDEA 0 6.3 Production relationships

Exam Scores

The relationship between "marginal" and "average" shown in Figure 6.2b is a mathematical necessity. If you add to a total a number larger than the current average of that total, the average must rise. And if you add to a total a number smaller than the current average of that total, the average must fall. You raise your average examination grade only when your score on an additional (marginal) examination is greater than the average of all your past scores. You lower your average

ILLUSTRATING THE IDEA when your grade on an additional exam is below your current average. In our production example, when the amount an extra worker adds to total product exceeds the average product of all workers currently employed, average product will rise. Conversely, when an extra worker adds to total product an amount that is less than the current average product, then average product will decrease.

Question:

Suppose your average exam score for the first three exams is 80 and you receive a 92 on your fourth exam. What is your marginal score? What is your new average score? Why did your average go up?

Short-Run Production Costs

Production information such as that in Figure 6.2 must be coupled with resource prices to determine the total and per-unit costs of producing various levels of output. We know that in the short run some resources, those associated with the firm's plant, are fixed. Other resources, however, are variable. So short-run costs are either fixed or variable.

Fixed, Variable, and Total Costs

Let's see what distinguishes fixed costs, variable costs, and total costs from one another.

Fixed Costs Fixed costs are costs that do not vary with changes in output. Fixed costs are associated with the very existence of a firm's plant and therefore must be paid even if its output is zero. Such costs as rental payments, interest on a firm's debts, a portion of depreciation on equipment and buildings, and insurance premiums are generally fixed costs; they do not increase even if a firm produces more. In column 2 of Figure 6.3's table, we assume that the firm's total fixed cost is \$100. By definition, this fixed cost is incurred at all levels of output, including zero. The firm cannot avoid paying fixed costs in the short run.

APPLYING THE ANALYSIS

Sunk Costs

Some of a firm's costs are not only *fixed* (recurring, but unrelated to the level of output) but *sunk* (unrecoverable). Such costs are like sunken ships on the ocean floor: Once these costs are incurred, they cannot be recovered. For example, suppose a firm spends \$1 million on R&D to bring out a new product, only to discover that the product sells very poorly. Should the firm continue to produce the product at a loss even when there is no realistic hope for future success? Obviously, it should not. In making this decision, the firm realizes that the amount it has spent in developing the product is irrelevant; it should stop production of the product and cut its losses. In fact, many firms have dropped products after spending millions of dollars on their development. For example, in 2007 Pfizer withdrew its novel insulin inhaler from the market because of poor sales and

fixed costs

Costs that do not change in total when the firm changes its output. concerns about long-term side effects. The product had cost an estimated \$2.8 billion to develop and market.

In short, a firm should ignore any cost that it cannot partly or fully recoup through a subsequent choice. Such costs are sunk costs. They are irrelevant in making futureoriented business decisions. Or, as the saying goes, don't cry over spilt milk.

Question:

Which is a sunk cost, rather than simply a recurring fixed cost: (1) a prior expenditure on a business computer that is now outdated or (2) a current monthly payment on an equipment lease that runs for 6 more months? Explain.

FIGURE 6.3 A firm's cost curves. AFC falls as a given amount of fixed costs is apportioned over a larger and larger output. AVC initially falls because of increasing marginal returns but then rises because of diminishing marginal returns. The marginal-cost (MC) curve eventually rises because of diminishing returns and cuts through the average-total-cost (ATC) curve and the average-variable-cost (AVC) curve at their minimum points.

	То	tal-Cost Dat	a	Av	erage-Cost Dat	a	Marginal Cost
(1)	(2) Total	(3) Total	(4)	(5) Average Fixed	(6) Average Variable	(7) Average Total Cost	(8)
Product (Q)	Cost (TFC)	Cost (TVC)	TC = TFC + TVC	$AFC = \frac{TFC}{Q}$	$AVC = \frac{TVC}{Q}$	$ATC = \frac{TC}{Q}$	$MC = \frac{\text{change in TC}}{\text{change in Q}}$
0	\$100	\$ 0	\$ 100				
I.	100	90	190	\$100.00	\$90.00	\$190.00	\$ 90
2	100	170	270	50.00	85.00	135.00	80
3	100	240	340	33.33	80.00	113.33	70
4	100	300	400	25.00	75.00	100.00	60
5	100	370	470	20.00	74.00	94.00	70
6	100	450	550	16.67	75.00	91.67	80
7	100	540	640	14.29	77.14	91.43	90
8	100	650	750	12.50	81.25	93.75	110
9	100	780	880	11.11	86.67	97.78	130
10	100	930	1030	10.00	93.00	103.00	150



variable costs

Costs that increase or decrease with a firm's output.

total cost The sum of fixed cost and variable cost.

average fixed cost (AFC) A firm's total fixed cost divided by output.

average variable cost (AVC) A firm's total variable cost divided by output. **Variable Costs** Unlike fixed costs, **variable costs** are costs that change with the level of output. They include payments for materials, fuel, power, transportation services, most labor, and similar variable resources. In column 3 of the table in Figure 6.3, we find that the total of variable costs changes directly with output.

Total Cost Total cost is the sum of fixed cost and variable cost at each level of output. It is shown in column 4 of the table in Figure 6.3. At zero units of output, total cost is equal to the firm's fixed cost. Then for each unit of the 10 units of production, total cost increases by the same amount as variable cost.

$$TC = TFC + TVC$$

The distinction between fixed and variable costs is significant to the business manager. Variable costs can be controlled or altered in the short run by changing production levels. Fixed costs are beyond the business manager's current control; they are incurred in the short run and must be paid regardless of output level.

Per-Unit, or Average, Costs

Producers are certainly interested in their total costs, but they are equally concerned with per-unit, or average, costs. In particular, average-cost data are more meaningful for making comparisons with product price, which is always stated on a per-unit basis. Average fixed cost, average variable cost, and average total cost are shown in columns 5 to 7 of the table in Figure 6.3.

AFC Average fixed cost (AFC) for any output level is found by dividing total fixed cost (TFC) by that output (*Q*). That is,

$$AFC = \frac{TFC}{Q}$$

Because the total fixed cost is, by definition, the same regardless of output, AFC must decline as output increases. As output rises, the total fixed cost is spread over a larger and larger output. When output is just 1 unit in Figure 6.3's table, TFC and AFC are the same at \$100. But at 2 units of output, the total fixed cost of \$100 becomes \$50 of AFC or fixed cost per unit; then it becomes \$33.33 per unit as \$100 is spread over 3 units, and \$25 per unit when spread over 4 units. This process is sometimes referred to as "spreading the overhead." Figure 6.3 shows that AFC graphs as a continuously declining curve as total output is increased.

AVC Average variable cost (AVC) for any output level is calculated by dividing total variable cost (TVC) by that output (Q):

$$AVC = \frac{TVC}{Q}$$

As added variable resources increase output, AVC declines initially, reaches a minimum, and then increases again. A graph of AVC is a U-shaped or saucer-shaped curve, as shown in Figure 6.3.

Because total variable cost reflects the law of diminishing returns, so must AVC, which is derived from total variable cost. Because marginal returns increase initially, it takes fewer and fewer additional variable resources to produce each of the first 4 units of output. As a result, variable cost per unit declines. AVC hits a minimum with the fifth unit of output, and beyond that point AVC rises because diminishing returns require more and more variable resources to produce each additional unit of output.

You can verify the U or saucer shape of the AVC curve by returning to the production table in Figure 6.2. Assume the price of labor is \$10 per unit. By dividing average product (output per labor unit) into \$10 (price per labor unit), we determine the labor cost per unit of output. Because we have assumed labor to be the only variable input, the labor cost per unit of output is the variable cost per unit of output, or AVC. When average product is initially low, AVC is high. As workers are added, average product rises and AVC falls. When average product is at its maximum, AVC is at its minimum. Then, as still more workers are added and average product declines, AVC rises. The "hump" of the average-product curve is reflected in the saucer or U shape of the AVC curve.

ATC Average total cost (ATC) for any output level is found by dividing total cost (TC) by that output (*Q*) or by adding AFC and AVC at that output:

$$ATC = \frac{TC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q} = AFC + AVC$$

Graphically, we can find ATC by adding vertically the AFC and AVC curves, as in Figure 6.3. Thus, the vertical distance between the ATC and AVC curves measures AFC at any level of output.

Marginal Cost

One final and very crucial cost concept remains: **Marginal cost** (**MC**) is *the extra*, *or additional*, *cost of producing 1 more unit of output*. MC can be determined for each added unit of output by noting the change in total cost which that unit's production entails:

$$MC = \frac{\text{change in TC}}{\text{change in } Q}$$

Calculations In column 4 of Figure 6.3's table, production of the first unit of output increases total cost from \$100 to \$190. Therefore, the additional, or marginal, cost of that first unit is \$90 (column 8). The marginal cost of the second unit is \$80 (= 270 - 190); the MC of the third is \$70 (= 340 - 270); and so forth. The MC for each of the 10 units of output is shown in column 8.

MC can also be calculated from the total-variable-cost column because the only difference between total cost and total variable cost is the constant amount of fixed costs (\$100). Thus, the change in total cost and the change in total variable cost accompanying each additional unit of output are always the same.

Marginal Decisions Marginal costs are costs the firm can control directly and immediately. Specifically, MC designates all the cost incurred in producing the last unit of output. Thus, it also designates the cost that can be "saved" by not producing that last unit. Average-cost figures do not provide this information. For example, suppose the firm is undecided whether to produce 3 or 4 units of output. At 4 units the table in Figure 6.3 indicates that ATC is \$100. But the firm does not increase its total costs by \$100 by producing the fourth unit, nor does it save \$100 by not producing that unit. Rather, the change in costs involved here is only \$60, as the MC column in the table reveals.

A firm's decisions as to what output level to produce are typically marginal decisions, that is, decisions to produce a few more or a few less units. Marginal cost is the change in costs when 1 more or 1 less unit of output is produced. When coupled with marginal revenue (which, as you will see in Chapter 7, indicates the change in revenue from 1 more or 1 less unit of output), marginal cost allows a firm to determine if it is profitable to expand or contract its production. The analysis in the next three chapters focuses on those marginal calculations. average total cost (ATC)

A firm's total cost (= total fixed costs + total variable costs) divided by output.

marginal cost (MC) The extra or additional cost of producing 1 more unit of output.

WORKED PROBLEMS

W 6.3 Per-unit cost

INTERACTIVE GRAPHS

G 6.1 Production and costs **Graphical Portrayal** Marginal cost is shown graphically in Figure 6.3. Marginal cost at first declines sharply, reaches a minimum, and then rises rather abruptly. This reflects the fact that variable costs, and therefore total cost, increase first by decreasing amounts and then by increasing amounts.

Relation of MC to AVC and ATC Figure 6.3 shows that the marginalcost curve MC intersects both the AVC and the ATC curves at their minimum points. As noted earlier, this marginal-average relationship is a mathematical necessity. When the amount (the marginal cost) added to total cost is less than the current average total cost, ATC will fall. Conversely, when the marginal cost exceeds ATC, ATC will rise. This means in Figure 6.3 that as long as MC lies below ATC, ATC will fall, and whenever MC lies above ATC, ATC will rise. Therefore, at the point of intersection where MC equals ATC, ATC has just ceased to fall but has not yet begun to rise. This, by definition, is the minimum point on the ATC curve. The marginal-cost curve intersects the average-total-cost curve at the ATC curve's minimum point.

Marginal cost can be defined as the addition either to total cost or to total variable cost resulting from 1 more unit of output; thus, this same rationale explains why the MC curve also crosses the AVC curve at the AVC curve's minimum point. No such relationship exists between the MC curve and the average-fixed-cost curve because the two are not related; marginal cost includes only those costs that change with output, and fixed costs by definition are those that are independent of output.

APPLYING THE ANALYSIS

The Doubling of the Price of Corn

The price of corn has more than doubled in recent years mainly due to a sharp increase in the production of ethanol, an alcohol-like substance that is refined from corn and can be used as a partial substitute for gasoline. The increased production of ethanol has been the result of two factors. First, gasoline prices increased rapidly, creating a much larger demand for ethanol as a gasoline substitute. Second, the government offered a large subsidy to ethanol producers, thereby encouraging them to convert more corn into gasoline.

The large increase in the price of corn has had a wide impact because corn is used as an important resource for a variety of products: For example, it is heavily used as livestock feed for cattle, as a sweetener (high fructose corn syrup) for soft drinks, and as the main ingredient in popular breakfast cereals. Corn also is used in tacos, tortillas, adhesives, candles, cardboard, and chewing gum.

Because of the higher price of corn, the firms producing these corn-based products experienced various degrees of increases in their short-run average variable costs, marginal costs, and average total costs. In terms of our analysis, their AVC, MC, and ATC curves all shifted upward. The extent of the upward shifts depended upon the relative importance of corn as a variable input in the various firms' individual production processe.

Question:

If rising corn prices increase the cost of livestock feed for cattle, how would that affect the cost curves of restaurants that use beef as an input in the meals they produce?

Long-Run Production Costs

In the long run, an industry and the individual firms it comprises can undertake all desired resource adjustments. That is, they can change the amount of all inputs used. The firm can alter its plant capacity; it can build a larger plant or revert to a smaller plant than that assumed in Figures 6.2 and 6.3. The industry also can change its overall capacity; the long run allows sufficient time for new firms to enter or for existing firms to leave an industry. We will discuss the impact of the entry and exit of firms to and from an industry in the next chapter; here we are concerned only with changes in plant capacity made by a single firm. Let's couch our analysis in terms of average total cost (ATC), making no distinction between fixed and variable costs because all resources, and therefore all costs, are variable in the long run.

Firm Size and Costs

Suppose a manufacturer with a single plant begins on a small scale and, as the result of successful operations, expands to successively larger plant sizes with larger output capacities. What happens to average total cost as this occurs? For a time, successively larger plants will lower average total cost. However, eventually the building of a still larger plant may cause ATC to rise.

Figure 6.4 illustrates this situation for five possible plant sizes. ATC-1 is the shortrun average-total-cost curve for the smallest of the five plants, and ATC-5, the curve for the largest. Constructing larger plants will lower the minimum average total costs through plant size 3. But then larger plants will mean higher minimum average total costs.

The Long-Run Cost Curve

The vertical lines perpendicular to the output axis in Figure 6.4 indicate the outputs at which the firm should change plant size to realize the lowest attainable average total costs of production. These are the outputs at which the per-unit costs for a larger plant drop below those for the current, smaller plant. For all outputs up to 20 units, the lowest average total costs are attainable with plant size 1. However, if the firm's volume of sales expands beyond 20 units but less than 30, it can achieve lower per-unit costs by constructing

FIGURE 6.4 The long-run average-total-cost curve: five possible plant sizes. The long-run average-total-cost curve is made up of segments of the short-run cost curves (ATC-1, ATC-2, etc.) of the various-size plants from which the firm might choose. Each point on the bumpy planning curve shows the lowest unit cost attainable for any output when the firm has had time to make all desired changes in its plant size.







a larger plant, size 2. Although total cost will be higher at the expanded levels of production, the cost per unit of output will be less. For any output between 30 and 50 units, plant size 3 will yield the lowest average total costs. From 50 to 60 units of output, the firm must build the size-4 plant to achieve the lowest unit costs. Lowest average total costs for any output over 60 units require construction of the still larger plant, size 5.

Tracing these adjustments, we find that the long-run ATC curve for the enterprise is made up of segments of the short-run ATC curves for the various plant sizes that can be constructed. The long-run ATC curve shows the lowest average total cost at which *any output level* can be produced after the firm has had time to make all appropriate adjustments in its plant size. In Figure 6.4 the red, bumpy curve is the firm's long-run ATC curve or, as it is often called, the firm's *planning curve*.

In most lines of production, the choice of plant size is much wider than in our illustration. In many industries the number of possible plant sizes is virtually unlimited, and in time quite small changes in the volume of output will lead to changes in plant size. Graphically, this implies an unlimited number of short-run ATC curves, one for each output level, as suggested by Figure 6.5. Then, rather than being made up of segments of short-run ATC curves as in Figure 6.4, the long-run ATC curve is made up of all the points of tangency of the unlimited number of short-run ATC curves from which the long-run ATC curve is derived. Therefore, the planning curve is smooth rather than bumpy. Each point on it tells us the minimum ATC of producing the corresponding level of output.

Economies and Diseconomies of Scale

We have assumed that, for a time, larger and larger plant sizes will lead to lower unit costs but that, beyond some point, successively larger plants will mean higher average total costs. That is, we have assumed the long-run ATC curve is U-shaped. But why should this be? It turns out that the U shape is caused by economies and diseconomies of large-scale production, as we explain in a moment. But before we do, please understand that the U shape of the long-run average-total-cost curve *cannot* be the result of rising resource prices or the law of diminishing returns. First, our discussion assumes that resource prices are constant. Second, the law of diminishing returns does not apply



FIGURE 6.6 Various possible long-run average-total-cost

curves. In (a), economies of scale are rather rapidly obtained as plant size rises, and diseconomies of scale are not encountered until a considerably large scale of output has been achieved. Thus, long-run average total cost is constant over a wide range of output. In (b), economies of scale are extensive, and diseconomies of scale occur only at very large outputs. Average total cost therefore declines over a broad range of output. In (c), economies of scale are exhausted quickly, followed immediately by diseconomies of scale. Minimum ATC thus occurs at a relatively low output.

to production in the long run. This is true because the law of diminishing returns only deals with situations in which a productive resource or input is held constant. Under our definition of "long run," all resources and inputs are variable.

Economies of Scale Economies of scale, or *economies of mass production*, explain the downsloping part of the long-run ATC curve, as indicated in Figure 6.6, graphs (a), (b), and (c). As plant size increases, a number of factors will, for a time, lead to lower average costs of production.

Labor Specialization Increased specialization in the use of labor becomes more achievable as a plant increases in size. Hiring more workers means jobs can be divided

economies of scale Reductions in the average total cost of producing a product as the firm expands the size of its operations (output) in the long run. and subdivided. Each worker may now have just one task to perform instead of five or six. Workers can work full-time on the tasks for which they have special skills. In a small plant, skilled machinists may spend half their time performing unskilled tasks, leading to higher production costs.

Further, by working at fewer tasks, workers become even more proficient at those tasks. The jack-of-all-trades doing five or six jobs is not likely to be efficient in any of them. Concentrating on one task, the same worker may become highly efficient.

Finally, greater labor specialization eliminates the loss of time that occurs whenever a worker shifts from one task to another.

Managerial Specialization Large-scale production also means better use of, and greater specialization in, management. A supervisor who can handle 20 workers is underused in a small plant that employs only 10 people. The production staff could be doubled with no increase in supervisory costs.

Small firms cannot use management specialists to best advantage. For example, a sales specialist working in a small plant may have to spend some of her time on functions outside of her area of expertise—marketing, personnel, and finance. A larger scale of operations would allow her to supervise marketing full-time, while different specialists perform other managerial functions. Greater efficiency and lower unit costs are the net result.

Efficient Capital Small firms often cannot afford the most efficient equipment. In many lines of production, such machinery is available only in very large and extremely expensive units. Furthermore, effective use of the equipment demands a high volume of production, and that again requires large-scale producers.

In the automobile industry the most efficient fabrication method employs robotics and elaborate assembly-line equipment. Effective use of this equipment demands an annual output of perhaps 200,000 to 400,000 automobiles. Only very-large-scale producers can afford to purchase and use this equipment efficiently. The small-scale producer is faced with a dilemma. To fabricate automobiles using other equipment is inefficient and therefore more costly per unit. But so, too, is buying and underutilizing the equipment used by the large manufacturers. Because it cannot spread the high equipment cost over very many units of output, the small-scale producer will be stuck with high costs per unit of output.

Other Factors Many products entail design and development costs, as well as other "start-up" costs, which must be incurred irrespective of projected sales. These costs decline per unit as output is increased. Similarly, advertising costs decline per auto, per computer, per stereo system, and per box of detergent as more units are produced and sold. Also, the firm's production and marketing expertise usually rises as it produces and sells more output. This *learning by doing* is a further source of economies of scale.

All these factors contribute to lower average total costs for the firm that is able to expand its scale of operations. Where economies of scale are possible, an increase in all resources of, say, 10 percent will cause a more-than-proportionate increase in output of, say, 20 percent. The result will be a decline in ATC.

In many U.S. manufacturing industries, economies of scale have been of great significance. Firms that have expanded their scale of operations to obtain economies of mass production have survived and flourished. Those unable to expand have become relatively high-cost producers, doomed to a struggle to survive.



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Photo Op Economies of Scale

Economies of scale are extensive in the automobile industry, where the capital required is large and expensive and many workers are needed to perform the numerous, highly specialized tasks. Economies of scale in copying keys are exhausted at low levels of output; production usually occurs in small shops, the capital involved is relatively small and inexpensive, and a small number of workers (often only one) perform all of the labor and managerial functions of the business. There would be little, if any, cost advantage to establishing a key copying "factory" with hundreds of stations.

The Verson Stamping Machine

In 1996 Verson (a U.S. firm located in Chicago) introduced a 49-foot-tall metalstamping machine that is the size of a house and weighs as much as 12 locomotives. This \$30 million machine, which cuts and sculpts raw sheets of steel into automobile hoods and fenders, enables automakers to make new parts in just 5 minutes compared with 8 hours for older stamping presses. A single machine is designed to make 5 million auto parts per year. So, to achieve the cost saving from the machine, an auto manufacturer must have sufficient auto production to use all these parts. By allowing the use of this cost-saving piece of equipment, large firm size achieves economies of scale.

Question:

Do you see any potential problems for a company that relies too heavily on just a few large machines for fabricating millions of its critical product parts?

Diseconomies of Scale In time the expansion of a firm may lead to diseconomies and therefore higher average total costs.

The main factor causing **diseconomies of scale** is the difficulty of efficiently controlling and coordinating a firm's operations as it becomes a large-scale producer. In a small plant a single key executive may make all the basic decisions for the plant's operation. Because of the firm's small size, the executive is close to the production line,

APPLYING THE ANALYSIS

diseconomies of scale

Increases in the average total cost of producing a product as the firm expands the size of its operations (output) in the long run.

constant returns to scale

No changes in the average total cost of producing a product as the firm expands the size of its operations (output) in the long run.

minimum efficient scale (MES)

The lowest level of output at which a firm can minimize long-run average total cost. understands the firm's operations, and can make efficient decisions because the small plant size requires only a relatively small amount of information to be examined and understood in optimizing production.

This neat picture changes as a firm grows. One person cannot assemble, digest, and understand all the information essential to decision making on a large scale. Authority must be delegated to many vice presidents, second vice presidents, and so forth. This expansion of the management hierarchy leads to problems of communication and cooperation, bureaucratic red tape, and the possibility that decisions will not be coordinated. Similarly, decision making may be slowed down to the point that decisions fail to reflect changes in consumer tastes or technology quickly enough. The result is impaired efficiency and rising average total costs.

Also, in massive production facilities, workers may feel alienated from their employers and care little about working efficiently. Opportunities to shirk, by avoiding work in favor of on-the-job leisure, may be greater in large plants than in small ones. Countering worker alienation and shirking may require additional worker supervision, which increases costs.

Where diseconomies of scale are operative, an increase in all inputs of, say, 10 percent will cause a less-than-proportionate increase in output of, say, 5 percent. As a consequence, ATC will increase. The rising portion of the long-run cost curves in Figure 6.6 illustrates diseconomies of scale.

Constant Returns to Scale In some industries there may exist a rather wide range of output between the output at which economies of scale end and the output at which diseconomies of scale begin. That is, there may be a range of **constant returns to scale** over which long-run average cost does not change. The q_1q_2 output range of Figure 6.6a is an example. Here a given percentage increase in all inputs of, say, 10 percent will cause a proportionate 10 percent increase in output. Thus, in this range ATC is constant.

Minimum Efficient Scale and Industry Structure

Economies and diseconomies of scale are an important determinant of an industry's structure. Here we introduce the concept of **minimum efficient scale (MES)**, which is the lowest level of output at which a firm can minimize long-run average costs. In Figure 6.6a that level occurs at q_1 units of output. Because of the extended range of constant returns to scale, firms producing substantially greater outputs could also realize the minimum attainable long-run average costs. Specifically, firms within the q_1q_2 range would be equally efficient. So we would not be surprised to find an industry with such cost conditions to be populated by firms of quite different sizes. The apparel, banking, furniture, snowboard, wood products, food processing, and small-appliance industries are examples. With an extended range of constant returns to scale, relatively large and relatively small firms can coexist in an industry and be equally successful.

Compare this with Figure 6.6b, where economies of scale continue over a wide range of outputs and diseconomies of scale appear only at very high levels of output. This pattern of declining long-run average total cost occurs in the automobile, aluminum, steel, and other heavy industries. The same pattern holds in several of the new industries related to information technology, for example, computer microchips, operating system software, and Internet service provision. Given consumer demand, efficient production will be achieved with a few large-scale producers. Small firms cannot realize the minimum efficient scale and will not be able to compete.

Where economies of scale are few and diseconomies come into play quickly, the minimum efficient size occurs at a low level of output, as shown in Figure 6.6c. In such industries a particular level of consumer demand will support a large number of relatively small producers. Many retail trades and some types of farming fall into this category. So do certain kinds of light manufacturing, such as the baking, clothing, and shoe industries. Fairly small firms are more efficient than larger-scale producers would be if they were present in such industries.

Our point here is that the shape of the long-run average-total-cost curve is determined by technology and the economies and diseconomies of scale that result. The shape of the long-run ATC curve, in turn, can be significant in determining whether an industry is populated by a relatively large number of small firms or is dominated by a few large producers, or lies somewhere in between.

But we must be cautious in our assessment because industry structure does not depend on cost conditions alone. Government policies, the geographic size of markets, managerial strategy and skill, and other factors must be considered in explaining the structure of a particular industry.

ORIGIN OF THE IDEA 0 6.4 Minimum efficient scale

Aircraft Assembly Plants versus Concrete Plants

Why are there only three plants in the United States (all operated by Boeing) that produce large commercial aircraft and thousands of plants (owned by hundreds of firms) that produce ready-mixed concrete? The simple answer is that MES is radically different in the two industries. Why is that? First, while economies of scale are extensive in assembling large commercial aircraft, they are only very modest in mixing concrete. Manufacturing airplanes is a complex process that requires huge facilities, thousands of workers, and very expensive, specialized machinery. Economies of scale extend to huge plant sizes. But mixing Portland cement, sand, gravel, and water to produce concrete requires only a handful of workers and relatively inexpensive equipment. Economies of scale are exhausted at relatively small size.

The differing MES also derives from the vastly different sizes of the geographic markets. The market for commercial airplanes is global, and aircraft manufacturers can deliver new airplanes anywhere in the world by flying them there. In contrast, the geographic market for a concrete plant is roughly the 50mile radius within which the concrete can be delivered before it "sets up." So in the ready-mix concrete industry, thousands of small concrete plants are positioned close to their customers in hundreds of small and large cities.

Question:

Speculate as to why the MES of firms in the Portland cement industry is considerably larger than the MES of single ready-mix concrete plants.

APPLYING THE ANALYSIS

Summary

- 1. Corporations—the dominant form of business organizations are legal entities, distinct and separate from the individuals who own them. They often have thousands, or even millions, of stockholders who jointly own them. They finance their operations and purchases of new plant and equipment partly through the issuance of stocks and bonds. Stocks are ownership shares of a corporation, and bonds are promises to repay a loan, usually at a set rate of interest.
- 2. A principal-agent problem may occur in corporations when the agents (managers) hired to represent the interest of the principals (stockholders) pursue their own objectives to the detriment of the objectives of the principals.
- 3. Economic costs include all payments that must be received by resource owners to ensure a continued supply of needed resources to a particular line of production. Economic costs include explicit costs, which flow to resources owned and supplied by others, and implicit costs, which are payments for the use of self-owned and self-employed resources. One implicit cost is a normal profit to the entrepreneur. Economic profit occurs when total revenue exceeds total cost (= explicit costs + implicit costs, including a normal profit).
- 4. In the short run, a firm's plant capacity is fixed. The firm can use its plant more or less intensively by adding or subtracting units of variable resources, but it does not have sufficient time in the short run to alter plant size.
- 5. The law of diminishing returns describes what happens to output as a fixed plant is used more intensively. As successive units of a variable resource, such as labor, are added to a fixed plant, beyond some point the marginal product associated with each additional unit of a resource declines.
- 6. Because some resources are variable and others are fixed, costs can be classified as variable or fixed in the short run. Fixed costs are independent of the level of output; variable costs vary with output. The total cost of any output is the sum of fixed and variable costs at that output.

- 7. Average fixed, average variable, and average total costs are fixed, variable, and total costs per unit of output. Average fixed cost declines continuously as output increases because a fixed sum is being spread over a larger and larger number of units of production. A graph of average variable cost is U-shaped, reflecting the law of diminishing returns. Average total cost is the sum of average fixed and average variable costs; its graph is also U-shaped.
- 8. Marginal cost is the extra, or additional, cost of producing 1 more unit of output. It is the amount by which total cost and total variable cost change when 1 more or 1 less unit of output is produced. Graphically, the marginal-cost curve intersects the ATC and AVC curves at their minimum points.
- 9. The long run is a period of time sufficiently long for a firm to vary the amounts of all resources used, including plant size. In the long run, all costs are variable. The long-run ATC, or planning, curve is composed of segments of the short-run ATC curves, and it represents the various plant sizes a firm can construct in the long run.
- 10. The long-run ATC curve is generally U-shaped. Economies of scale are first encountered as a small firm expands. Greater specialization in the use of labor and management, the ability to use the most efficient equipment, and the spreading of start-up costs among more units of output all contribute to economies of scale. As the firm continues to grow, it will encounter diseconomies of scale stemming from the managerial complexities that accompany large-scale production. The ranges of output over which economies and diseconomies of scale occur in an industry are often an important determinant of the structure of that industry.
- 11. A firm's minimum efficient scale (MES) is the lowest level of output at which it can minimize its long-run average cost. In some industries, MES occurs at such low levels of output that numerous firms can populate the industry. In other industries, MES occurs at such high output levels that only a few firms can exist in the long run.

Terms and Concepts

stocks bonds limited liability principal-agent problem explicit costs implicit costs normal profit economic profit short run long run total product (TP) marginal product (MP) average product (AP) law of diminishing returns fixed costs variable costs total cost average fixed cost (AFC) average variable cost (AVC) average total cost (ATC) marginal cost (MC) economies of scale diseconomies of scale constant returns to scale minimum efficient scale (MES)

Study Questions Econnect

- 1. Distinguish between a plant, a firm, and an industry. Contrast a vertically integrated firm, a horizontally integrated firm, and a conglomerate. Cite an example of a horizontally integrated firm from which you have recently made a purchase. LOI
- 2. What major advantages of corporations have given rise to their dominance as a form of business organization? LOI
- 3. What is the principal-agent problem as it relates to corporate managers and stockholders? How did firms try to solve this problem in the 1990s? In what way did the "solution" backfire on some firms? LOI
- **4.** Distinguish between explicit and implicit costs, giving examples of each. Why does the economist classify normal profit as a cost? Is economic profit a cost of production? Explain why or why not. **LO2**
- 5. Gomez runs a small pottery firm. He hires one helper at \$12,000 per year, pays annual rent of \$5000 for his shop, and spends \$20,000 per year on materials. He has \$40,000 of his own funds invested in equipment (pottery wheels, kilns, and so forth) that could earn him \$4000 per year if alternatively invested. He has been offered \$15,000 per year to work as a potter for a competitor. He estimates his entrepreneurial talents are worth \$3000 per year. Total annual revenue from pottery sales is \$72,000. Calculate the accounting profit and the economic profit for Gomez's pottery firm. LO2
- 6. Which of the following are short-run and which are long-run adjustments? LO3
 - a. Wendy's builds a new restaurant.
 - **b.** IBM hires 200 more software engineers.
 - **c.** A farmer increases the amount of fertilizer used on his corn crop.
 - d. An Alcoa aluminum plant adds a third shift of workers.

7. Complete the following table by calculating marginal product and average product from the data given: **LO3**

Inputs of Labor	Total Product	Marginal Product	Average Product
0	0		
I	15		
2	34		
3	51		
4	65		
5	74		
6	80		
7	83		
8	82		

Explain why marginal product eventually declines and ultimately becomes negative. What bearing does the law of diminishing returns have on marginal costs? Be specific.

- 8. Why can the distinction between fixed costs and variable costs be made in the short run? Classify the following as fixed or variable costs: advertising expenditures, fuel, interest on company-issued bonds, shipping charges, payments for raw materials, real estate taxes, executive salaries, insurance premiums, wage payments, sales taxes, and rental payments on leased office machinery. **LO4**
- **9.** A firm has fixed costs of \$60 and variable costs as indicated in the accompanying table. **LO4**

Complete the table and check your calculations by referring to question 3 at the end of Chapter 7.

a. Graph the AFC, ATC, and MC curves. Why does the AFC curve slope continuously downward? Why does the

Total Product	Total Fixed Cost	Total Variable Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0	\$	\$ 0	\$	\$	\$	\$	¢
I.		45					φ
2		85					
3		120					
4		150					
5		185					
6		225					
7		270					
8		325					
9		390					
10		465					
8 9 10		325 390 465					

MC curve eventually slope upward? Why does the MC curve intersect the ATC curve at its minimum point?

- b. Explain how the location of each curve graphed in question 9a would be altered if (1) total fixed cost had been \$100 rather than \$60 and (2) total variable cost had been \$10 less at each level of output.
- Indicate how each of the following would shift the (1) marginal-cost curve, (2) average-variable-cost curve, (3) average-fixed-cost curve, and (4) average-total-cost curve of a manufacturing firm. In each case, specify the direction of the shift. LO4
 - a. A reduction in business property taxes.
 - **b.** An increase in the hourly wage rates of production workers.
 - **c.** A decrease in the price of electricity.
 - d. An increase in transportation costs.
- 11. Suppose a firm has only three possible plant-size options, represented by the ATC curves shown in the accompanying figure. What plant size will the firm choose in producing (a) 50, (b) 130, (c) 160, and (d) 250 units of output? Draw the firm's long-run average-cost curve on the diagram and describe this curve. **LO5**

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do.



12. Use the concepts of economies and diseconomies of scale to explain the shape of a firm's long-run ATC curve. What is the concept of minimum efficient scale? What bearing can the shape of the long-run ATC curve have on the structure of an industry? **LO5**

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnellbriefmicrole.com

Also, you will find one or more Web-based questions that require information from the Internet to answer.

IN THIS CHAPTER YOU WILL LEARN:

- I The names and main characteristics of the four basic market models.
- 2 The conditions required for purely competitive markets.
- **3** How purely competitive firms maximize profits or minimize losses.
- 4 Why the marginal-cost curve and supply curve of competitive firms are identical.
- 5 How industry entry and exit produce economic efficiency.
- 6 The differences between constant-cost, increasing-cost, and decreasing-cost industries.



Pure Competition

In Chapter 4 we examined the relationship between product demand and total revenue, and in Chapter 6 we discussed businesses and their costs of production. Now we want to connect revenues and costs to see how a business decides what price to charge and how much output to produce. But a firm's decisions concerning price and production depend greatly on the character of the industry in which it is operating. There is no "average" or "typical" industry. At one extreme is a single producer that dominates the market; at the other extreme are industries in which thousands of firms each produces a tiny fraction of market supply. Between these extremes are many other industries.

Since we cannot examine each industry individually, our approach will be to look at four basic *models* of market structure. Together, these models will help you understand how price, output, and profit are determined in the many product markets in the economy. They also will help you evaluate the efficiency or inefficiency of those markets. Finally, these four models will provide a crucial background for assessing public policies (such as antitrust policy) relating to certain firms and industries.

Four Market Models

Economists group industries into four distinct market structures: pure competition, pure monopoly, monopolistic competition, and oligopoly. These four market models differ in several respects: the number of firms in the industry, whether those firms produce a standardized product or try to distinguish their products from those of other firms, and how easy or how difficult it is for firms to enter the industry.

The four models are as follows, presented in order of degree of competition (most to least):

- *Pure competition* involves a very large number of firms producing a standardized product (that is, a product identical to that of other producers, such as cotton or cucumbers). New firms can enter or exit the industry very easily.
- *Monopolistic competition* is characterized by a relatively large number of sellers producing differentiated products (clothing, furniture, books). Present in this model is widespread *nonprice competition*, a selling strategy in which one firm tries to distinguish its product or service from all competing products on the basis of attributes such as design and workmanship (an approach called *product differentiation*). Either entry to or exit from monopolistically competitive industries is quite easy.
- *Oligopoly* involves only a few sellers of a standardized or differentiated product, so each firm is affected by the decisions of its rivals and must take those decisions into account in determining its own price and output.
- *Pure monopoly* is a market structure in which one firm is the sole seller of a product or service for which there is no good substitute (for example, a local electric utility or patented medical device). Since the entry of additional firms is blocked, one firm constitutes the entire industry. The pure monopolist produces a single unique product, so product differentiation is not an issue.



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Photo Op Standardized versus Differentiated Products

Wheat is an example of a standardized product, whereas Pert shampoo is an example of a differentiated product.

Pure Competition: Characteristics and Occurrence

Let's take a fuller look at **pure competition**, the focus of the remainder of this chapter:

- *Very large numbers* A basic feature of a purely competitive market is the presence of a large number of independently acting sellers, often offering their products in large national or international markets. Examples: markets for farm commodities, the stock market, and the foreign exchange market.
- **Standardized product** Purely competitive firms produce a standardized (identical or homogeneous) product. As long as the price is the same, consumers will be indifferent about which seller to buy the product from. Buyers view the products of firms B, C, D, and E as perfect substitutes for the product of firm A. Because purely competitive firms sell standardized products, they make no attempt to differentiate their products and do not engage in other forms of nonprice competition.
- "*Price takers*" In a purely competitive market, individual firms do not exert control over product price. Each firm produces such a small fraction of total output that increasing or decreasing its output will not perceptibly influence total supply or, therefore, product price. In short, the competitive firm is a **price taker**: It cannot change market price; it can only adjust to it. That means that the individual competitive producer is at the mercy of the market. Asking a price higher than the market price would be futile. Consumers will not buy from firm A at \$2.05 when its 9999 competitors are selling an identical product, and therefore a perfect substitute, at \$2 per unit. Conversely, because firm A can sell as much as it chooses at \$2 per unit, it has no reason to charge a lower price, say, \$1.95. Doing that would shrink its profit.
- *Free entry and exit* New firms can freely enter and existing firms can freely leave purely competitive industries. No significant legal, technological, financial, or other obstacles prohibit new firms from selling their output in any competitive market.

Although pure competition is somewhat rare in the real world, this market model is highly relevant to several industries. In particular, we can learn much about markets for agricultural goods, fish products, foreign exchange, basic metals, and stock shares by studying the pure-competition model. Also, pure competition is a meaningful starting point for any discussion of how prices and output are determined. Moreover, the operation of a purely competitive economy provides a norm for evaluating the efficiency of the real-world economy.

Demand as Seen by a Purely Competitive Seller

To develop a model of pure competition, we first examine demand from a competitive seller's viewpoint and see how it affects revenue. This seller might be a wheat farmer, a strawberry grower, a sheep rancher, a catfish raiser, or some other pure competitor. Because each purely competitive firm offers only a negligible fraction of total market supply, it must accept the price predetermined by the market. Pure competitors are price takers, not price makers.

Perfectly Elastic Demand

The demand schedule faced by the *individual firm* in a purely competitive industry is perfectly elastic at the market price, as demonstrated in Figure 7.1. As shown in column 1 of the table in Figure 7.1, the market price is \$131. The firm represented cannot

pure competition

A market structure in which a very large number of firms produce a standardized product and there are no restrictions on entry.

price taker

A competitive firm that cannot change the market price, but can only accept it as "given" and adjust to it.

FIGURE 7.1 A purely competitive firm's demand and

(D) of a purely competitive firm is a horizontal line (perfectly elastic) because the firm can sell as much output as it wants at the market price (here, \$131). Because each additional unit sold increases total revenue by the amount of the price, the firm's total-revenue curve (TR) is a straight upward-sloping line and its marginal-revenue curve (MR) coincides with the firm's demand curve. The average-revenue curve (AR) also coincides with the demand curve.

Firm's Demand Schedule		Firm's Revenue Data		
(1)	(2)	(3)	(4)	
Product Price (P)	Quantity	Total Revenue	Marginal	
(Average Revenue)	Demanded (<i>Q</i>)	(TR), (1) × (2)	Revenue (MR)	
\$131 131 131 131 131 131 131 131 131 131	0 1 2 3 4 5 6 7 8	\$ 0 131 262 393 524 655 786 917 1048	\$131 131 131 131 131 131 131 131	
131	9	1179	131	
131	10		131	



obtain a higher price by restricting its output, nor does it need to lower its price to increase its sales volume. Columns 1 and 2 show that the firm can produce as little or much as it wants and sell all the units at \$131 each.

We are *not* saying that *market* demand is perfectly elastic in a competitive market. Rather, market demand graphs as a downsloping curve. An entire industry (all firms producing a particular product) can affect price by changing industry output. For example, all firms, acting independently but simultaneously, can increase price by reducing output. But the individual competitive firm cannot do that. Its demand curve will plot as a straight, horizontal line such as *D* in Figure 7.1.

Average, Total, and Marginal Revenue

The firm's demand schedule is also its average-revenue schedule. Price per unit to the purchaser is also revenue per unit, or average revenue, to the seller. To say that all buyers must pay \$131 per unit is to say that the revenue per unit, or **average revenue**, received by the seller is \$131. Price and average revenue are the same thing from different viewpoints.

The **total revenue** for each sales level is found by multiplying price by the corresponding quantity the firm can sell. (Column 1 multiplied by column 2 in the table in Figure 7.1 yields column 3.) In this case, total revenue increases by a constant amount, \$131, for each additional unit of sales. Each unit sold adds exactly its constant price to total revenue.

When a firm is pondering a change in its output, it will consider how its total revenue will change as a result. **Marginal revenue** is the change in total revenue (or the extra revenue) that results from selling 1 more unit of output. In column 3 of the table in Figure 7.1, total revenue is zero when zero units are sold. The first unit of output sold increases total revenue from zero to \$131, so marginal revenue for that unit is \$131. The second unit sold increases total revenue from \$131 to \$262, and marginal revenue is again \$131. Note in column 4 that marginal revenue is a constant \$131, as is price. *In pure competition, marginal revenue and price are equal.*

Figure 7.1 shows the purely competitive firm's total-revenue, demand, marginalrevenue, and average-revenue curves. Total revenue (TR) is a straight line that slopes upward to the right. Its slope is constant because each extra unit of sales increases TR by \$131. The demand curve (D) is horizontal, indicating perfect price elasticity. The marginal-revenue curve (MR) coincides with the demand curve because the product price (and hence MR) is constant. The average revenue equals price and therefore also coincides with the demand curve.

Profit Maximization in the Short Run

Because the purely competitive firm is a price taker, it can maximize its economic profit (or minimize its loss) only by adjusting its *output*. And, in the short run, the firm has a fixed plant. Thus, it can adjust its output only through changes in the amount of variable resources (materials, labor) it uses. It adjusts its variable resources to achieve the output level that maximizes its profit.

More specifically, the firm compares the amounts that each *additional* unit of output would add to total revenue and to total cost. In other words, the firm compares the *marginal revenue* (MR) and the *marginal cost* (MC) of each successive unit of output. Assuming that producing is preferable to shutting down, the firm should produce any unit of output whose marginal revenue exceeds its marginal cost because the firm would gain more in revenue from selling that unit than it would add to its costs by producing it. Conversely, if the marginal cost of a unit of output exceeds its marginal revenue, the firm should not produce that unit. Producing it would add more to costs than to revenue, and profit would decline or loss would increase.

In the initial stages of production, where output is relatively low, marginal revenue will usually (but not always) exceed marginal cost. So it is profitable to produce through this range of output. But at later stages of production, where output is relatively high, rising marginal costs will exceed marginal revenue. Obviously, a profit-maximizing firm will want to avoid output levels in that range. Separating these two production ranges is a unique point at which marginal revenue equals marginal cost. This point is the key to the output-determining rule: *In the short run, the firm will maximize profit or minimize loss by producing the output at which marginal revenue equals marginal cost (as long state)*.

average revenue

Total revenue from the sale of a product divided by the quantity of the product sold.

total revenue

The total number of dollars received by a firm from the sale of a product.

marginal revenue

The change in total revenue that results from selling 1 more unit of a firm's product. MR = MC rule

A method of determining the total output at which economic profit is at a maximum (or losses at a minimum). *as producing is preferable to shutting down*). This profit-maximizing guide is known as the **MR = MC rule.** (For most sets of MR and MC data, MR and MC will be precisely equal at a fractional level of output. In such instances the firm should produce the last complete unit of output for which MR exceeds MC.)

Keep in mind these three features of the MR = MC rule:

- As noted, the rule applies only if producing is preferable to shutting down. We will show shortly that if marginal revenue does not equal or exceed average variable cost, the firm will shut down rather than produce the amount of output at which MR = MC.
- The rule is an accurate guide to profit maximization for all firms whether they are purely competitive, monopolistic, monopolistically competitive, or oligopolistic.
- We can restate the rule as P = MC when applied to a purely competitive firm. Because the demand schedule faced by a competitive seller is perfectly elastic at the going market price, product price and marginal revenue are equal. So under pure competition (and only under pure competition) we may substitute P for MR in the rule: When producing is preferable to shutting down, the competitive firm that wants to maximize its profit or minimize its loss should produce at that point where price equals marginal cost (P = MC).

Now let's apply the MR = MC rule or, because we are considering pure competition, the P = MC rule.

Profit Maximization

The first five columns in the table in Figure 7.2 reproduce the AFC, AVC, ATC, and MC data derived for our product in Chapter 6. Here, we will compare the marginalcost data of column 5 with price (equals marginal revenue) for each unit of output. Suppose first that the market price, and therefore marginal revenue, is \$131, as shown in column 6.

What is the profit-maximizing output? Every unit of output up to and including the ninth unit represents greater marginal revenue than marginal cost of output. Each of the first 9 units therefore adds to the firm's profit and should be produced. The firm, however, should not produce the tenth unit. It would add more to cost (\$150) than to revenue (\$131).

We can calculate the economic profit realized by producing 9 units from the average-total-cost data. Price (\$131) multiplied by output (9) yields total revenue of \$1179. Multiplying average total cost (\$97.78) by output (9) gives us total cost of \$880.¹ The difference of \$299 (= \$1179 - \$880) is the economic profit. Clearly, this firm will prefer to operate rather than shut down.

An alternative, and perhaps easier, way to calculate the economic profit is to determine the profit per unit by subtracting the average total cost (97.78) from the product price (131). Then multiply the difference (a per-unit profit of 33.22) by output (9). Take some time now to verify the numbers in column 7 in the table in Figure 7.2. You will find that any output other than that which adheres to the MR = MC rule will yield either profits below 299 or losses.

Figure 7.2 also shows price (= MR) and marginal cost graphically. Price equals marginal cost at the profit-maximizing output of 9 units. There the per-unit economic profit is P - A, where P is the market price and A is the average total cost of 9 units of output. The total economic profit is $9 \times (P - A)$, shown by the gray rectangular area.

WORKED PROBLEMS W 7.1 Profit maximization: MR = MC



¹ Most of the unit-cost data are rounded figures from the total-cost figures presented in the previous chapter. Therefore, economic profits calculated from the unit-cost figures will typically vary by a few cents from the profits determined by subtracting actual total cost from total revenue. Here we simply ignore the fewcents differentials.

FIGURE 7.2 Short-run profit maximizing for a purely competitive firm. The MR = MC output enables the purely competitive firm to maximize profits or to minimize losses. In this case MR (= P in pure competition) and MC are equal at 9 units of output, Q. There P exceeds the average total cost A =\$97.78, so the firm realizes an economic profit of P - A per unit. The total economic profit is represented by the gray rectangle and is $9 \times (P - A)$.

(l) Total Product (Output)	(2) Average Fixed Cost (AFC)	(3) Average Variable Cost (AVC)	(4) Average Total Cost (ATC)	(5) Marginal Cost (MC)	(6) \$131 Price = Marginal Revenue (MR)	(7) Total Economic Profit (+) or Loss (-)
0						\$-I00
I	\$100.00	\$90.00	\$190.00	\$ 90	\$131	- 59
2	50.00	85.00	135.00	80	131	- 8
3	33.33	80.00	113.33	70	131	+ 53
4	25.00	75.00	100.00	60	131	+124
5	20.00	74.00	94.00	70	131	+ 185
6	16.67	75.00	91.67	80	131	+ 185
7	10.07	73.00	21.07	90	131	+ 277
,	17.27	77.14	71.43	110	131	+2/7
8	12.50	81.25	93.75	130	131	+298
У	11.11	86.67	97.78	150	131	+299
10	10.00	93.00	103.00			1280



Loss Minimization and Shutdown

Now let's assume that the market price is \$81 rather than \$131. Should the firm still produce? If so, how much? And what will be the resulting profit or loss? The answers, respectively, are "Yes," "Six units," and "A loss of \$64."

The first five columns in the table in Figure 7.3 are the same as those in Figure 7.2. Column 6, however, shows the new price (equal to MR) of \$81. Looking at columns 5 and 6, notice that the first unit of output adds \$90 to total cost but only \$81 to total revenue. One might conclude: "Don't produce—close down!" But that would be hasty. Remember that in the very early stages of production, marginal product is low, making marginal cost unusually high. The price–marginal cost relationship improves with increased production. For units 2 through 6, price exceeds marginal cost. Each of these 5 units adds more to revenue than to cost, and as shown in column 7, they decrease the total loss. Together they more than compensate for the "loss" taken on the first unit. Beyond 6 units, however, MC exceeds MR (= P). The firm should therefore produce 6 units.

FIGURE 7.3 Short-run loss minimization for a purely competitive firm. If price *P* exceeds the minimum AVC (here, \$74 at Q = 5) but is less than ATC, the MR = MC output (here, 6 units) will permit the firm to minimize its losses. In this instance the loss is A - P per unit, where *A* is the average total cost at 6 units of output. The total loss is shown by the red area and is equal to $6 \times (A - P)$.

(l) Total Product (Output)	(2) Average Fixed Cost (AFC)	(3) Average Variable Cost (AVC)	(4) Average Total Cost (ATC)	(5) Marginal Cost (MC)	(6) \$81 Price = Marginal Revenue (MR)	(7) Profit (+) or Loss (–), \$81 Price
0						\$-100
1	\$100.00	\$90.00	\$190.00	\$ 90	\$81	-109
2	50.00	85.00	135.00	80	81	-108
3	33 33	80.00	113 33	70	81	- 97
4	25.00	75.00	100.00	60	81	- 76
-	20.00	73.00	94.00	70	81	- 70
5	20.00	74.00	94.00	80	81	- 65
0	10.07	75.00	91.67	90	81	-64
7	14.29	77.14	91.43	110	81	- 73
8	12.50	81.25	93.75	110	01	-102
9	11.11	86.67	97.78	130	81	- 5
10	10.00	93.00	103.00	150	81	-220



In general, the profit-seeking producer should always compare marginal revenue (or price under pure competition) with the rising portion of the marginal-cost schedule or curve.

Loss Minimization Will production be profitable? No, because at 6 units of output the average total cost of \$91.67 exceeds the price of \$81 by \$10.67 per unit. If we multiply that by the 6 units of output, we find the firm's total loss is \$64. Alternatively, comparing the total revenue of \$486 (= $6 \times 81) with the total cost of \$550 (= $6 \times 91.67), we see again that the firm's loss is \$64.

Then why produce? Because this loss is less than the firm's \$100 of fixed costs, which is the \$100 loss the firm would incur in the short run by closing down. The firm receives enough revenue per unit (\$81) to cover its average variable costs of \$75 and also provide \$6 per unit, or a total of \$36, to apply against fixed costs. Therefore, the firm's loss is only \$64 (= \$100 - \$36), not \$100.

This loss-minimizing case is shown graphically in Figure 7.3. Wherever price P exceeds AVC but is less than ATC, the firm can pay part, but not all, of its fixed costs by producing. The firm minimizes its loss by producing the output at which MC = MR (here, 6 units). At that output, each unit contributes P - V to covering fixed cost, where V is the AVC at 6 units of output. The per-unit loss is A - P =\$10.67, and the total loss is $6 \times (A - P)$, or \$64, as shown by the red area.

Shutdown Suppose now that the market yields a price of only \$71. Should the firm produce? No, because at every output the firm's average variable cost is greater than the price (compare columns 3 and 6 in the table in Figure 7.4). The smallest loss the firm can incur by producing is greater than the \$100 fixed cost it will lose by shutting down (as shown by column 7). The best action is to shut down.

FIGURE 7.4 The short-run shutdown case for a purely competitive firm. If price *P* (here, \$71) falls below the minimum AVC (here, \$74 at Q = 5), the competitive firm will minimize its losses in the short run by shutting down. There is no level of output at which the firm can produce and realize a loss smaller than its total fixed cost.

(l) Total Product (Output)	(2) Average Fixed Cost (AFC)	(3) Average Variable Cost (AVC)	(4) Average Total Cost (ATC)	(5) Marginal Cost (MC)	(6) \$71 Price = Marginal Revenue (MR)	(7) Profit (+) or Loss (–), \$81 Price
0				* • • •	6 71	\$-100
I.	\$100.00	\$90.00	\$190.00	\$ 90	\$71	-119
2	50.00	85.00	135.00	80	71	- I 28
3	33.33	80.00	113.33	70	71	-127
4	25.00	75.00	100.00	60	71	-116
5	20.00	74.00	94.00	70	71	-115
6	16.67	75.00	91.67	80	71	-124
7	14 29	77 4	91 43	90	71	-143
8	12.50	81.25	93 75	110	71	-182
9	11.11	86.67	97 78	130	71	-241
10	10.00	93.00	103.00	150	71	-320



You can see this shutdown situation in the graph in Figure 7.4, where the MR = P line lies below AVC at all points. The \$71 price comes closest to covering average variable costs at the MR (= P) = MC output of 5 units. But even here, the table reveals that price or revenue per unit would fall short of average variable cost by \$3 (= \$74 - \$71). By producing at the MR (= P) = MC output, the firm would lose its \$100 worth of fixed cost plus \$15 (= \$3 of variable cost on each of the 5 units), for a total loss of \$115. This compares unfavorably with the \$100 fixed-cost loss the firm would incur by shutting down and producing no output. So it will make sense for the firm to shut down rather than produce at a \$71 price—or at any price less than the minimum average variable cost of \$74.

The shutdown case reminds us of the qualifier to our MR (= P) = MC rule. A competitive firm will maximize profit or minimize loss in the short run by producing that output at which MR (= P) = MC, provided that market price exceeds minimum average variable cost.

APPLYING THE ANALYSIS

The Still There Motel

Have you ever driven by a poorly maintained business facility and wondered why the owner does not either fix up the property or go out of business? The somewhat surprising reason is that it may be unprofitable to improve the facility yet profitable to continue for a time to operate the business as it deteriorates. Seeing why will aid your understanding of the "stay open or shut down" decision facing firms experiencing declining demand.

Consider the Still There Motel on Old Highway North, Anytown, USA. The owner built the motel on the basis of traffic patterns and competition existing several decades ago. But as interstate highways were built, the motel found itself located on a relatively untraveled stretch of road. Also, it faced severe competition from "chain" motels located much closer to the interstate highway.

As demand and revenue fell, Still There moved from profitability to loss (P < ATC). But at first its room rates and annual revenue were sufficient to cover its total variable costs and contribute some to the payment of fixed costs such as insurance and property taxes (P > AVC). By staying open, Still There lost less than it would have if it shut down. But since its total revenue did not cover its total costs (or P < ATC), the owner realized that something must be done in the long run. The owner decided to lower average total costs by reducing annual maintenance. In effect, the owner opted to allow the motel to deteriorate as a way of regaining temporary profitability.

This renewed profitability of Still There cannot last because in time no further reduction in maintenance costs will be possible. The further deterioration of the motel structure will produce even lower room rates, and therefore even less total revenue. The owner of Still There knows that sooner or later total revenue will again fall below total cost (or *P* will again fall below ATC), even with an annual maintenance expense of zero. When that occurs, the owner will close down the business, tear down the structure, and sell the vacant property. But, in the meantime, the motel is still there—open, deteriorating, and profitable.

Question:

Why might even a well-maintained, profitable motel shut down in the long run if the land on which it is located becomes extremely valuable due to surrounding economic development?

Marginal Cost and Short-Run Supply

In the preceding section, we simply selected three different prices and asked what quantity the profit-seeking competitive firm, faced with certain costs, would choose to offer in the market at each price. This set of product prices and corresponding quantities supplied constitutes part of the supply schedule for the competitive firm.

Table 7.1 summarizes the supply schedule data for those three prices (\$131, \$81, and \$71) and four others. This table confirms the direct relationship between product price and quantity supplied that we identified in Chapter 3. Note first that the firm will not produce at price \$61 or \$71 because both are less than the \$74 minimum AVC. Then note that quantity supplied increases as price increases. Observe finally that economic profit is higher at higher prices.

Generalized Depiction

Figure 7.5 generalizes the MR = MC rule and the relationship between short-run production costs and the firm's supply behavior. The ATC, AVC, and MC curves are shown, along with several marginal-revenue lines drawn at possible market prices. Let's observe quantity supplied at each of these prices:

- Price P_1 is below the firm's minimum average variable cost, so at this price the firm won't operate at all. Quantity supplied will be zero, as it will be at all other prices below P_2 .
- Price P_2 is just equal to the minimum average variable cost. The firm will supply Q_2 units of output (where $MR_2 = MC$) and just cover its total variable cost. Its loss will equal its total fixed cost. (Actually, the firm would be indifferent as to shutting down or supplying Q_2 units of output, but we assume it produces.)
- At price P_3 the firm will supply Q_3 units of output to minimize its short-run losses. At any other price between P_2 and P_4 the firm will minimize its losses by producing and supplying the MR = MC quantity.
- The firm will just break even at price P_4 . There it will supply Q_4 units of output (where $MR_4 = MC$), earning a normal profit but not an economic profit. (Recall that a normal profit is a cost and included in the cost curves.) Total revenue will just cover total cost, including a normal profit, because the revenue per unit ($MR_4 = P_4$) and the total cost per unit (ATC) are the same.
- At price P_5 the firm will realize an economic profit by producing and supplying Q_5 units of output. In fact, at any price above P_4 , the firm will obtain economic profit by producing to the point where MR (= P) = MC.

Note that each of the MR (= P) = MC intersection points labeled b, c, d, and e in Figure 7.5 indicates a possible product price (on the vertical axis) and the corresponding quantity that the firm would supply at that price (on the horizontal axis). Thus, points such as these are on the upsloping supply curve of the competitive firm. Note too that quantity supplied would be zero at any price below the minimum average

Price	Quantity Supplied	Maximum Profit (+) or Minimum Loss (−)
\$151	10	\$ +480
131	9	+299
111	8	+138
91	7	- 3
81	6	- 64
71	0	-100
61	0	-100

TABLE 7.1The Supply Schedule of aCompetitive Firm Confrontedwith the Cost Data in Figure 7.2

FIGURE 7.5 The P = MC rule and the competitive firm's shortrun supply curve. Application of the P = MC rule, as modified by the shutdown case, reveals that the (solid) segment of the firm's MC curve that lies above AVC is the firm's short-run supply curve.



variable cost (AVC). We can conclude that the portion of the firm's marginal-cost curve lying above its average-variable-cost curve is its short-run supply curve. In Figure 7.5, the solid segment of the marginal-cost curve MC is this firm's **short-run supply curve**. It tells us the amount of output the firm will supply at each price in a series of prices. It slopes upward because of the law of diminishing returns.

Firm and Industry: Equilibrium Price

In the preceding section we established the competitive firm's short-run supply curve by applying the MR (= P) = MC rule. But which of the various possible prices will actually be the market equilibrium price?

From Chapter 3 we know that the market equilibrium price will be the price at which the total quantity supplied of the product equals the total quantity demanded. So to determine the equilibrium price, we first need to obtain a total supply schedule and a total demand schedule. We find the total supply schedule by assuming a particular number of firms in the industry and supposing that each firm has the same individual supply schedule as the firm represented in Figure 7.5. Then we sum the quantities supplied at each price level to obtain the total (or market) supply schedule. Columns 1 and 3 in Table 7.2 repeat the supply schedule for the individual competitive firm, as derived in Table 7.1. Suppose 1000 firms compete in this industry, all having the same total and unit costs as the single firm we discussed. This lets us calculate the market supply schedule (columns 2 and 3) by multiplying the quantity-supplied figures of the single firm (column 1) by 1000.

Market Price and Profits To determine the equilibrium price and output, we must compare these total-supply data with total-demand data. Let's assume that total demand is as shown in columns 3 and 4 in Table 7.2. By comparing the total quantity supplied and the total quantity demanded at the seven possible prices, we determine that the equilibrium price is \$111 and the equilibrium quantity is 8000 units for the industry—8 units for each of the 1000 identical firms.

short-run supply curve

A curve that shows the quantity of a product a firm in a purely competitive industry will offer to sell at various prices in the short run.

(I) Quantity Supplied, Single Firm	(2) Total Quantity Supplied, 1000 Firms	(3) Product Price	(4) Total Quantity Demanded
10	10,000	\$151	4,000
9	9,000	131	6,000
8	8,000	111	8,000
7	7,000	91	9,000
6	6,000	81	11,000
0	0	71	13,000
0	0	61	16,000

TABLE 7.2

Firm and Market Supply and Market Demand

Will these conditions of market supply and demand make this a profitable or unprofitable industry? Multiplying product price (\$111) by output (8 units), we find that the total revenue of each firm is \$888. The total cost is \$750, found by looking at column 4 in the table in Figure 6.3. The \$138 difference is the economic profit of each firm. For the industry, total economic profit is \$138,000. This, then, is a profitable industry.

Another way of calculating economic profit is to determine per-unit profit by subtracting average total cost (\$93.75) from product price (\$111) and multiplying the difference (per-unit profit of \$17.25) by the firm's equilibrium level of output (8). Again we obtain an economic profit of \$138 per firm and \$138,000 for the industry.

Figure 7.6 shows this analysis graphically. The individual supply curves of each of the 1000 identical firms—one of which is shown as s = MC in Figure 7.6a—are summed horizontally to get the total-supply curve $S = \Sigma MC$'s of Figure 7.6b. With total-demand curve D, it yields the equilibrium price \$111 and equilibrium quantity (for the industry) 8000 units. This equilibrium price is given and unalterable to the individual firm; that is, each firm's demand curve is perfectly elastic at the equilibrium price, as indicated by d in Figure 7.6a. Because the individual firm is a price

FIGURE 7.6 Short-run competitive equilibrium for (a) a firm and (b) the industry. The horizontal sum of the 1000 firms' individual supply curves (s) determines the industry (market) supply curve (S). Given industry (market) demand (D), the short-run equilibrium price and output for the industry are \$111 and 8000 units. Taking the equilibrium price as given, the individual firm establishes its profit-maximizing output at 8 units and, in this case, realizes the economic profit represented by the gray area.



WORKED PROBLEMS W 7.2 Short-run competitive equilibrium taker, the marginal-revenue curve coincides with the firm's demand curve d. This \$111 price exceeds the average total cost at the firm's equilibrium MR = MC output of 8 units, so the firm earns an economic profit represented by the gray area in Figure 7.6a.

Assuming no changes in costs or market demand, these diagrams reveal a genuine equilibrium in the short run. There are no shortages or surpluses in the market to cause price or total quantity to change. Nor can any firm in the industry increase its profit by altering its output. Note, however, that weaker market demand or stronger market supply (and therefore lower prices) could shift the line *d* downward and change the situation to losses (P < ATC) or even to shutdown (P < AVC).

Firm versus Industry Figure 7.6 underscores a point made earlier: Product price is a given fact to the individual competitive firm, but the supply plans of all competitive producers as a group are a basic determinant of product price. There is no inconsistency here. One firm, supplying a negligible fraction of total supply, cannot affect price. But the sum of the supply curves of all the firms in the industry constitutes the market supply curve, and that curve (along with demand) does have an important bearing on equilibrium price.

Profit Maximization in the Long Run

In the short run, the industry is composed of a specific number of firms, each with a fixed, unalterable plant. Firms may shut down in the sense that they can produce zero units of output in the short run, but they do not have sufficient time to liquidate their assets and go out of business. By contrast, in the long run, firms already in an industry have sufficient time either to expand or to contract their capacities. More important, the number of firms in the industry may either increase or decrease as new firms enter or existing firms leave. You need to know how these long-run adjustments affect price, quantity, and profits.

Assumptions

We make three simplifying assumptions, none of which alters our conclusions:

- *Entry and exit only* The only long-run adjustment is the entry or exit of firms. Moreover, we ignore all short-run adjustments in order to concentrate on the effects of the long-run adjustments.
- *Identical costs* All firms in the industry have identical cost curves. This assumption lets us discuss an "average," or "representative," firm, knowing that all other firms in the industry are similarly affected by any long-run adjustments that occur.
- *Constant-cost industry* The industry is a constant-cost industry. This means that the entry and exit of firms does not affect resource prices or, consequently, the locations of the average-total-cost curves of individual firms.

Goal of Our Analysis

The basic conclusion we seek to explain is this: After all long-run adjustments are completed, product price will be exactly equal to, and production will occur at, each firm's minimum average total cost.

This conclusion follows from two basic facts: (1) Firms seek profits and shun losses and (2) under pure competition, firms are free to enter and leave an industry. If market price initially exceeds minimum average total costs, the resulting economic profits will attract new firms to the industry. But this industry expansion will increase supply until price is brought back down to equality with minimum average total cost. Conversely, if price is initially less than minimum average total cost, resulting losses will cause firms to leave the industry. As they leave, total supply will decline, bringing the price back up to equality with minimum average total cost.

Long-Run Equilibrium

Consider the average firm in a purely competitive industry that is initially in long-run equilibrium. This firm is represented in Figure 7.7a, where MR = MC and price and minimum average total cost are equal at \$50. Economic profit here is zero; the industry is in equilibrium or "at rest" because there is no tendency for firms to enter or to leave. The existing firms are earning normal profits, which, recall, are included in their cost curves. The \$50 market price is determined in Figure 7.7b by market or industry demand D_1 and supply S_1 . (S_1 is a short-run supply curve; we will develop the long-run industry supply curve in our discussion.)

As shown on the quantity axes of the two graphs, equilibrium output in the industry is 100,000 while equilibrium output for the single firm is 100. If all firms in the industry are identical, there must be 1000 firms (=100,000/100).

Entry Eliminates Economic Profits Let's upset the long-run equilibrium in Figure 7.7 and see what happens. Suppose a change in consumer tastes increases product demand from D_1 to D_2 . Price will rise to \$60, as determined at the intersection of D_2 and S_1 , and the firm's marginal-revenue curve will shift upward to \$60. This \$60 price exceeds the firm's average total cost of \$50 at output 100, creating an economic profit of \$10 per unit. This economic profit will lure new firms into the industry. Some entrants will be newly created firms; others will shift from less-prosperous industries.

As firms enter, the market supply of the product increases and the product price falls below \$60. Economic profits persist, and entry continues until short-run supply increases to S_2 . Market price falls to \$50, as does marginal revenue for the firm. Price and minimum average total cost are again equal at \$50. The economic profits caused

FIGURE 7.7 Temporary profits and the reestablishment of long-run equilibrium in (a) a representative firm and (b) the industry. A favorable shift in demand $(D_1 \text{ to } D_2)$ will upset the original industry equilibrium and produce economic profits. But those profits will entice new firms to enter the industry, increasing supply $(S_1 \text{ to } S_2)$ and lowering product price until economic profits are once again zero.



FIGURE 7.8 Temporary losses and the reestablishment of long-run equilibrium in (a) a representative firm and (b) the industry. An unfavorable shift in demand (D_1 to D_3) will upset the original industry equilibrium and produce losses. But those losses will cause firms to leave the industry, decreasing supply (S_1 to S_3) and increasing product price until all losses have disappeared.



by the boost in demand have been eliminated, and, as a result, the previous incentive for more firms to enter the industry has disappeared. Long-run equilibrium has been restored.

Observe in Figure 7.7a and 7.7b that total quantity supplied is now 110,000 units and each firm is producing 100 units. Now 1100 firms rather than the original 1000 populate the industry. Economic profits have attracted 100 more firms.

Exit Eliminates Losses Now let's consider a shift in the opposite direction. We begin in Figure 7.8b with curves S_1 and D_1 setting the same initial long-run equilibrium situation as in our previous analysis, including the \$50 price.

Suppose consumer demand declines from D_1 to D_3 . This forces the market price and marginal revenue down to \$40, making production unprofitable at the minimum ATC of \$50. In time the resulting losses will induce firms to leave the industry. Their owners will seek a normal profit elsewhere rather than accept the below-normal profits (losses) now confronting them. As this exodus of firms proceeds, however, industry supply decreases, pushing the price up from \$40 toward \$50. Losses continue and more firms leave the industry until the supply curve shifts to S_3 . Once this happens, price is again \$50, just equal to the minimum average total cost. Losses have been eliminated and long-run equilibrium is restored.

In Figure 7.8a and 7.8b, total quantity supplied is now 90,000 units and each firm is producing 100 units. Only 900 firms, not the original 1000, populate the industry. Losses have forced 100 firms out.

You may have noted that we have sidestepped the question of which firms will leave the industry when losses occur by assuming that all firms have identical cost curves. In the "real world," of course, managerial talents differ. Even if resource prices and technology are the same for all firms, less skillfully managed firms tend to incur higher costs and therefore are the first to leave an industry when demand declines. Similarly, firms with less-productive labor forces or higher transportation costs will be higher-cost producers and likely candidates to quit an industry when demand decreases.

The Exit of Farmers from U.S. Agriculture

The U.S. agricultural industry serves as a good example of how losses resulting from declining prices received by individual producers create an exit of producers from an industry.

A rapid rate of technological advance has significantly increased the *supply* of U.S. agricultural products over time. This technological progress has many roots: the mechanization of farms, improved techniques of land management, soil conservation, irrigation, development of hybrid crops, availability of improved fertilizers and insecticides, polymer-coated seeds, and improvements in the breeding and care of livestock. In 1950 each farmworker produced enough food and fiber to support about a dozen people. By 2007 that figure had increased to more than 100 people!

Increases in *demand* for agricultural products, however, have failed to keep pace with technologically created increases in the supply of the products. The demand for farm products in the United States is *income-inelastic*. Estimates indicate that a 10 percent increase in real per capita after-tax income produces about a 2 percent increase in consumption of farm products. Once consumers' stomachs are filled, they turn to the amenities of life that manufacturing and services, not agriculture, provide. So, as the incomes of Americans rise, the demand for farm products increases far less rapidly than the demand for products in general.

The consequences of the long-run supply and demand conditions just outlined have been those predicted by the long-run pure-competition model. Financial losses in agriculture have triggered a large decline in the number of farms and a massive exit of workers to other sectors of the economy. In 1950 there were about 5.4 million farms in the United States employing 9.3 million people. Today there are just over 2 million farms employing 1.9 million people. Since 1950, farm employment has declined from 15.8 percent of the U.S. workforce to just 1.3 percent. Moreover, the exodus of farmers would have been even larger in the absence of government subsidies that have enabled many farmers to remain in agriculture. Such subsidies were traditionally in the form of government price supports (price floors) but have more recently evolved to direct subsidy payments to farmers. Such payments have averaged more than \$18 billion annually over the last decade.

Question:

Why is the exit of farmers from U.S. agriculture bad for the farmers who must leave but good for the farmers who remain?

Long-Run Supply for a Constant-Cost Industry

We have established that changes in market supply through entry and exit create a long-run equilibrium in purely competitive markets. Although our analysis has dealt with the long run, we have noted that the market supply curves in Figures 7.7b and 7.8b are short-run curves. What then is the character of the **long-run supply curve** of a competitive industry? Our analysis points us toward an answer. The crucial factor here is the effect, if any, that changes in the number of firms in the industry will have on costs of the individual firms in the industry.

long-run supply curve

A curve that shows the prices at which a purely competitive industry will make various quantities of the product available in the long run.

constant-cost industry

An industry in which the entry of new firms has no effect on resource prices and thus no effect on production costs. In our discussion of long-run competitive equilibrium, we assumed that the industry under discussion was a **constant-cost industry**. This means that industry expansion or contraction will not affect resource prices and therefore production costs. Graphically, it means that the entry or exit of firms does not shift the long-run ATC curves of individual firms. This is the case when the industry's demand for resources is small in relation to the total demand for those resources. Then the industry can expand or contract without significantly affecting resource prices and costs.

What does the long-run supply curve of a constant-cost industry look like? The answer is contained in our previous analysis. There we saw that the entry and exit of firms changes industry output but always brings the product price back to its original level, where it is just equal to the constant minimum ATC. Specifically, we discovered that the industry would supply 90,000, 100,000, or 110,000 units of output, all at a price of \$50 per unit. In other words, the long-run supply curve of a constant-cost industry is perfectly elastic.

Figure 7.9a demonstrates this graphically. Suppose industry demand is originally D_1 , industry output is Q_1 (100,000 units), and product price is P_1 (\$50). This situation, from Figure 7.7, is one of long-run equilibrium. We saw that when demand increases to D_2 , upsetting this equilibrium, the resulting economic profits attract new firms. Because this is a constant-cost industry, entry continues and industry output expands until the price is driven back down to the level of the unchanged minimum ATC. This is at price P_2 (\$50) and output Q_2 (110,000).

From Figure 7.8, we saw that a decline in market demand from D_1 to D_3 causes an exit of firms and ultimately restores equilibrium at price P_3 (\$50) and output Q_3 (90,000 units). The points Z_1 , Z_2 , and Z_3 in Figure 7.9a represent these three price-quantity combinations. A line or curve connecting all such points shows the various price-quantity combinations that firms would produce if they had enough time to make all desired adjustments to changes in demand. This line or curve is the industry's long-run supply curve. In a constant-cost industry, this curve (straight line) is horizontal, as in Figure 7.9a, thus representing perfectly elastic supply.






Long-Run Supply for an Increasing-Cost Industry

Constant-cost industries are a special case. Most industries are **increasing-cost industries**, in which firms' ATC curves shift upward as the industry expands and downward as the industry contracts. The construction industry and medical care industries are examples.

Usually, the entry of new firms will increase resource prices, particularly in industries using specialized resources whose long-run supplies do not readily increase in response to increases in resource demand. Higher resource prices result in higher long-run average total costs for all firms in the industry. These higher costs cause upward shifts in each firm's long-run ATC curve.

Thus, when an increase in product demand results in economic profits and attracts new firms to an increasing-cost industry, a two-way squeeze works to eliminate those profits. As before, the entry of new firms increases market supply and lowers the market price. But now each firm's ATC curve also shifts upward. The overall result is a higher-than-original equilibrium price. The industry produces a larger output at a higher product price because the industry expansion has increased resource prices and the minimum average total cost.

Since greater output will be supplied at a higher price, the long-run industry supply curve is upsloping. Instead of supplying 90,000, 100,000, or 110,000 units at the same price of \$50, an increasing-cost industry might supply 90,000 units at \$45, 100,000 units at \$50, and 110,000 units at \$55. A higher price is required to induce more production because costs per unit of output increase as production increases.

Figure 7.9b nicely illustrates the situation. Original market demand is D_1 and industry price and output are P_1 (\$50) and Q_1 (100,000 units), respectively, at equilibrium point Y_1 . An increase in demand to D_2 upsets this equilibrium and leads to economic profits. New firms enter the industry, increasing both market supply and production costs of individual firms. A new price is established at point Y_2 , where P_2 is \$55 and Q_2 is 110,000 units.

Conversely, a decline in demand from D_1 to D_3 makes production unprofitable and causes firms to leave the industry. The resulting decline in resource prices reduces the minimum average total cost of production for firms that stay. A new equilibrium price is established at some level below the original price, say, at point Y_3 , where P_3 is \$45 and Q_3 is 90,000 units. Connecting these three equilibrium positions, we derive the upsloping long-run supply curve S in Figure 7.9b.

Long-Run Supply for a Decreasing-Cost Industry

In **decreasing-cost industries**, firms experience lower costs as their industry expands. The personal computer industry is an example. As demand for personal computers increased, new manufacturers of computers entered the industry and greatly increased the resource demand for the components used to build them (for example, memory chips, hard drives, monitors, and operating software). The expanded production of the components enabled the producers of those items to achieve substantial economies of scale. The decreased production costs of the components reduced their prices, which greatly lowered the computer manufacturers' average costs of production. The supply of personal computers increased by more than demand, and the price of personal computers declined. Although not shown in Figure 7.9, the long-run supply curve of a decreasing-cost industry is *downsloping*.

increasing-cost industry

An industry in which the entry of new firms raises the prices for resources and thus increases their production costs.

decreasing-cost industry

An industry in which the entry of new firms lowers the prices of resources and thus decreases production costs.



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Photo Op Increasing-Cost versus Decreasing-Cost Industries

Mining is an example of an increasing-cost industry, whereas electronic goods is an example of a decreasing-cost industry

Pure Competition and Efficiency

Our final goal in this chapter is to examine the efficiency aspects of pure competition. Whether a purely competitive industry is a constant-cost industry or an increasing-cost industry, the final long-run equilibrium positions of all firms have the same basic efficiency characteristics. As shown in Figure 7.10, price (and marginal revenue) will settle where it is equal to minimum average total cost: P(and MR) = minimum ATC. Moreover, since the marginal-cost curve intersects the average-total-cost curve at its minimum point, marginal cost and average total cost are equal: MC = minimum ATC. So in long-run equilibrium, a multiple equality occurs: P(and MR) = MC = minimum ATC.

FIGURE 7.10 Long-run equilibrium of a competitive firm. The equality of price (*P*), marginal cost (MC), and minimum average total cost (ATC) indicates that the firm is achieving productive efficiency and allocative efficiency. It is using the most efficient technology, charging the lowest price, and producing the greatest output consistent with its costs. It is receiving only a normal profit, which is incorporated into the ATC curve. The equality of price and marginal cost indicates that society is allocating its scarce resources on the basis of consumer preferences.



This triple equality tells us that although a competitive firm may realize economic profit or loss in the short run, it will earn only a normal profit by producing in accordance with the MR (= P) = MC rule in the long run. Also, this triple equality suggests certain conclusions of great social significance concerning the efficiency of a purely competitive economy.

Economists agree that, subject to Chapter 5's qualifications relating to public goods and externalities, an idealized purely competitive market economy leads to an efficient use of society's scarce resources. This is true because a competitive market economy uses the limited amounts of resources available to society in a way that maximizes the satisfaction of consumers. In particular, competitive market economies generate both productive efficiency and allocative efficiency.

Productive efficiency requires that goods be produced in the least costly way. Allocative efficiency requires that resources be apportioned among firms and industries so as to yield the mix of products and services that is most wanted by society (least-cost production assumed). Allocative efficiency has been realized when it is impossible to alter the combination of goods produced and achieve a net gain for society. Let's look at how productive and allocative efficiency would be achieved under purely competitive conditions.

Productive Efficiency: P = Minimum ATC

In the long run, pure competition forces firms to produce at the minimum average total cost of production and to charge a price that is just consistent with that cost. That is a highly favorable situation from the consumer's point of view. It means that unless firms use the best-available (least-cost) production methods and combinations of inputs, they will not survive. Stated differently, it means that the minimum amount of resources will be used to produce any particular output. Let's suppose that output in Figure 7.10 is cucumbers.

In the final equilibrium position shown in Figure 7.10, suppose each firm in the cucumber industry is producing 100 units (say, pickup truckloads) of output by using \$5000 (equal to average total cost of 50×100 units) worth of resources. If one firm produced that same output at a total cost of, say, \$7000, its resources would be used inefficiently. Society would be faced with a net loss of \$2000 worth of alternative products. But this cannot happen in pure competition; this firm would incur a loss of \$2000, requiring it either to reduce its costs or go out of business.

Note, too, that consumers benefit from productive efficiency by paying the lowest product price possible under the prevailing technology and cost conditions. And the firm receives only a normal profit, which is part of its economic costs and thus incorporated in its ATC curve.

Allocative Efficiency: P = MC

Productive efficiency alone does not ensure the efficient allocation of resources. Leastcost production must be used to provide society with the "right goods"—the goods that consumers want most. Before we can show that the competitive market system does just that, we must discuss the social meaning of product prices. There are two critical elements here:

- The money price of any product is society's measure of the relative worth of an additional unit of that product—for example, cucumbers. So the price of a unit of cucumbers is the marginal benefit derived from that unit of the product.
- Similarly, recalling the idea of opportunity cost, we see that the marginal cost of an additional unit of a product measures the value, or relative worth, of the other goods sacrificed to obtain it. In producing cucumbers, resources are drawn away from producing other goods. The marginal cost of producing a unit of cucumbers measures society's sacrifice of those other products.

ORIGIN OF THE IDEA 07.1 Allocative efficiency **Efficient Allocation** In pure competition, when profit-motivated firms produce each good or service to the point where price (marginal benefit) and marginal cost are equal, society's resources are being allocated efficiently. Each item is being produced to the point at which the value of the last unit is equal to the value of the alternative goods sacrificed by its production. Altering the production of cucumbers would reduce consumer satisfaction. Producing cucumbers beyond the P = MC point in Figure 7.10 would sacrifice alternative goods whose value to society exceeds that of the extra cucumbers. Producing cucumbers short of the P = MC point would sacrifice cucumbers that society values more than the alternative goods its resources could produce.

Dynamic Adjustments A further attribute of purely competitive markets is their ability to restore efficiency when disrupted by changes in the economy. A change in consumer tastes, resource supplies, or technology will automatically set in motion the appropriate realignments of resources. For example, suppose that cucumbers and pickles become dramatically more popular. First, the price of cucumbers will increase, and so, at current output, the price of cucumbers will exceed their marginal cost. At this point efficiency will be lost, but the higher price will create economic profits in the cucumber industry and stimulate its expansion. The profitability of cucumbers will permit the industry to bid resources away from now less-pressing uses, say, watermelons. Expansion of the industry will end only when the price of cucumbers and their marginal cost are equal—that is, when allocative efficiency has been restored.

Similarly, a change in the supply of a particular resource—for example, the field laborers who pick cucumbers—or in a production technique will upset an existing price—marginal-cost equality by either raising or lowering marginal cost. The resulting inequality will cause business managers, in either pursuing profit or avoiding loss, to reallocate resources until price once again equals marginal cost. In so doing, they will correct any inefficiency in the allocation of resources that the original change may have temporarily imposed on the economy.

"Invisible Hand" Revisited Finally, the highly efficient allocation of resources that a purely competitive economy promotes comes about because businesses and resource suppliers seek to further their self-interest. For private goods with no externalities (Chapter 5), the "invisible hand" (Chapter 2) is at work. The competitive system not only maximizes profits for individual producers but also, at the same time, creates a pattern of resource allocation that maximizes consumer satisfaction. The invisible hand thus organizes the private interests of producers in a way that is fully in sync with society's interest in using scarce resources efficiently. Striving for profit (and avoiding losses) produces highly desirable economic outcomes.

Summary

- 1. Economists group industries into four models based on their market structures: (a) pure competition, (b) monopolistic competition, (c) oligopoly, and (d) pure monopoly.
- 2. A purely competitive industry consists of a large number of independent firms producing a standardized product. Pure competition assumes that firms and resources are mobile among different industries.
- 3. In a competitive industry, no single firm can influence market price. This means that the firm's demand curve is

perfectly elastic and price equals both marginal revenue and average revenue.

4. Provided price exceeds minimum average variable cost, a competitive firm maximizes profit or minimizes loss in the short run by producing the output at which price or marginal revenue equals marginal cost. If price is less than average variable cost, the firm minimizes its loss by shutting down. If price is greater than average variable cost but is less than average total cost, the firm minimizes its loss by

producing the MR (= P) = MC output. If price also exceeds average total cost, the firm maximizes its economic profit at the MR (= P) = MC output.

- 5. Applying the MR (= P) = MC rule at various possible market prices leads to the conclusion that the segment of the firm's short-run marginal-cost curve that lies above the firm's average-variable-cost curve is its short-run supply curve.
- 6. In the long run, the market price of a product will equal the minimum average total cost of production. At a higher price, economic profits would entice firms to enter the industry until those profits had been competed away. At a lower price, losses would force firms to exit the industry until the product price rose to equal average total cost.

Terms and Concepts

pure competition price taker average revenue total revenue marginal revenue MR = MC rule short-run supply curve long-run supply curve

- 7. The long-run supply curve is horizontal for a constant-cost industry, upsloping for an increasing-cost industry, and downsloping for a decreasing-cost industry.
- 8. The long-run equality of price and minimum average total cost means that competitive firms will use the most efficient known technology and charge the lowest price consistent with their production costs. It also means that the firm receives only a normal profit (which is one of its economic costs).
- 9. The long-run equality of price and marginal cost implies that resources will be allocated in accordance with consumer tastes. The competitive price system will reallocate resources in response to a change in consumer tastes, in technology, or in resource supplies and will thereby maintain allocative efficiency over time.

constant-cost industry increasing-cost industry decreasing-cost industry

Study Questions In connect

- 1. Briefly state the basic characteristics of pure competition. Strictly speaking, pure competition has probably never existed and probably never will. Then why study it? LOI
- 2. Use the following demand schedule to determine total revenue and marginal revenue for each possible level of sales: LO2

Quantity Demanded	Total Revenue	Marginal Revenue
0	\$	
L		\$
2		
3		
4		
5		
	Quantity Demanded 0 1 2 3 4 5	Quantity Demanded Total Revenue 0 \$ 1 2 3 4 5

- **a.** What can you conclude about the structure of the industry in which this firm is operating? Explain.
- **b.** Graph the demand, total-revenue, and marginal-revenue curves for this firm.
- **c.** Why do the demand, marginal-revenue, and average-revenue curves coincide?
- **d.** "Marginal revenue is the change in total revenue associated with additional units of output." Explain verbally and graphically, using the data in the table.

3. Assume the following cost data are for a purely competitive producer: **LO3**

Total Product	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0 2 3	\$60.00 30.00 20.00	\$45.00 42.50 40.00	\$105.00 72.50 60.00	\$45 40 35
4 5 6 7 8	15.00 12.00 10.00 8.57 7.50	37.50 37.00 37.50 38.57 40.63	52.50 49.00 47.50 47.14 48.13	30 35 40 45 55 65
9 10	6.67 6.00	43.33 46.50	50.00 52.50	75

- **a.** At a product price of \$56, will this firm produce in the short run? Why or why not? If it is preferable to produce, what will be the profit-maximizing or loss-minimizing output? Explain. What economic profit or loss will the firm realize per unit of output?
- **b.** Answer the relevant questions of 3a assuming product price is \$41.

- **c.** Answer the relevant questions of 3a assuming product price is \$32.
- **d.** In the table below, complete the short-run supply schedule for the firm (columns 1 and 2) and indicate the profit or loss incurred at each output (column 3).

(I) Price	(2) Quantity Supplied, Single Firm	(3) Profit (+) or Loss (–)	(4) Quantity Supplied, 1500 Firms
\$26		\$	
32			
38			
41			
46			
56			
66			

- e. Explain: "That segment of a competitive firm's marginalcost curve that lies above its average-variable-cost curve constitutes the short-run supply curve for the firm." Illustrate graphically. How does this curve relate to the law of diminishing returns (Chapter 6)?
- f. Using the data in 3d, assume that there are 1500 identical firms in this competitive industry; that is, there are 1500 firms, each of which has the cost data shown in the table. Complete the industry supply schedule (column 4).
- **g.** Suppose the market demand data for the product are as follows:

What will be the equilibrium price for the product in 3d? What will be the equilibrium output for the industry? For each firm? What will be the profit or loss per unit? Per firm? Will this industry expand or contract in the long run?

- **4.** Why is the equality of marginal revenue and marginal cost essential for profit maximization? Explain why price can be substituted for marginal revenue in the MR = MC rule when an industry is purely competitive. **LO3**
- **5.** Explain: "The short-run rule for operating or shutting down is P > AVC, operate; P < AVC shut down. The long-run rule for continuing in business or exiting the industry is $P \ge ATC$, continue; P < ATC, exit." **LO5**
- 6. Using diagrams for both the industry and a representative firm, illustrate competitive long-run equilibrium. Assuming constant costs, employ these diagrams to show how (a) an increase and (b) a decrease in market demand will upset that long-run equilibrium. Trace graphically and describe verbally the adjustment processes by which long-run equilibrium is restored. Now rework your analysis for increasing- and decreasing-cost industries, and compare the three long-run supply curves. **LO6**
- In long-run equilibrium, P = minimum ATC = MC. What is the significance of the equality of P and minimum ATC for society? The equality of P and MC? Distinguish between productive efficiency and allocative efficiency in your answer. LOS

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Price	Total Quantity Demanded
\$26	17,000
32	15,000
38	13,500
41	12,000
46	10,500
56	9,500
66	8,000

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.



IN THIS CHAPTER YOU WILL LEARN:

- I The characteristics of pure monopoly.
- 2 How a pure monopoly sets its profit-maximizing output and price.
- **3** The economic effects of monopoly.
- 4 Why a monopolist might prefer to charge different prices in different markets.
- 5 The antitrust laws that are used to deal with monopoly.

Pure Monopoly

We turn now from pure competition to pure monopoly (a single seller). You deal with monopolies—or near-monopolies—more often than you might think. This happens when you see the Microsoft Windows logo after you turn on your computer and when you swallow a prescription drug that is under patent. Depending on where you live, you may be patronizing a local or regional monopoly when you make a local telephone call, turn on your lights, or subscribe to cable TV.

What precisely do we mean by "pure monopoly," and what conditions enable it to arise and survive? How does a pure monopolist determine what price to charge? Does a pure monopolist achieve the efficiency associated with pure competition? If not, what should the government try to do about it? A model of pure monopoly will help us answer these questions. pure monopoly An industry in which one firm is the sole producer or seller of a product or service for which there are no close substitutes.

ORIGIN OF THE IDEA O 8.1 Monopoly

An Introduction to Pure Monopoly

Pure monopoly exists when a single firm is the sole producer of a product for which there are no close substitutes. Here are the main characteristics of **pure monopoly**:

- *Single seller* A pure, or absolute, monopoly is an industry in which a single firm is the sole producer of a specific good or the sole supplier of a service; the firm and the industry are synonymous.
- *No close substitutes* A pure monopoly's product is unique in that there are no close substitutes. The consumer who chooses not to buy the monopolized product must do without it.
- *Price maker* The pure monopolist controls the total quantity supplied and thus has considerable control over price; it is a *price maker*. (Unlike a pure competitor, which has no such control and therefore is a *price taker*.) The pure monopolist confronts the usual downward-sloping product demand curve. It can change its product price by changing the quantity of the product it produces. The monopolist will use this power whenever it is advantageous to do so.
- *Blocked entry* A pure monopolist faces no immediate competition because certain barriers keep potential competitors from entering the industry. Those barriers may be economic, technological, legal, or of some other type. But entry is totally blocked in pure monopoly.

Examples of *pure* monopoly are relatively rare, but there are excellent examples of less pure forms. In many cities, government-owned or government-regulated public utilities—natural gas and electric companies, the water company, the cable TV company, and the local telephone company—are all monopolies or virtually so.

There are also many "near-monopolies" in which a single firm has the bulk of sales in a specific market. Intel, for example, provides 80 percent of the central microprocessors used in personal computers. First Data Corporation, via its Western Union subsidiary, accounts for 80 percent of the market for money order transfers. Brannock Device Company has an 80 percent market share of the shoe-sizing devices found in shoe stores. Wham-O, through its Frisbee brand, sells 90 percent of plastic throwing disks. The De Beers diamond syndicate effectively controls 55 percent of the world's supply of rough-cut diamonds.

Professional sports teams are, in a sense, monopolies because they are the sole suppliers of specific services in large geographic areas. With a few exceptions, a single major-league team in each sport serves each large American city. If you want to see a live major-league baseball game in St. Louis or Seattle, you must patronize the Cardinals or the Mariners, respectively. Other geographic monopolies exist. For example, a small town may be served by only one airline or railroad. In a small, extremely isolated community, the local barber shop, dry cleaner, or grocery store may approximate a monopoly.

Of course, there is almost always some competition. Satellite television is a substitute for cable, and amateur softball is a substitute for professional baseball. The Linux operating system can substitute for Windows, and so on. But such substitutes are typically in some way less appealing.

Barriers to Entry

The factors that prohibit firms from entering an industry are called **barriers to entry**. In pure monopoly, strong barriers to entry effectively block all potential competition. Somewhat weaker barriers may permit *oligopoly*, a market structure dominated by a few firms. Still weaker barriers may permit the entry of a fairly large number of competing firms, giving rise to *monopolistic competition*. And the absence of any effective entry

barriers to entry

Any conditions that prevent the entry of firms into an industry. barriers permits the entry of a very large number of firms, which provide the basis of pure competition. So barriers to entry are pertinent not only to the extreme case of pure monopoly but also to other market structures in which there is some degree of monopoly-like conditions and behavior.

Economies of Scale

Modern technology in some industries is such that economies of scale—declining average total cost with added firm size—are extensive. So a firm's long-run average-cost schedule will decline over a wide range of output. Given market demand, only a few large firms or, in the extreme, only a single large firm can achieve low average total costs.

If a pure monopoly exists in such an industry, economies of scale will serve as an entry barrier and will protect the monopolist from competition. New firms that try to enter the industry as small-scale producers cannot realize the cost economies of the monopolist. They therefore will be undercut and forced out of business by the monopolist, which can sell at a much lower price and still make a profit because of its lower per-unit cost associated with its economies of scale. A new firm might try to start out big, that is, to enter the industry as a large-scale producer so as to achieve the necessary economies of scale. But the massive plant facilities required would necessitate huge amounts of financing, which a new and untried enterprise would find difficult to secure. In most cases, the financial obstacles and risks to "starting big" are prohibitive. This explains why efforts to enter such industries as automobiles, computer operating software, commercial aircraft, and basic steel are so rare.

In the extreme circumstance, in which the market demand curve cuts the long-run ATC curve where average total costs are still declining, the single firm is called a **natural monopoly.** It might seem that a natural monopolist's lower unit cost would enable it to charge a lower price than if the industry were more competitive. But that won't necessarily happen. As with any monopolist, a natural monopolist may, instead, set its price far above ATC and obtain substantial economic profit. In that event, the lowest-unit-cost advantage of a natural monopolist would accrue to the monopolist as profit and not as lower prices to consumers.

Legal Barriers to Entry: Patents and Licenses

Government also creates legal barriers to entry by awarding patents and licenses.

Patents A *patent* is the exclusive right of an inventor to use, or to allow another to use, her or his invention. Patents and patent laws aim to protect the inventor from rivals who would use the invention without having shared in the effort and expense of developing it. At the same time, patents provide the inventor with a monopoly position for the life of the patent. The world's nations have agreed on a uniform patent length of 20 years from the time of application. Patents have figured prominently in the growth of modern-day giants such as IBM, Pfizer, Kodak, Xerox, Intel, General Electric, and DuPont.

Research and development (R&D) is what leads to most patentable inventions and products. Firms that gain monopoly power through their own research or by purchasing the patents of others can use patents to strengthen their market position. The profit from one patent can finance the research required to develop new patentable products. In the pharmaceutical industry, patents on prescription drugs have produced large monopoly profits that have helped finance the discovery of new patentable medicines. So monopoly power achieved through patents may well be self-sustaining, even though patents eventually expire and generic drugs then compete with the original brand. ORIGIN OF THE IDEA O 8.2 Minimum efficient scale

natural monopoly An industry in which economies of scale are so great that only a single firm can achieve minimum efficient scale. **Licenses** Government may also limit entry into an industry or occupation through *licensing*. At the national level, the Federal Communications Commission licenses only so many radio and television stations in each geographic area. In many large cities, one of a limited number of municipal licenses is required to drive a taxicab. The consequent restriction of the supply of cabs creates economic profit for cab owners and drivers. New cabs cannot enter the industry to drive down prices and profits. In a few instances, the government might "license" itself to provide some product and thereby create a public monopoly. For example, in some states only state-owned retail outlets can sell liquor. Similarly, many states have "licensed" themselves to run lotteries.

Ownership or Control of Essential Resources

A monopolist can use private property as an obstacle to potential rivals. For example, a firm that owns or controls a resource essential to the production process can prohibit the entry of rival firms. At one time the International Nickel Company of Canada (now called Inco) controlled a large percentage of the world's known nickel reserves. A local firm may own all the nearby deposits of sand and gravel. And it is very difficult for new sports leagues to be created because existing professional sports leagues have contracts with the best players and have long-term leases on the major stadiums and arenas.

Pricing and Other Strategic Barriers to Entry

Even if a firm is not protected from entry by, say, extensive economies of scale or ownership of essential resources, entry may effectively be blocked by the way the monopolist responds to attempts by rivals to enter the industry. Confronted with a new entrant, the monopolist may "create an entry barrier" by slashing its price, stepping up its advertising, or taking other strategic actions to make it difficult for the entrant to succeed.

Examples of entry deterrence: In 2005 Dentsply, the dominant American maker of false teeth (70 percent market share) was found to have unlawfully precluded independent distributors of false teeth from carrying competing brands. The lack of access to the distributors deterred potential foreign competitors from entering the U.S. market. As another example, in 2001 a U.S. court of appeals upheld a lower court's finding that Microsoft used a series of illegal actions to maintain its monopoly in Intel-compatible PC operating systems (95 percent market share). One such action was charging higher prices for its Windows operating system to computer manufacturers that featured Netscape's Navigator rather than Microsoft's Internet Explorer.

Monopoly Demand

Now that we have explained the sources of monopoly, we want to build a model of pure monopoly so that we can analyze its price and output decisions. Let's start by making three assumptions:

- Patents, economies of scale, or resource ownership secures our firm's monopoly.
- No unit of government regulates the firm.
- The firm is a single-price monopolist; it charges the same price for all units of output.

The crucial difference between a pure monopolist and a purely competitive seller lies on the demand side of the market. The purely competitive seller faces a perfectly elastic demand at the price determined by market supply and demand. It is a price taker that can sell as much or as little as it wants at the going market price. Each additional unit sold will add the amount of the constant product price to the firm's total revenue. That means that marginal revenue for the competitive seller is constant and equal to product price. (Review Figure 7.1 for price, marginal-revenue, and total-revenue relationships for the purely competitive firm.)

The demand curve for the monopolist (or oligopolist or monopolistic competitor) is quite different from that of the pure competitor. Because the pure monopolist *is* the industry, its demand curve is *the market demand curve*. And because market demand is not perfectly elastic, the monopolist's demand curve is downsloping. Columns 1 and 2 in the table in Figure 8.1 illustrate this fact. Note that quantity demanded increases as price decreases.

In Chapter 7 we drew separate demand curves for the purely competitive industry and for a single firm in such an industry. But only a single demand curve is needed in pure monopoly because the firm and the industry are one and the same. We have graphed part of the demand data in the table in Figure 8.1 as demand curve D in Figure 8.1a. This is the monopolist's demand curve *and* the market demand curve. The downward-sloping demand curve has two implications that are essential to understanding the monopoly model.

Marginal Revenue Is Less Than Price

With a fixed downsloping demand curve, the pure monopolist can increase sales only by charging a lower price. Consequently, marginal revenue is less than price (average revenue) for every unit of output except the first. Why so? The reason is that the lower price of the extra unit of output also applies to all prior units of output. The monopolist could have sold these prior units at a higher price if it had not produced and sold the extra output. Each additional unit of output sold increases total revenue by an amount equal to its own price less the sum of the price cuts that apply to all prior units of output.

Figure 8.1a confirms this point. There, we have highlighted two price-quantity combinations from the monopolist's demand curve. The monopolist can sell 1 more unit at \$132 than it can at \$142 and that way obtain \$132 of extra revenue (the blue area). But to sell that fourth unit for \$132, the monopolist must also sell the first 3 units at \$132 rather than \$142. The \$10 reduction in revenue on 3 units results in a \$30 revenue loss (the red area). The net difference in total revenue from selling a fourth unit is \$102: the \$132 gain from the fourth unit minus the \$30 forgone on the first 3 units. This net gain (marginal revenue) of \$102 from the fourth unit is clearly less than the \$132 price of the fourth unit.

Column 4 in the table shows that marginal revenue is always less than the corresponding product price in column 2, except for the first unit of output. We show the relationship between the monopolist's demand curve and marginal-revenue curve in Figure 8.1b. For this figure, we extended the demand and marginal-revenue data of columns 1, 2, and 4 in the table, assuming that successive \$10 price cuts each elicits 1 additional unit of sales. That is, the monopolist can sell 11 units at \$62, 12 units at \$52, and so on. Note that the monopolist's MR curve lies below the demand curve, indicating that marginal revenue is less than price at every output quantity except the very first unit.

The Monopolist Is a Price Maker

All imperfect competitors, whether they are pure monopolists, oligopolists, or monopolistic competitors, face downward-sloping demand curves. So firms in those industries can, to one degree or another, influence total supply through their own output decisions. In changing market supply, they also can influence product price. Firms with downsloping demand curves are *price makers*.

FIGURE 8.1 Demand, price, and marginal revenue in pure

monopoly. (a) A pure monopolist (or any other imperfect competitor) must set a lower price in order to sell more output. Here, by charging \$132 rather than \$142, the monopolist sells an extra unit (the fourth unit) and gains \$132 from that sale. But from this gain \$30 is subtracted, which reflects the \$10 less the monopolist received for each of the first 3 units. Thus, the marginal revenue of the fourth unit is 102 (= 132 - 30), considerably less than its \$132 price. (b) Because a monopolist must lower the price on all units sold in order to increase its sales, its marginal-revenue curve (MR) lies below its downsloping demand curve (D).

Revenue Data				
(I) Quantity of Output	(2) Price (Average Revenue)	(3) Total Revenue, (1) × (2)	(4) Marginal Revenue	
0	\$172	\$0 ₇		
I.	162	162 -	\$162	
2	152	304 -	142	
3	142	426 -	122	
4	132	528 -	102	
5	122	610 -	82	
6	112	672 -	62	
7	102	714 -	42	
8	92	736 -	22	
9	82	738 -	2	
10	72	720	-18	





Demand and marginal-revenue curves

This is most evident in pure monopoly, where one firm controls total output. The monopolist faces a downsloping demand curve in which each amount of output is associated with some unique price. Thus, in deciding on the quantity of output to produce, the monopolist is also indirectly determining the price it will charge. Through control of output, it can "make the price." From columns 1 and 2 in the table in Figure 8.1 we find that the monopolist can charge a price of \$72 if it produces and offers for sale 10 units, a price of \$82 if it produces and offers for sale 9 units, and so forth.

Output and Price Determination

At what specific price-quantity combination will a profit-maximizing monopolist choose to operate? To answer this question, we must add production costs to our analysis.

Cost Data

On the cost side, we will assume that although the firm is a monopolist in the product market, it hires resources competitively and employs the same technology as Chapter 7's competitive firm does. This lets us use the cost data we developed in Chapter 6 and applied in Chapter 7, so we can compare the price-output decisions of a pure monopoly with those of a pure competitor. Columns 5 through 7 in the table in Figure 8.2 restate the pertinent cost data from the table in Figure 7.2.

MR = MC Rule

A monopolist seeking to maximize total profit will employ the same rationale as a profitseeking firm in a competitive industry. If producing is preferable to shutting down, it will produce up to the output at which marginal revenue equals marginal cost (MR = MC).

A comparison of columns 4 and 7 in the table in Figure 8.2 indicates that the profit-maximizing output is 5 units because the fifth unit is the last unit of output whose marginal revenue exceeds its marginal cost. What price will the monopolist charge? The demand schedule shown as columns 1 and 2 in the table indicates there is only one price at which 5 units can be sold: \$122.

This analysis is shown in Figure 8.2, where we have graphed the demand, marginal-revenue, average-total-cost, and marginal-cost data from the table. The profit-maximizing output occurs at 5 units of output (Q_m), where the marginal-revenue (MR) and marginal-cost (MC) curves intersect. There, MR = MC.

To find the price the monopolist will charge, we extend a vertical line from Q_m up to the demand curve D. The unique price P_m at which Q_m units can be sold is \$122. In this case, it is the profit-maximizing price. The monopolist sets the quantity at Q_m to charge its profit-maximizing price of \$122.

Columns 2 and 5 of the table show that at 5 units of output, the product price (\$122) exceeds the average total cost (\$94). The monopolist thus obtains an economic profit of \$28 per unit, and the total economic profit is then \$140 (= 5 units × \$28). In the graph in Figure 8.2, per-unit profit is $P_m - A$, where A is the average total cost of producing Q_m units. Total economic profit of \$140 (the gray rectangle) is found by multiplying this per-unit profit by the profit-maximizing output Q_m .

Misconceptions Concerning Monopoly Pricing

Our analysis exposes three fallacies concerning monopoly behavior.

Not Highest Price Because a monopolist can manipulate output and price, people often believe it "will charge the highest price possible." That is incorrect. There are many prices above P_m in Figure 8.2, but the monopolist shuns them because they

WORKED PROBLEMS



FIGURE 8.2 Profit maximization by a pure monopolist. The pure monopolist maximizes profit by producing the MR = MC output, here $Q_m = 5$ units. Then, as seen from the demand curve, it will charge price $P_m =$ \$122. Average total cost is A =\$94, so per-unit profit is $P_m - A$ and total profit is $5 \times (P_m - A)$. Total economic profit is thus \$140, as shown by the gray rectangle.

	Reve	nue Data			Cost	: Data	
(I) Quantity of Output	(2) Price (Average Revenue)	(3) Total Revenue, (1) × (2)	(4) Marginal Revenue	(5) Average Total Cost	(6) Total Cost, (1) × (5)	(7) Marginal Cost	(8) Profit (+) or Loss (-)
0 1 2 3 4 <i>5</i> 6 7 8 9	\$172 162 152 142 132 /22 112 102 92 82 72	\$ 0 162 304 426 528 610 672 714 736 738 720	\$162 142 122 102 82 62 42 22 2 -18	\$190.00 135.00 113.33 100.00 94.00 91.67 91.43 93.75 97.78 103.00	\$ 100 190 270 340 400 470 550 640 750 880 1020	\$ 90 80 70 60 70 80 90 110 130 150	\$-100 - 28 + 34 + 86 + 128 + 140 + 122 + 74 - 14 - 142 - 310



yield a smaller-than-maximum total profit. The monopolist seeks maximum total profit, not maximum price. Some high prices that could be charged would reduce sales and total revenue too severely to offset any decrease in total cost.

Total, Not Unit, Profit The monopolist seeks maximum *total* profit, not maximum *unit* profit. In Figure 8.2 a careful comparison of the vertical distance between average total cost and price at various possible outputs indicates that per-unit

profit is greater at a point slightly to the left of the profit-maximizing output Q_m . This is seen in the table, where unit profit at 4 units of output is \$32 (= \$132 - \$100) compared with \$28 (= \$122 - \$94) at the profit-maximizing output of 5 units. Here the monopolist accepts a lower-than-maximum per-unit profit because additional sales more than compensate for the lower unit profit. A profit-seeking monopolist would rather sell 5 units at a profit of \$28 per unit (for a total profit of \$140) than 4 units at a profit of \$32 per unit (for a total profit of \$128).

Possibility of Losses The likelihood of economic profit is greater for a pure monopolist than for a pure competitor. In the long run, the pure competitor is destined to have only a normal profit, whereas barriers to entry mean that any economic profit realized by the monopolist can persist. In pure monopoly there are no new entrants to increase supply, drive down price, and eliminate economic profit.

But pure monopoly does not guarantee profit. Despite dominance in its market (as, say, a seller of home sewing machines), a monopoly enterprise can suffer a loss because of weak demand and relatively high costs. If the demand and cost situation faced by the monopolist is far less favorable than that in Figure 8.2, the monopolist can incur losses. Like the pure competitor, the monopolist will not persist in operating at a loss in the long run. Faced with continuing losses, the firm's owners will move their resources to alternative industries that offer better profit opportunities. Like any firm, a monopolist must obtain a minimum of a normal profit in the long run or it will go out of business.

Economic Effects of Monopoly

Let's now evaluate pure monopoly from the standpoint of society as a whole. Our reference for this evaluation will be the outcome of long-run efficiency in a purely competitive market, identified by the triple equality P = MC = minimum ATC.

Price, Output, and Efficiency

Figure 8.3 graphically contrasts the price, output, and efficiency outcomes of pure monopoly and a purely competitive *industry*. The S = MC curve in Figure 8.3a reminds us that the market supply curve S for a purely competitive industry is the horizontal sum of the marginal-cost curves of all the firms in the industry. Suppose there are 1000 such firms. Comparing their combined supply curve S with market demand D, we see that the purely competitive price and output are P_c and Q_c .

Recall that this price-output combination results in both productive efficiency and allocative efficiency. *Productive efficiency* is achieved because free entry and exit force firms to operate where their average total cost is at a minimum. The sum of the minimum-ATC outputs of the 1000 pure competitors is the industry output, here, Q_c . Product price is at the lowest level consistent with minimum average total cost. The *allocative efficiency* of pure competition results because production occurs up to that output at which price (the measure of a product's value or marginal benefit to society) equals marginal cost (the worth of the alternative products forgone by society in producing any given commodity). In short: P = MC =minimum ATC.

Now let's suppose that this industry becomes a pure monopoly (Figure 8.3b) as a result of one firm acquiring all its competitors. We also assume that no changes in costs or market demand result from this dramatic change in the industry structure. What formerly were 1000 competing firms are now a single pure monopolist consisting of 1000 noncompeting branches.

FIGURE 8.3 Inefficiency of pure monopoly relative to a purely competitive industry. (a) In a purely competitive industry, entry and exit of firms ensure that price (P_c) equals marginal cost (MC) and that the minimum average-total-cost output (Q_c) is produced. Both productive efficiency $(P = \min \text{ATC})$ and allocative efficiency (P = MC) are obtained. (b) In pure monopoly, the MR curve lies below the demand curve. The monopolist maximizes profit at output Q_m , where MR = MC, and charges price P_m . So output is lower $(Q_m \text{ rather than } Q_c)$ and price is higher $(P_m \text{ rather than } P_c)$ than they would be in a purely competitive industry. Monopoly is inefficient since output is less than that required for achieving minimum ATC (here, at Q_c) and because the monopolist's price exceeds MC.



The competitive market supply curve *S* has become the marginal-cost curve (MC) of the monopolist, the summation of the MC curves of its many branch plants. The important change, however, is on the demand side. From the viewpoint of each of the 1000 individual competitive firms, demand was perfectly elastic, and marginal revenue was therefore equal to price. Each firm equated MR (= price) and MC in maximizing profits. But market demand and individual demand are the same to the pure monopolist. The firm *is* the industry, and thus the monopolist sees the downsloping demand curve *D* shown in Figure 8.3b.

This means that marginal revenue is less than price, that graphically the MR curve lies below demand curve *D*. In using the MR = MC rule, the monopolist selects output Q_m and price P_m . A comparison of both graphs in Figure 8.3 reveals that the monopolist finds it profitable to sell a smaller output at a higher price than do the competitive producers.

Monopoly yields neither productive nor allocative efficiency. The monopolist's output is less than Q_c , the output at which average total cost is lowest. And price is higher than the competitive price P_c , which in long-run-equilibrium pure competition equals minimum average total cost. Thus the monopoly price *exceeds* minimum average total cost. Also, at the monopolist's Q_m output, product price is considerably higher than marginal cost, meaning that society values additional units of this monopolized product more highly than it values the alternative products the resources could otherwise produce.

So the monopolist's profit-maximizing output results in an underallocation of resources. The monopolist finds it profitable to restrict output and therefore employ fewer resources than are justified from society's standpoint. So the monopolist does not achieve allocative efficiency. In monopoly, then

- *P* exceeds MC.
- *P* exceeds minimum ATC.

Income Transfer

In general, monopoly transfers income from consumers to the stockholders who own the monopoly. Because of their market power, monopolists charge a higher price than would a purely competitive firm with the same costs. So monopolists in effect levy a "private tax" on consumers and often obtain substantial economic profits. These monopolistic profits are not equally distributed because corporate stock is largely owned by high-income groups. The owners of monopolistic enterprises thus tend to benefit at the expense of the consumers, who "overpay" for the product. Because, on average, these owners have more income than the buyers, monopoly increases income inequality.

Exception: If the buyers of a monopoly product are wealthier than the owners of the monopoly, the income transfer from consumers to owners may reduce income inequality. But, in general, this is not case. In normal circumstances, monopoly contributes to income inequality.

Cost Complications

Our conclusion has been that, given identical costs, a purely monopolistic industry will charge a higher price, produce a smaller output, and allocate economic resources less efficiently than a purely competitive industry. These inferior results are rooted in the entry barriers present in monopoly.

Now we must recognize that costs may not be the same for purely competitive and monopolistic producers. The unit cost incurred by a monopolist may be either larger or smaller than that incurred by a purely competitive firm. There are four reasons why costs may differ: (1) economies of scale, (2) a factor called "X-inefficiency," (3) the need for monopoly-preserving expenditures, and (4) the "very long run" perspective, which allows for technological advance.

Economies of Scale Once Again Where economies of scale are extensive, market demand may not be sufficient to support a large number of competing firms, each producing at minimum efficient scale (MES). In such cases, an industry of one or two firms would have a lower average total cost than would the same industry made up of numerous competitive firms. At the extreme, only a single firm—a natural monopoly—might be able to achieve the lowest long-run average total cost.

Some firms relating to new information technologies—for example, computer software, Internet service, and wireless communications—have displayed extensive economies of scale. As these firms have grown, their long-run average total costs have declined because of greater use of specialized inputs, the spreading of product development costs, and learning by doing. Also, *simultaneous consumption* and *network effects* have reduced costs.

A product's ability to satisfy a large number of consumers at the same time is called **simultaneous consumption.** Dell Inc. needs to produce a personal computer for each customer, but Microsoft needs to produce its Windows program only once. Then, at very low marginal cost, Microsoft delivers its program by disk or Internet to millions of consumers. Others able to deliver to additional consumers at low cost include Internet service providers, music producers, and wireless communication firms. Because marginal costs are so low, the average total cost of output typically declines as more customers are added.

Network effects are present if the value of a product to each user, including existing users, increases as the total number of users rises. Good examples are computer software, cell phones, social networking software, palm computers, and other products related to the Internet. When other people have Internet service and devices to access

simultaneous consumption A product's ability to satisfy a large number of consumers at the same time.

network effects

Increases in the value of a product to each user as the total number of users rises.

ORIGIN OF THE IDEA 0 8.3 X-inefficiency

X-inefficiency

The production of output, whatever its level, at higher than the lowest average (and total) cost possible.

rent-seeking behavior

Any action designed to gain special benefits from government at taxpayers' or someone else's expense. it, a person can conveniently send e-mail messages to them. And when they have similar software, then documents, spreadsheets, and photos can be attached to the e-mail messages. The greater the number of persons connected to the system, the greater are the benefits of the product to each person.

Such network effects may drive a market toward monopoly because consumers tend to choose standard products that everyone else is using. The focused demand for these products permits their producers to grow rapidly and thus achieve economies of scale. Smaller firms, which have either higher-cost "right" products or "wrong" products, get acquired or go out of business.

Economists generally agree that some new information firms have not yet exhausted their economies of scale. But most economists question whether such firms are truly natural monopolies. Most firms eventually achieve their minimum efficient scale at less than the full size of the market. That means competition among firms is possible.

But even if natural monopoly develops, it's unlikely that the monopolist will pass cost reductions along to consumers as price reductions. So, with perhaps a handful of exceptions, economies of scale do not change the general conclusion that monopolies are inefficient relative to more competitive industries.

X-Inefficiency In constructing all the average-total-cost curves used in this book, we have assumed that the firm uses the most efficient existing technology. In other words, it uses the procedures and combinations of inputs that permit it to achieve the lowest average total cost of whatever level of output it decides to produce. In contrast, **X-inefficiency** occurs when a firm produces output, whatever its level, at higher than the lowest possible cost of producing it. For example, in Figure 8.2 the ATC and MC curves might be located above those shown, indicating higher costs at each level of output.

Why is X-inefficiency allowed to occur if it reduces profits? The answer harks back to our early discussion of the principal-agent problem. Managers may have goals, such as expanding power, having an easier work life, avoiding business risk, or giving jobs to incompetent relatives, that conflict with cost minimization. Or X-inefficiency may arise because a firm's workers are poorly motivated or ineffectively supervised. Or a firm may simply become lethargic and inert, relying on rules of thumb or intuition in decision making as opposed to relevant calculations of costs and revenues.

Presumably, monopolistic firms tend more toward X-inefficiency than competitive producers do. Firms in competitive industries are continually under pressure from rivals, forcing them to be internally efficient to survive. But monopolists are sheltered from such competitive forces by entry barriers, and that lack of pressure may lead to X-inefficiency.

Rent-Seeking Expenditures Economists define **rent-seeking behavior** as any activity designed to transfer income or wealth to a particular firm or resource supplier at someone else's, or even society's, expense. We have seen that a monopolist can obtain an economic profit even in the long run. Therefore, it is no surprise that a firm may go to great expense to acquire or maintain a monopoly granted by government through legislation or an exclusive license. Such rent-seeking expenditures add nothing to the firm's output, but they clearly increase its costs. Taken alone, rent-seeking implies that monopoly involves higher costs and less efficiency than suggested in Figure 8.3b.

Technological Advance In the very long run, firms can reduce their costs through the discovery and implementation of new technology. If monopolists are more likely than competitive producers to develop more efficient production techniques over time, then the inefficiency of monopoly might be overstated. The general view of

economists is that a pure monopolist will not be technologically progressive. Although its economic profit provides ample means to finance research and development, it has little incentive to implement new techniques (or products). The absence of competitors means that there is no external pressure for technological advance in a monopolized market. Because of its sheltered market position, the pure monopolist can afford to be inefficient and lethargic; there is no major penalty for being so.

One caveat: Recall that entirely new products and new methods of production can suddenly supplant existing monopoly through the process of creative destruction (Chapter 2). Recognizing this threat, the monopolist may continue to engage in R&D and seek technological advance to avoid falling prey to future rivals. In this case technological advance is essential to the maintenance of monopoly. But forestalling creative destruction means that it is *potential* competition, not the monopoly market structure, that is driving the technological advance. By assumption, no such competition exists in the pure-monopoly model because entry is entirely blocked.

Is De Beers' Diamond Monopoly Forever?

De Beers, a Swiss-based company controlled by a South African corporation, produces about 45 percent of the world's rough-cut diamonds and purchases for resale a sizable number of the rough-cut diamonds produced by other mines worldwide. As a result, De Beers markets about 55 percent of the world's diamonds to a select group of diamond cutters and dealers. But that percentage has declined from 80 percent in the mid-1980s. Therein lies the company's problem.

De Beers' past monopoly behavior and results are a classic example of the monopoly model illustrated in Figure 8.2. No matter how many diamonds it mined or purchased, it sold only the quantity of diamonds that would yield an "appropriate" (monopoly) price. That price was well above production costs, and De Beers and its partners earned monopoly profits.

When demand fell, De Beers reduced its sales to maintain price. The excess of production over sales was then reflected in growing diamond stockpiles held by De Beers. It also attempted to bolster demand through advertising ("Diamonds are forever"). When demand was strong, it increased sales by reducing its diamond inventories.

De Beers used several methods to control the production of many mines it did not own. First, it convinced a number of independent producers that "singlechannel" or monopoly marketing through De Beers would maximize their profit. Second, mines that circumvented De Beers often found their market suddenly flooded with similar diamonds from De Beers' vast stockpiles. The resulting price decline and loss of profit often would encourage a "rogue" mine into the De Beers fold. Finally, De Beers simply purchased and stockpiled diamonds produced by independent mines to keep their added supplies from undercutting the market.

Several factors have come together to unravel the monopoly. New diamond discoveries resulted in a growing leakage of diamonds into world markets outside De Beers' control. For example, significant prospecting and trading in Angola APPLYING THE ANALYSIS occurred. Recent diamond discoveries in Canada's Northwest Territories posed another threat. Although De Beers is a participant in that region, a large uncontrolled supply of diamonds has begun to emerge. Similarly, although Russia's diamond monopoly Alrosa is part of the De Beers monopoly, it is allowed to sell one-half of its large diamond stock directly to diamond cutters.

Moreover, the international media began to focus heavily on the role that diamonds play in financing the bloody civil wars in Africa. Fearing a consumer boycott of diamonds, De Beers pledged that it would not buy these "conflict" diamonds or do business with any firms that did. These diamonds, however, continue to find their way into the marketplace, eluding De Beers' control.

In mid-2000 De Beers abandoned its attempt to control the supply of diamonds. Since then it has tried to transform itself from a diamond cartel to a modern international corporation selling "premium" diamonds under the De Beers label. It has gradually reduced its \$4 billion stockpile of diamonds and turned its efforts to increasing the demand for its "branded" diamonds through advertising. De Beers' new strategy is to establish itself as "the diamond supplier of choice."

Diamonds may be forever, but the DeBeers diamond monopoly was not. Nevertheless, with its high market share and ability to control its own production levels, De Beers continues to wield considerable influence over the price of roughcut diamonds.

Question:

De Beers' advertising is trying to establish the tradition of giving diamond anniversary rings. What is the logic behind its efforts? Use Figure 8.2 to demonstrate this graphically.

Price Discrimination

We have thus far assumed that the monopolist charges a single price to all buyers. But under certain conditions the monopolist can increase its profit by charging different prices to different buyers. In so doing, the monopolist is engaging in **price discrimination**, the practice of selling a specific product at more than one price when the price differences are not justified by cost differences.

Price discrimination is a common business practice that rarely reduces competition and therefore is rarely challenged by government. The exception occurs when a firm engages in price discrimination as part of a strategy to block entry or drive out competitors.

Conditions

The opportunity to engage in price discrimination is not readily available to all sellers. Price discrimination is possible when the following conditions are met:

- *Monopoly power* The seller must be a monopolist or, at least, must possess some degree of monopoly power, that is, some ability to control output and price.
- *Market segregation* At relatively low cost to itself, the seller must be able to segregate buyers into distinct classes, each of which has a different willingness or ability to pay for the product. This separation of buyers is usually based on different price elasticities of demand, as the examples below will make clear.
- *No resale* The original purchaser cannot resell the product or service. If buyers in the low-price segment of the market could easily resell in the high-price segment, the

price discrimination

The selling of a product to different buyers at different prices when the price differences are not justified by differences in costs.

ORIGIN OF THE IDEA

O 8.4 Price discrimination monopolist's price-discrimination strategy would create competition in the high-price segment. This competition would reduce the price in the high-price segment and undermine the monopolist's price-discrimination policy. This condition suggests that service industries such as the transportation industry or legal and medical services, where resale is impossible, are candidates for price discrimination.

Examples

Price discrimination is widely practiced in the U.S. economy. For example, airlines charge high fares to business travelers, whose demand for travel is inelastic, and offer lower highly restricted, nonrefundable fares to attract vacationers and others whose demands are more elastic.

Electric utilities frequently segment their markets by end uses, such as lighting and heating. The absence of reasonable lighting substitutes means that the demand for electricity for illumination is inelastic and that the price per kilowatt-hour for such use is high. But the availability of natural gas and petroleum for heating makes the demand for electricity for this purpose less inelastic and the price lower.

Movie theaters and golf courses vary their charges on the basis of time (for example, higher evening and weekend rates) and age (for example, lower rates for children, senior discounts). Railroads vary the rate charged per ton-mile of freight according to the market value of the product being shipped. The shipper of 10 tons of television sets or refrigerators is charged more than the shipper of 10 tons of gravel or coal.

The issuance of discount coupons, redeemable at purchase, is a form of price discrimination. It enables firms to give price discounts to their most price-sensitive customers who have elastic demand. Less price-sensitive consumers who have less elastic demand are not as likely to take the time to clip and redeem coupons. The firm thus makes a larger profit than if it had used a single-price, no-coupon strategy.

Finally, price discrimination often occurs in international trade. A Russian aluminum producer, for example, might sell aluminum for less in the United States than in Russia. In the United States, this seller faces an elastic demand because several substitute suppliers are available. But in Russia, where the manufacturer dominates the market and trade barriers impede imports, consumers have fewer choices and thus demand is less elastic.

Graphical Analysis

Figure 8.4 demonstrates price discrimination graphically. The two graphs are for a single pure monopolist selling its product, say, software, in two segregated parts of the market. For example, one segment might be small-business customers and the other students. Student versions of the software are identical to the versions sold to businesses but are available (1 per person) only to customers with a student ID. Presumably, students have lower ability to pay for the software and are charged a discounted price.

The demand curve D_b , in Figure 8.4a, represents the relatively inelastic demand for the product of business customers. The demand curve D_s , in Figure 8.4b, reflects the elastic demand of students. The marginal revenue curves (MR_b and MRs) lie below their respective demand curves, reflecting the demand–marginal revenue relationship previously described.

For visual clarity, we have assumed that average total cost (ATC) is constant. Therefore, marginal cost (MC) equals average total cost (ATC) at all quantities of output. These costs are the same for both versions of the software and therefore appear as the single straight line labeled "MC = ATC."

What price will the pure monopolist charge to each set of customers? Using the MR = MC rule for profit maximization, the firm will offer Q_b units of the software for

FIGURE 8.4 Price discrimination to different groups of buyers. The price-discriminating monopolist represented here maximizes its total profit by dividing the market into two segments based on differences in elasticity of demand. It then produces and sells the MR = MC output in each market segment. (For visual clarity, average total cost (ATC) is assumed to be constant. Therefore MC equals ATC at all output levels.) (a) The firm charges a higher price (here, P_b) to customers who have a less elastic demand curve and (b) a lower price (here, P_s) to customers with a more elastic demand. The price discriminator's total profit is larger than it would be with no discrimination and therefore a single price.



sale to small businesses. It can sell that profit-maximizing output by charging price P_b . Again using the MR = MC rule, the monopolist will offer Q_s units of software to students. To sell those Q_s units, the firm will charge students the lower price P_s .

Firms engage in price discrimination because it enhances their profit. The numbers (not shown) behind the curves in Figure 8.4 would reveal that the sum of the two profit rectangles shown in gray exceeds the single profit rectangle the firm would obtain from a single monopoly price. How do consumers fare? In this case, students clearly benefit by paying a lower price than they would if the firm charged a single monopoly price; in contrast, the price discrimination results in a higher price for business customers. Therefore, compared to the single-price situation, students buy more of the software and small businesses buy less.

APPLYING THE ANALYSIS

Price Discrimination at the Ballpark

Professional baseball teams earn substantial revenues through ticket sales. To maximize profit, they offer significantly lower ticket prices for children (whose demand is elastic) than those for adults (whose demand is inelastic). This discount may be as much as 50 percent.

If this type of price discrimination increases revenue and profit, why don't teams also price-discriminate at the concession stands? Why don't they offer halfprice hot dogs, soft drinks, peanuts, and Cracker Jack to children? The answer involves the three requirements for successful price discrimination. All three requirements are met for game tickets: (1) The team has monopoly power; (2) it can segregate ticket buyers by age group, each group having a different elasticity of demand; and (3) children cannot resell their discounted tickets to adults.

WORKED PROBLEMS

W 8.2 Price discrimination It's a different situation at the concession stands. Specifically, the third condition is *not* met. If the team had dual prices, it could not prevent the exchange or "resale" of the concession goods from children to adults. Many adults would send children to buy food and soft drinks for them: "Here's some money, Billy. Go buy 10 hot dogs for all of us." In this case, price discrimination would reduce, not increase, team profit. Thus, children and adults are charged the same high prices at the concession stands.

Question:

Why are the prices for concessions at the games quite high compared to prices for the same or similar items at the local convenience store?

Monopoly and Antitrust Policy

Monopoly is a legitimate concern. Monopolists can charge higher-than-competitive prices that result in an underallocation of resources to the monopolized product. They can stifle innovation, engage in rent-seeking behavior, and foster X-inefficiency. Even when their costs are low because of economies of scale, there is no guarantee that the price they charge will reflect those low costs. The cost savings may simply accrue to the monopoly as greater economic profit.

Not Widespread

Fortunately, however, monopoly is not widespread in the United States. Barriers to entry are seldom completely successful. Although research and technological advances may strengthen the market position of a monopoly, technology may also undermine monopoly power. Over time, the creation of new technologies may work to destroy monopoly positions (creative destruction). For example, the development of courier delivery, fax machines, and e-mail has eroded the monopoly power of the U.S. Postal Service. Cable television monopolies are now challenged by satellite TV and by new technologies that permit the transmission of audio and visual signals over the Internet.

Similarly, patents eventually expire; and even before they do, the development of new and distinct substitutable products often circumvents existing patent advantages. New sources of monopolized resources sometimes are found, and competition from foreign firms may emerge. (See Global Snapshot 8.1.) Finally, if a monopoly is sufficiently fearful of future competition from new products, it may keep its prices relatively low so as to discourage rivals from developing such products. If so, consumers may pay nearly competitive prices even though competition is currently lacking.

Antitrust Policy

What should government do about monopoly when it arises and persists in the real world? Economists agree that government needs to look carefully at monopoly on a case-by-case basis. If the monopoly appears to be unsustainable over a long period of time, say, because of emerging new technology, society can simply choose to ignore it. In contrast, the government may want to file charges against a monopoly under the antitrust laws if the monopoly was achieved through anticompetitive actions, creates substantial economic inefficiency, and appears to be long-lasting. (Monopolies were once called "trusts.") The relevant antitrust law is the Sherman Act of 1890, which has two main provisions:

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GLOBAL SNAPSHOT 8.1

Competition from Foreign Multinational Corporations

Competition from foreign multinational corporations diminishes the market power of firms in the United States. Here are just a few of the hundreds of foreign multinational corporations that compete strongly with U.S. firms in certain American markets.

Company (Country)	Main Products
Bayer (Germany)	chemicals
BP Amoco (United Kingdom)	gasoline
Michelin (France)	tires
NEC (Japan)	computers
Nestlé (Switzerland)	food products
Nokia (Finland)	wireless phones
Nokia (Finland) Royal Dutch/Shell (Netherlands)	wireless phones gasoline
Nokia (Finland) Royal Dutch/Shell (Netherlands) Royal Philips (Netherlands)	wireless phones gasoline electronics
Nokia (Finland) Royal Dutch/Shell (Netherlands) Royal Philips (Netherlands) Sony (Japan)	wireless phones gasoline electronics electronics
Nokia (Finland) Royal Dutch/Shell (Netherlands) Royal Philips (Netherlands) Sony (Japan) Toyota (Japan)	wireless phones gasoline electronics electronics automobiles

Source: Compiled from the Forbes 2000 listing of the world's largest firms, www.forbes.com.

- *Section 1* "Every contract, combination in the form of a trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations is declared to be illegal."
- *Section 2* "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony ..." (as later amended from "misdemeanor").

In the 1911 Standard Oil case, the Supreme Court found Standard Oil guilty of monopolizing the petroleum industry through a series of abusive and anticompetitive actions. The Court's remedy was to divide Standard Oil into several competing firms. But the Standard Oil case left open an important question: Is every monopoly in violation of Section 2 of the Sherman Act or just those created or maintained by anticompetitive actions?

In the 1920 U.S. Steel case, the courts established a **rule of reason** interpretation of Section 2, saying that it is not illegal to be a monopoly. Only monopolies that "un-reasonably" restrain trade violate Section 2 of the Sherman Act and are subject to anti-trust action. Size alone was not an offense. Although U.S. Steel clearly possessed monopoly power, it was innocent of "monopolizing" because it had not resorted to illegal acts against competitors in obtaining that power nor had it unreasonably used its monopoly power. Unlike Standard Oil, which was a "bad trust," U.S. Steel was a "good trust" and therefore not in violation of the law. The rule of reason was attacked and once reversed by the courts, but today it is the accepted legal interpretation of the Sherman Act's monopoly provisions.

rule of reason

The court ruling that only monopolies unreasonably attained or maintained are illegal. Today, the U.S. Department of Justice, the Federal Trade Commission, injured private parties, or state attorney generals can file antitrust suits against alleged violators of the Sherman Act. The courts can issue injunctions to prohibit anticompetitive practices (a behavioral remedy) or, if necessary, break up monopolists into competing firms (a structural remedy). Courts also can fine and imprison violators. Also, parties injured by monopolies can sue for *treble damages*—an award of three times the amount of the monetary injury done to them. In some cases, these damages have summed to millions or even billions of dollars.

The largest and most significant monopoly case of recent times is the Microsoft case, which is the subject of the application that follows.

United States v. Microsoft

In May 1998 the U.S. Justice Department, 19 individual states, and the District of Columbia (hereafter, "the government") filed antitrust charges against Microsoft under the Sherman Antitrust Act. The government charged that Microsoft had violated Section 2 of the act through a series of unlawful actions designed to maintain its "Windows" monopoly. It also charged that some of that conduct violated Section 1 of the Sherman Act, which prohibits actions that restrain trade or commerce.

Microsoft denied the charges, arguing it had achieved its success through product innovation and lawful business practices. Microsoft contended it should not be penalized for its superior foresight, business acumen, and technological prowess. It also insisted that its monopoly was highly transitory because of rapid technological advance.

In June 2000 the district court ruled that the relevant market was software used to operate Intel-compatible personal computers (PCs). Microsoft's 95 percent share of that market clearly gave it monopoly power. The court pointed out, however, that being a monopoly is not illegal. The violation of the Sherman Act occurred because Microsoft used anticompetitive means to maintain its monopoly power.

According to the court, Microsoft feared that the success of Netscape's Navigator, which allowed people to browse the Internet, might allow Netscape to expand its software to include a competitive PC operating system—software that would threaten the Windows monopoly. It also feared that Sun's Internet applications of its Java programming language might eventually threaten Microsoft's Windows monopoly.

To counter these and similar threats, Microsoft illegally signed contracts with PC makers that required them to feature its Internet Explorer on the PC desktop and penalized companies that promoted software products that competed with Microsoft products. Moreover, it gave friendly companies coding that linked Windows to software applications and withheld such coding from companies featuring Netscape. Finally, under license from Sun, Microsoft developed Windows related Java software that made Sun's own software incompatible with Windows.

The district court ordered Microsoft to split into two competing companies, one initially selling the Windows operating system and the other initially selling Microsoft applications (such as Word, Hotmail, MSN, PowerPoint, and Internet Explorer). Both companies would be free to develop new products that compete

APPLYING THE ANALYSIS

with each other, and both could derive those products from the intellectual property embodied in the common products existing at the time of divestiture.

In late 2000 Microsoft appealed the district court decision to a U.S. court of appeals. In 2001 the higher court affirmed that Microsoft illegally maintained its monopoly, but tossed out the district court's decision to break up Microsoft. It agreed with Microsoft that the company was denied due process during the penalty phase of the trial and concluded that the district court judge had displayed an appearance of bias by holding extensive interviews with the press. The appeals court sent the remedial phase of the case to a new district court judge to determine appropriate remedies. The appeals court also raised issues relating to the wisdom of a structural remedy.

At the urging of the new district court judge, the Federal government and Microsoft negotiated a proposed settlement. With minor modification, the settlement became the final court order in 2002. The breakup was rescinded and replaced with a behavioral remedy. It (1) prevents Microsoft from retaliating against any firm that is developing, selling, or using software that competes with Microsoft Windows or Internet Explorer or is shipping a personal computer that includes both Windows and a non-Microsoft operating system; (2) requires Microsoft to establish uniform royalty and licensing terms for computer manufacturers wanting to include Windows on their PCs; (3) requires that manufacturers be allowed to remove Microsoft icons and replace them with other icons on the Windows desktop; and (4) calls for Microsoft to provide technical information to other companies so those firms can develop programs that work as well with Windows as Microsoft's own products.

Microsoft's actions and conviction have indirectly resulted in billions of dollars of fines and payouts by Microsoft. Main examples: To AOL Time Warner (Netscape), \$750 million; to the European Commission, \$600 million in 2004 and \$1.35 billion in 2008, to Sun Microsystems, \$1.6 billion; to Novell, \$536 million; to Brust.com, \$60 million; to Gateway; \$150 million; to interTrust, \$440 million; to RealNetworks, \$761 million; and to IBM, \$850 million.

Question:

Why is the 2002 Microsoft settlement a behavioral remedy rather than a structural remedy?

Source: United States v. Microsoft (District Court Conclusions of Law), April 2000; United States v. Microsoft (court of appeals), June 2001; United States v. Microsoft (Final Judgment), November 2002; and Reuters and Associated Press news services.

Summary

- 1. A pure monopolist is the sole producer of a good or service for which there are no close substitutes.
- 2. The existence of pure monopoly is explained by barriers to entry in the form of (a) economies of scale, (b) patent ownership and research, (c) ownership or control of essential resources, and (d) pricing and other strategic behavior.
- 3. The pure monopolist's market situation differs from that of a competitive firm in that the monopolist's demand curve is downsloping, causing the marginal-revenue curve to lie

below the demand curve. Like the competitive seller, the pure monopolist will maximize profit by equating marginal revenue and marginal cost. Barriers to entry may permit a monopolist to acquire economic profit even in the long run. However, (a) the monopolist does not charge "the highest price possible"; (b) the price that yields maximum total profit to the monopolist rarely coincides with the price that yields maximum unit profit; and (c) high costs and a weak demand may prevent the monopolist from realizing any profit at all.

- 4. With the same costs, the pure monopolist will find it profitable to restrict output and charge a higher price than would sellers in a purely competitive industry. This restriction of output causes a misallocation of resources, as is evidenced by the fact that price exceeds marginal cost in monopolized markets.
- 5. In general, monopoly transfers income from consumers to the owners of the monopoly. Because, on average, consumers of monopolized products have less income than the corporate owners, monopoly increases income inequality.
- 6. The costs monopolists and competitive producers face may not be the same. On the one hand, economies of scale may make lower unit costs available to monopolists but not to competitors. Also, pure monopoly may be more likely than pure competition to reduce costs via technological advance because of the monopolist's ability to realize economic profit, which can be used to finance research. On the other hand, X-inefficiency—the failure to produce with the least costly combination of inputs—is more common among mo-

nopolists than among competitive firms. Also, monopolists may make costly expenditures to maintain monopoly privileges that are conferred by government. Finally, the blocked entry of rival firms weakens the monopolist's incentive to be technologically progressive.

- 7. A firm can increase its profit through price discrimination provided it (a) has monopoly pricing power, (b) can segregate buyers on the basis of elasticities of demand, and (c) can prevent its product or service from being readily transferred between the segregated markets.
- 8. The cornerstone of antimonopoly law is the Sherman Act of 1890, particularly Section 2. According to the rule of reason, possession of monopoly power is not illegal. But monopoly that is unreasonably gained or unreasonably maintained is a violation of the law.
- 9. If a company is found guilty of violating the Sherman Act, the government can either break up the monopoly into competing firms (a structural remedy) or prohibit it from engaging in specific anticompetitive business practices (a behavioral remedy).

Terms and Concepts

pure monopoly barriers to entry natural monopoly simultaneous consumption network effects X-inefficiency rent-seeking behavior price discrimination rule of reason

Study Questions Connect

- "No firm is completely sheltered from rivals; all firms compete for consumer dollars. If that is so, then pure monopoly does not exist." Do you agree? Explain. LOI
- 2. Discuss the major barriers to entry into an industry. Explain how each barrier can foster either monopoly or oligopoly. Which barriers, if any, do you feel give rise to monopoly that is socially justifiable? **LOI**
- **3.** How does the demand curve faced by a purely monopolistic seller differ from that confronting a purely competitive firm? Why does it differ? Of what significance is the difference? Why is the pure monopolist's demand curve typically not perfectly inelastic? **LO2**
- 4. Use the following demand schedule for a pure monopolist to calculate total revenue and marginal revenue at each quantity. Plot the monopolist's demand curve and marginal-revenue curve, and explain the relationships between them. Explain why the marginal revenue of the fourth unit of output is \$3.50, even though its price is \$5. What generalization can you make as to the relationship between the monopolist's demand and its marginal reve-

nue? Suppose the marginal cost of successive units of output was zero. What output would the single-price monopolist produce, and what price would it charge? **LO2**

Price (P)	Quantity Demanded (Q)	Price (P)	Quantity Demanded (Q)
\$7.00	0	\$4.50	5
6.50	I.	4.00	6
6.00	2	3.50	7
5.50	3	3.00	8
5.00	4	2.50	9

5. Suppose a pure monopolist is faced with the demand schedule that follows and the same cost data as the competitive producer discussed in question 3 at the end of Chapter 7. Calculate the missing total-revenue and marginal-revenue amounts, and determine the profit-maximizing price and profit-earning output for this monopolist. What is the

monopolist's profit? Verify your answer graphically and by comparing total revenue and total cost. **LO2**

Price	Quantity Demanded	Total Revenue	Marginal Revenue
\$115	0	\$	¢
100	l I		۰ ب
83	2		
71	3		
63	4		
55	5		
48	6		
42	7		
37	8		
33	9		
29	10		

- **6.** Assume that a pure monopolist and a purely competitive firm have the same unit costs. Contrast the two with respect to (a) price, (b) output, (c) profits, (d) allocation of resources, and (e) impact on the distribution of income. Since both monopolists and competitive firms follow the MR = MC rule in maximizing profits, how do you account for the different results? Why might the costs of a purely competitive firm and those of a monopolist be different? What are the implications of such a cost difference? **LO3**
- 7. Critically evaluate and explain each statement: LO3
 - **a.** Because they can control product price, monopolists are always assured of profitable production by simply charging the highest price consumers will pay.
 - **b.** The pure monopolist seeks the output that will yield the greatest per-unit profit.

- **c.** An excess of price over marginal cost is the market's way of signaling the need for more production of a good.
- **d.** The more profitable a firm, the greater its monopoly power.
- **e.** The monopolist has a pricing policy; the competitive producer does not.
- **f.** With respect to resource allocation, the interests of the seller and of society coincide in a purely competitive market but conflict in a monopolized market.
- **g.** In a sense the monopolist makes a profit for not producing; the monopolist produces profit more than it does goods.
- **8.** Assume a monopolistic publisher has agreed to pay an author 15 percent of the total revenue from the sales of a text. Will the author and the publisher want to charge the same price for the text? Explain. **LO2**
- **9.** U.S. pharmaceutical companies charge different prices for prescription drugs to buyers in different nations, depending on elasticity of demand and government-imposed price ceilings. Explain why these companies, for profit reasons, oppose laws allowing reimportation of their drugs back into the United States. **LO4**
- 10. How was De Beers able to control the world price of diamonds over the past several decades even though it produced only 45 percent of the diamonds? What factors ended its monopoly? What is its new profit strategy? LO5
- 11. Under what law and on what basis did the federal district court find Microsoft guilty of violating the Sherman Act? What was the initial district court's remedy? How did Microsoft fare with its appeal to the court of appeals? What was the final negotiated remedy? LOS

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At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.



IN THIS CHAPTER YOU WILL LEARN:

- I The characteristics of monopolistic competition.
- 2 Why monopolistic competitors earn only a normal profit in the long run.
- 3 The characteristics of oligopoly.
- 4 How game theory relates to oligopoly.
- 5 Why the demand curve of an oligopolist may be kinked.
- 6 The incentives and obstacles to collusion among oligopolists.
- 7 The positive and potential negative effects of advertising.

Monopolistic Competition and Oligopoly

Most markets in the U.S. economy fall between the two poles of pure competition (Chapter 7) and pure monopoly (Chapter 8). Real-world industries usually have fewer than the hundreds of producers required for pure competition and more than the single producer that defines pure monopoly. Most firms have distinguishable rather than standardized products and have some discretion over the prices they charge. Competition often occurs on the basis of price, quality, location, service, and advertising. Entry to most real-world industries ranges from easy to very difficult but is rarely completely blocked.

This chapter examines two models that more closely approximate these widespread markets. You will discover that *monopolistic competition* mixes a small amount of monopoly power with a large amount of competition. *Oligopoly,* in contrast, blends a large amount of monopoly power, a small amount of competition through entry, and considerable rivalry among industry firms.







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Photo Op Monopolistic Competition versus Oligopoly

Furniture is produced in a monopolistically competitive industry, whereas refrigerators are produced in an oligopolistic industry.

monopolistic competition

A market structure in which many firms sell a differentiated product and entry into and exit from the market are relatively easy.

ORIGIN OF THE IDEA 0 9.1 Monopolistic competition

Monopolistic Competition

Let's begin by examining **monopolistic competition**, which is characterized by (1) a relatively large number of sellers, (2) differentiated products (often promoted by heavy advertising), and (3) easy entry to, and exit from, the industry. The first and third characteristics provide the "competitive" aspect of monopolistic competition; the second characteristic provides the "monopolistic" aspect. In general, however, monopolistically competitive industries are much more competitive than they are monopolistic.

Relatively Large Number of Sellers

Monopolistic competition is characterized by a fairly large number of firms, say, 25, 35, 60, or 70, not by the hundreds or thousands of firms in pure competition. Consequently, monopolistic competition involves:

- *Small market shares* Each firm has a comparatively small percentage of the total market and consequently has limited control over market price.
- *No collusion* The presence of a relatively large number of firms ensures that collusion by a group of firms to restrict output and set prices is unlikely.
- *Independent action* With numerous firms in an industry, there is no feeling of interdependence among them; each firm can determine its own pricing policy without considering the possible reactions of rival firms. A single firm may realize a modest increase in sales by cutting its price, but the effect of that action on competitors' sales will be nearly imperceptible and will probably trigger no response.

Differentiated Products

In contrast to pure competition, in which there is a standardized product, monopolistic competition is distinguished by **product differentiation**. Monopolistically competitive firms turn out variations of a particular product. They produce products with slightly different physical characteristics, offer varying degrees of customer service, provide varying amounts of locational convenience, or proclaim special qualities, real or imagined, for their products.

These aspects of product differentiation require more attention.

Product Attributes Product differentiation may entail physical or qualitative differences in the products themselves. Real differences in functional features, materials, design, and workmanship are vital aspects of product differentiation. Personal computers, for example, differ in terms of storage capacity, speed, graphic displays, and included software. There are dozens of competing principles of economics textbooks that differ in content, organization, presentation and readability, pedagogical aids, and graphics and design. Most cities have a variety of retail stores selling men's and women's clothes that differ greatly in styling, materials, and quality of work. Similarly, one pizza place may feature its thin crust Neapolitan style pizza, while another may tout its thick-crust pizza.

Service Service and the conditions surrounding the sale of a product are forms of product differentiation too. One shoe store may stress the fashion knowledge and help-fulness of its clerks. A competitor may leave trying on shoes and carrying them to the register to its customers but feature lower prices. Customers may prefer 1-day over 3-day dry cleaning of equal quality. The prestige appeal of a store, the courteousness and helpfulness of clerks, the firm's reputation for servicing or exchanging its products, and the credit it makes available are all service aspects of product differentiation.

Location Products may also be differentiated through the location and accessibility of the stores that sell them. Small convenience stores manage to compete with large supermarkets, even though these minimarts have a more limited range of products and charge higher prices. They compete mainly on the basis of location—being close to customers and situated on busy streets. A motel's proximity to an interstate highway gives it a locational advantage that may enable it to charge a higher room rate than nearby motels in less convenient locations.

Brand Names and Packaging Product differentiation may also be created through the use of brand names and trademarks, packaging, and celebrity connections. Most aspirin tablets are very much alike, but many headache sufferers believe that one brand—for example, Bayer, Anacin, or Bufferin—is superior and worth a higher price than a generic substitute. A celebrity's name associated with watches, perfume, or athletic apparel may enhance the appeal of those products for some buyers. Many customers prefer one style of ballpoint pen to another. Packaging that touts "natural spring" bottled water may attract additional customers.

Some Control over Price Despite the relatively large number of firms, monopolistic competitors do have some control over their product prices because of product differentiation. If consumers prefer the products of specific sellers, then within limits they will pay more to satisfy their preferences. Sellers and buyers are not linked randomly, as in a purely competitive market. But the monopolistic competitor's control over price is quite limited since there are numerous potential substitutes for its product.

product differentiation

A form of nonprice competition in which a firm tries to distinguish its product or service from all competing ones on the basis of attributes such as design and quality.

Easy Entry and Exit

Entry into monopolistically competitive industries is relatively easy compared to oligopoly or pure monopoly. Because monopolistic competitors are typically small firms, both absolutely and relatively, economies of scale are few and capital requirements are low. On the other hand, compared with pure competition, financial barriers may result from the need to develop and advertise a product that differs from rivals' products. Some firms may have trade secrets relating to their products or hold trademarks on their brand names, making it difficult and costly for other firms to imitate them.

Exit from monopolistically competitive industries is relatively easy. Nothing prevents an unprofitable monopolistic competitor from holding a going-out-of-business sale and shutting down.

Advertising

The expense and effort involved in product differentiation would be wasted if consumers were not made aware of product differences. Thus, monopolistic competitors advertise their products, often heavily. The goal of product differentiation and advertising—so-called **nonprice competition**—is to make price less of a factor in consumer purchases and make product differences a greater factor. If successful, the demand for the firm's product will increase. The firm's demand may also become less elastic because of the greater loyalty to the firm's product.

Monopolistically Competitive Industries

Several manufacturing industries approximate monopolistic competition. Examples of manufactured goods produced in monopolistically competitive industries are jewelry, asphalt, wood pallets, commercial signs, leather goods, plastic pipes, textile bags, and kitchen cabinets. In addition, many retail establishments in metropolitan areas are monopolistically competitive, including grocery stores, gasoline stations, hair salons, dry cleaners, clothing stores, and restaurants. Also, many providers of professional services such as medical care, legal assistance, real estate sales, and basic bookkeeping are monopolistic competitors.

Price and Output in Monopolistic Competition

How does a monopolistically competitive firm decide what quantity to produce and what price to charge? Initially, we assume that each firm in the industry is producing a specific differentiated product and engaging in a particular amount of advertising. Later we'll see how changes in the product and in the amount of advertising modify our conclusions.

The Firm's Demand Curve

Our explanation is based on Figure 9.1. The basic feature of that diagram is the elasticity of demand, as shown by the individual firm's demand curve. The demand curve faced by a monopolistically competitive seller is highly, but not perfectly, elastic. It is precisely this feature that distinguishes monopolistic competition from pure monopoly and pure competition. The monopolistic competitor's demand is more elastic than the demand faced by a pure monopolist because the monopolistically competitive seller has many competitors producing closely substitutable goods. The pure monopolist has no rivals at all. Yet, for two reasons, the monopolistic competitor's demand is not perfectly

nonprice

competition A selling strategy in which one firm tries to distinguish its product or service from all competing ones on the basis of attributes other than price.

FIGURE 9.1 A monopolistically competitive firm: short run and long run. The monopolistic competitor maximizes profit or minimizes loss by producing the output at which MR = MC. The economic profit shown in (a) will induce new firms to enter, eventually eliminating economic profit. The loss shown in (b) will cause an exit of firms until normal profit is restored. After such entry and exit, the price will settle in (c) to where it just equals average total cost at the MR = MC output. At this price P_3 and output Q_3 , the monopolistic competitor earns only a normal profit, and the industry is in long-run equilibrium.



elastic like that of the pure competitor. First, the monopolistic competitor has fewer rivals; second, its products are differentiated, so they are not perfect substitutes.

The price elasticity of demand faced by the monopolistically competitive firm depends on the number of rivals and the degree of product differentiation. The larger the number of rivals and the weaker the product differentiation, the greater the price elasticity of each seller's demand, that is, the closer monopolistic competition will be to pure competition.

The Short Run: Profit or Loss

The monopolistically competitive firm maximizes its profit or minimizes its loss in the short run just as do the other firms we have discussed: by producing the output at which marginal revenue equals marginal cost (MR = MC). In Figure 9.1a the firm produces output Q_1 , where MR = MC. As shown by demand curve D_1 , it then can charge price P_1 . It realizes an economic profit, shown by the gray area [= $(P_1 - A_1) \times Q_1$].

But with less favorable demand or costs, the firm may incur a loss in the short run. We show this possibility in Figure 9.1b, where the firm's best strategy is to minimize its loss. It does so by producing output Q_2 (where MR = MC) and, as determined by demand curve D_2 , by charging price P_2 . Because price P_2 is less than average total cost A_2 , the firm incurs a per-unit loss of $A_2 - P_2$ and a total loss represented as the red area $[= (A_2 - P_2) \times Q_2]$.

The Long Run: Only a Normal Profit

In the long run, firms will enter a profitable monopolistically competitive industry and leave an unprofitable one. So a monopolistic competitor will earn only a normal profit in the long run or, in other words, will only break even. (Remember that the cost curves include both explicit and implicit costs, including a normal profit.)

Profits: Firms Enter In the case of short-run profit (Figure 9.1a), economic profits attract new rivals because entry to the industry is relatively easy. As new firms enter, the demand curve faced by the typical firm shifts to the left (falls). Why? Because each firm has a smaller share of total demand and now faces a larger number of close-substitute products. This decline in the firm's demand reduces its economic profit. When entry of new firms has reduced demand to the extent that the demand curve is tangent to the average-total-cost curve at the profit-maximizing output, the firm is just making a normal profit. This situation is shown in Figure 9.1c, where demand is D_3 and the firm's long-run equilibrium output is Q_3 . As Figure 9.1c indicates, any greater or lesser output will entail an average total cost that exceeds product price P_3 , meaning a loss for the firm. At the tangency point between the demand curve and ATC, total revenue equals total costs. With the economic profit gone, there is no further incentive for additional firms to enter.

Losses: Firms Leave When the industry suffers short-run losses, as in Figure 9.1b, some firms will exit in the long run. Faced with fewer substitute products and blessed with an expanded share of total demand, the surviving firms will see their demand curves shift to the right (rise), as to D_3 . Their losses will disappear and give way to normal profits (Figure 9.1c). (For simplicity we have assumed a constant-cost industry; shifts in the cost curves as firms enter or leave would complicate our discussion slightly but would not alter our conclusions.)

Monopolistic Competition and Efficiency

We know from Chapter 7 that economic efficiency requires the triple equality P = MC = minimum ATC. The equality of P and ATC yields *productive efficiency*. The good is being produced in the least costly way, and the price is just sufficient to cover average total cost, including a normal profit. The equality of P and MC yields *allocative efficiency*. The right amount of output is being produced, and thus the right amount of society's scarce resources is being devoted to this specific use.

How efficient is monopolistic competition, as measured against this triple equality?

Neither Productive nor Allocative Efficiency

In monopolistic competition, neither productive nor allocative efficiency occurs in long-run equilibrium. Figure 9.2 enlarges part of Figure 9.1c and clearly shows this. First note that the profit-maximizing price P_3 slightly exceeds the lowest average total cost, A_4 . In producing the profit-maximizing output Q_3 , the firm's average total cost therefore is slightly higher than optimal from society's perspective—productive efficiency is not achieved. Also note that the profit-maximizing price P_3 exceeds marginal

INTERACTIVE GRAPHS G 9.1 Monopolistic competition **FIGURE 9.2 The inefficiency of monopolistic competition.** In long-run equilibrium, a monopolistic competitor achieves neither productive nor allocative efficiency. Productive efficiency is not realized because production occurs where the average total cost A_3 exceeds the minimum average total cost A_4 . Allocative efficiency is not achieved because the product price P_3 exceeds the marginal cost M_3 . The result is an underallocation of resources and excess productive capacity of $Q_4 - Q_3$.



cost (here, M_3), meaning that monopolistic competition causes an underallocation of resources. Society values each unit of output between Q_3 and Q_4 more highly than the goods it would have to forgo to produce those units. Thus, to a modest extent, monopolistic competition also fails the allocative-efficiency test. Consumers pay a higher-than-competitive price and obtain a less-than-optimal output. Indeed, monopolistic competitors must charge a higher-than-competitive price in the long run in order to achieve a normal profit.

Excess Capacity

In monopolistic competition, the gap between the minimum-ATC output and the profit-maximizing output identifies **excess capacity:** plant and equipment that are underused because firms are producing less than the minimum-ATC output. This gap is shown as the distance between Q_4 and Q_3 in Figure 9.2. If each monopolistic competitor could profitably produce at the minimum-ATC output, fewer firms could produce the same total output, and the product could be sold at a lower price. Monopolistically competitive industries thus are overcrowded with firms, each operating below its optimal capacity. This situation is typified by many kinds of retail establishments. For example, in most cities there is an abundance of small motels and restaurants that operate well below half capacity.

Product Variety and Improvement

But monopolistic competition also has two notable virtues. It promotes product variety and product improvement. A monopolistic competitor is rarely satisfied with the

excess capacity

Plant or equipment that is underused because the firm is producing less than the minimum-ATC output. situation portrayed in Figure 9.1c because it means only a normal profit. Instead, it may try to regain its economic profit through further product differentiation and better advertising. By developing or improving its product, it may be able to re-create, at least for a while, the profit outcome of Figure 9.1a.

The product variety and product improvement that accompany the drive to regain economic profit in monopolistic competition are benefits for society—ones that may offset the cost of the inefficiency associated with monopolistic competition. Consumers have a wide diversity of tastes: Some people like Italian salad dressing, others prefer French dressing; some people like contemporary furniture, others prefer traditional furniture. If a product is differentiated, then at any time the consumer will be offered a wide range of types, styles, brands, and quality gradations of that product. Compared with pure competition, this provides an advantage to the consumer. The range of choice is widened, and producers more fully meet the wide variation in consumer tastes.

The product improvement promoted by monopolistic competition further differentiates products and expands choices. And a successful product improvement by one firm obligates rivals to imitate or improve on that firm's temporary market advantage or else lose business. So society benefits from new and improved products.

Oligopoly

In terms of competitiveness, the spectrum of market structures reaches from pure competition, to monopolistic competition, to oligopoly, to pure monopoly. We now direct our attention to **oligopoly**, a market dominated by a few large producers of a homogeneous or differentiated product. Because of their "fewness," oligopolists have considerable control over their prices, but each must consider the possible reaction of rivals to its own pricing, output, and advertising decisions.

A Few Large Producers

The phrase "a few large producers" is necessarily vague because the market model of oligopoly covers much ground, ranging between pure monopoly, on the one hand, and monopolistic competition, on the other. Oligopoly encompasses the U.S. aluminum industry, in which three huge firms dominate an entire national market, and the situation in which four or five much smaller auto-parts stores enjoy roughly equal shares of the market in a medium-size town. Generally, however, when you hear a term such as "Big Three," "Big Four," or "Big Six," you can be sure it refers to an oligopolistic industry. Examples of U.S. industries that are oligopolies are tires, beer, cigarettes, copper, greeting cards, lightbulbs, aircraft, motor vehicles, gypsum products, and breakfast cereals. There are numerous others.

Either Homogeneous or Differentiated Products

An oligopoly may be either a **homogeneous oligopoly** or a **differentiated oligopoly**, depending on whether the firms in the oligopoly produce standardized (homogeneous) or differentiated products. Many industrial products (steel, zinc, copper, aluminum, lead, cement, industrial alcohol) are virtually standardized products that are produced in oligopolies. Alternatively, many consumer goods industries (automobiles, tires, household appliances, electronic equipment, breakfast cereals, cigarettes, and many sporting goods) are differentiated oligopolies. These differentiated oligopolies typically engage in considerable nonprice competition supported by heavy advertising.

oligopoly

A market structure dominated by a few large producers of homogeneous or differentiated products.

homogeneous oligopoly An oligopoly in which the firms produce a standardized product.

differentiated

oligopoly An oligopoly in which the firms produce a differentiated product.
Control over Price, but Mutual Interdependence

Because firms are few in oligopolistic industries, each firm is a "price maker"; like the monopolist, it can set its price and output levels to maximize its profit. But unlike the monopolist, which has no rivals, the oligopolist must consider how its rivals will react to any change in its price, output, product characteristics, or advertising. Oligopoly is thus characterized by *strategic behavior* and *mutual interdependence*. By **strategic behavior**, we simply mean self-interested behavior that takes into account the reactions of others. Firms develop and implement price, quality, location, service, and advertising strategies to "grow their business" and expand their profits. But because rivals are few, there is **mutual interdependence:** a situation in which each firm's profit depends not entirely on its own price and sales strategies but also on those of the other firms. So oligopolistic firms base their decisions on how they think rivals will react. Example: In deciding whether to increase the price of its cosmetics, L'Oreal will try to predict the response of the other major producers, such as Clinique. Second example: In deciding on its advertising strategy, Burger King will take into consideration how McDonald's might react.

strategic behavior

Self-interested behavior that takes into account the reactions of others.

mutual interdependence

A situation in which a change in strategy (usually price) by one firm will affect the sales and profits of other firms.

Creative Strategic Behavior

The following story, offered with tongue in cheek, illustrates a localized market that exhibits some characteristics of oligopoly, including strategic behavior.

Tracy Martinez's Native American Arts and Crafts store is located in the center of a small tourist town that borders on a national park. In its early days, Tracy had a minimonopoly. Business was brisk, and prices and profits were high.

To Tracy's annoyance, two "copycat" shops opened adjacent to her store, one on either side of her shop. Worse yet, the competitors named their shops to take advantage of Tracy's advertising. One was "Native Arts and Crafts"; the other, "Indian Arts and Crafts." These new sellers drew business away from Tracy's store, forcing her to lower her prices. The three side-by-side stores in the small, isolated town constituted a localized oligopoly for Native American arts and crafts.

Tracy began to think strategically about ways to boost profit. She decided to distinguish her shop from those on either side by offering a greater mix of high-quality, expensive products and a lesser mix of inexpensive souvenir items. The tactic worked for a while, but the other stores eventually imitated her product mix.

Then, one of the competitors next door escalated the rivalry by hanging up a large sign proclaiming "We Sell for Less!" Shortly thereafter, the other shop put up a large sign stating "We Won't Be Undersold!"

Not to be outdone, Tracy painted a colorful sign of her own and hung it above her door. It read "Main Entrance."

ILLUSTRATING THE IDEA

Entry Barriers

The same barriers to entry that create pure monopoly also contribute to the creation of oligopoly. Economies of scale are important entry barriers in a number of oligopolistic industries, such as the aircraft, rubber, and copper industries. In those industries, three or four firms might each have sufficient sales to achieve economies of scale, but new firms would have such a small market share that they could not do so. They would then be high-cost producers, and as such they could not survive. A closely related barrier is the large expenditure for capital—the cost of obtaining necessary plant and equipment—required for entering certain industries. The jet engine, automobile, commercial aircraft, and petroleum-refining industries, for example, are all characterized by very high capital requirements.

The ownership and control of raw materials help explain why oligopoly exists in many mining industries, including gold, silver, and copper. In the computer, chemicals, consumer electronics, and pharmaceutical industries, patents have served as entry barriers. Moreover, oligopolists can sometimes preclude the entry of new competitors through preemptive and retaliatory pricing and advertising strategies.

Mergers

Some oligopolies have emerged mainly through the growth of the dominant firms in a given industry (examples: breakfast cereals, chewing gum, candy bars). But for other industries the route to oligopoly has been through mergers (examples: steel, in its early history; and, more recently, airlines, banking, and entertainment). Section 7 of the Clayton Act (1914) outlaws mergers that *substantially* lessen competition. But the implied "rule of reason" leaves room for considerable interpretation. As a result, many mergers between firms in the same industry go unchallenged by government.

The combining of two or more firms in the same industry may significantly increase their market share, which may allow the new firm to achieve greater economies of scale. The merger also may increase the firm's monopoly power (pricing power) through greater control over market supply. Finally, because the new firm is a larger buyer of inputs, it may be able to obtain lower prices (costs) on its production inputs.

Oligopoly Behavior: A Game-Theory Overview

Oligopoly pricing behavior has the characteristics of certain games of strategy, such as poker, chess, and bridge. The best way to play such a game depends on the way one's opponent plays. Players (and oligopolists) must pattern their actions according to the actions and expected reactions of rivals. The study of how people or firms behave in strategic situations is called **game theory**.

game theory The study of how people or firms behave in strategic situations.

> ILLUSTRATING THE IDEA

The Prisoner's Dilemma

Games come in different forms, with many possible strategies and outcomes, and have numerous business, political, and personal applications. One frequently observed type of game is known as a *prisoner's dilemma game* because it is similar to a situation in which two people—let's call them Betty and Al have committed a diamond heist and are being detained by the police as prime suspects. Unknown to the two, the evidence against them is weak so that the best hope that the police have for getting a conviction is if one or both of the thieves confess to the crime. The police place Betty and Al in separate holding cells and offer each the same deal: Confess to the crime and receive a lighter prison sentence.

Each detainee therefore faces a dilemma. If Betty remains silent and Al confesses, Betty will end up with a long prison sentence. If Betty confesses and Al says nothing, Al will receive a long prison sentence. What happens? Fearful that the other person will confess, both confess, even though they each would be better off saying nothing. In business, a form of the "confess–confess outcome" can occur when two oligopolists escalate their advertising budgets to high levels, even though both would earn higher profits at agreed-upon lower levels. In politics, it occurs when two candidates engage in negative advertising, despite claiming that, in principle, they are opposed to its use.

Question:

How might the prisoners' strategies or decisions be affected if the general prison population tends to punish those who are known to "rat out" (confess against) their partners?

Now let's look at a more detailed prisoner's dilemma game, using the tools of game theory to analyze the pricing behavior of oligopolists. We assume that a duopoly, or two-firm oligopoly, is producing athletic shoes. Each of the two firms—for example, RareAir and Uptown—has a choice of two pricing strategies: price high or price low. The profit each firm earns will depend on the strategy it chooses *and* the strategy its rival chooses.

There are four possible combinations of strategies for the two firms, and a lettered cell in Figure 9.3 represents each combination. For example, cell C represents a low-price strategy for Uptown along with a high-price strategy for RareAir. Figure 9.3 is called a *payoff matrix*, because each cell shows the payoff (profit) to each firm that would result from each combination of strategies. Cell C shows that if Uptown adopts a low-price strategy and RareAir a high-price strategy, then Uptown will earn \$15 million (gray portion) and RareAir will earn \$6 million (lavender portion).

Mutual Interdependence Revisited

The data in Figure 9.3 are hypothetical, but their relationships are typical of real situations. Recall that oligopolistic firms can increase their profits, and influence their rivals' profits, by changing their pricing strategies. Each firm's profit depends on its own pricing strategy and that of its rivals. This mutual interdependence of oligopolists is the most obvious point demonstrated by Figure 9.3. If Uptown adopts a high-price strategy, its profit will be \$12 million provided that RareAir also employs a high-price strategy (cell A). But if RareAir uses a low-price strategy against Uptown's high-price strategy (cell B), RareAir will increase its market share and boost its profit from \$12 million to \$15 million. RareAir's higher profit will come at the expense of Uptown, whose profit will fall from \$12 million to \$6 million. Uptown's high-price strategy is a good strategy only if RareAir also employs a high-price strategy.

ORIGIN OF THE IDEA 0 9.2 Game theory FIGURE 9.3 Profit payoff (in millions) for a two-firm oligopoly. Each firm has two possible pricing strategies. RareAir's strategies are shown in the top margin, and Uptown's in the left margin. Each lettered cell of this four-cell payoff matrix represents one combination of a RareAir strategy and an Uptown strategy and shows the profit that combination would earn for each firm. Assuming no collusion, the outcome of this game is cell D, with both parties using low-price strategies and earning \$8 million of profits.



collusion

A situation in which firms act together and in agreement to fix prices, divide markets, or otherwise restrict competition.

Collusion

Figure 9.3 also suggests that oligopolists often can benefit from **collusion**—that is, cooperation with rivals. Collusion occurs whenever firms in an industry reach an agreement to fix prices, divide up the market, or otherwise restrict competition among them. To see the benefits of collusion, first suppose that both firms in Figure 9.3 are acting independently and following high-price strategies. Each realizes a \$12 million profit (cell A).

Note that either RareAir or Uptown could increase its profit by switching to a low-price strategy (cell B or C). The low-price firm would increase its profit to \$15 million, and the profit of the high-price firm would fall to \$6 million. The high-price firm would be better off if it, too, adopted a low-price policy because its profit would rise from \$6 million to \$8 million (cell D). The effect of all this independent strategy shifting would be the reduction of both firms' profits from \$12 million (cell A) to \$8 million (cell D).

In real situations, too, independent action by oligopolists may lead to mutually "competitive" low-price strategies: Independent oligopolists compete with respect to price, and this leads to lower prices and lower profits. This outcome is clearly beneficial to consumers but not to the oligopolists, whose profits decrease.

How could oligopolists avoid the low-profit outcome of cell D? The answer is that they could collude, rather than establish prices competitively or independently. In our example, the two firms could agree to establish and maintain a high-price policy. So each firm will increase its profit from \$8 million (cell D) to \$12 million (cell A).

INTERACTIVE GRAPHS G 9.2 Game theory

Incentive to Cheat

The payoff matrix also explains why an oligopolist might be strongly tempted to cheat on a collusive agreement. Suppose Uptown and RareAir agree to maintain high-price policies, with each earning \$12 million in profit (cell A). Both are tempted

to cheat on this collusive pricing agreement because either firm can increase its profit to \$15 million by lowering its price. If Uptown secretly cheats on the agreement by charging low prices, the payoff moves from cell A to cell C. Uptown's profit rises to \$15 million and RareAir's falls to \$6 million. If RareAir cheats, the payoff moves from cell A to cell B, and RareAir gets the \$15 million. Fearful that each other will cheat, both firms will probably cheat and the game will settle back to cell D, with each firm using its low-price strategy. This is another example of the prisoner's dilemma illustrated previously.

Kinked-Demand Model

Our game-theory discussion is helpful in understanding more traditional, graphical oligopoly models. We begin by examining a model in which rivals do not overtly collude to fix a common price. Such collusion is, in fact, illegal in the United States. Specifically, Section 1 of the Sherman Act of 1890 outlaws conspiracies to restrain trade. In antitrust law, these violations are known as **per se violations;** they are "in and of themselves" illegal, and therefore not subject to the rule of reason (Chapter 8). To gain a conviction, the government needs to show only that there was a conspiracy to fix prices, rig bids, or divide up markets, not that the conspiracy succeeded or caused serious damage to other parties.

Kinked-Demand Curve

Imagine an oligopolistic industry made up of three law-abiding firms (Arch, King, and Dave's), each having about one-third of the total market for a differentiated product. The question is, "What does each firm's demand curve look like?"

Let's focus on Arch, understanding that the analysis is applicable to each firm. Assume that the going price for the product is P_0 and Arch is currently selling output Q_0 , as shown in Figure 9.4. Suppose Arch is considering a price increase. But if Arch raises its price above P_0 and its rivals ignore the price increase, Arch will lose sales significantly to its two rivals, who will be underpricing it. If that is the case, the demand and marginal-revenue curves faced by Arch will resemble the straight lines D_2 and MR₂ in Figure 9.4. Demand in this case is quite elastic: Arch's total revenue will fall. Because of product differentiation, however, Arch's sales and total revenue will not fall to zero when it raises its price; some of Arch's product.

And what about a price cut? It is reasonable to expect that King and Dave's will exactly match any price cut to prevent Arch from gaining an advantage over them. Arch's sales will increase only modestly. The small increase in sales that Arch (and its two rivals) will realize is at the expense of other industries; Arch will gain no sales from King and Dave's. So Arch's demand and marginal-revenue curves below price P_0 will look like the straight lines labeled D_1 and MR_1 in Figure 9.4.

Graphically, the D_2e "rivals ignore" segment of Arch's demand curve seems relevant for price increases, and the D_1e "rivals match" segment of demand seems relevant for price cuts. It is logical, then, or at least a reasonable assumption, that the noncollusive oligopolist faces the **kinked-demand curve** D_2eD_1 , as shown in Figure 9.4. Demand is highly elastic above the going price P_0 but much less elastic or even inelastic below that price.

Note also that if rivals ignore a price increase but match a price decrease, the marginal-revenue curve of the oligopolist also will have an odd shape. It, too, will be made up of two segments: the left-hand marginal-revenue curve MR_2f in Figure 9.4 and the right-hand marginal-revenue curve MR_1g . Because of the sharp difference in

per se violation

A collusive action, such as an attempt to fix prices or divide a market, that violates the antitrust laws, even if the action is unsuccessful.

kinked-demand curve

A demand curve based on the assumption that rivals will ignore a price increase and follow a price decrease. **FIGURE 9.4** The kinked-demand curve. In all likelihood an oligopolist's rivals will ignore a price increase above the going price P_0 but follow a price cut below P_0 . This causes the oligopolist's demand curve (D_2eD_1) to be kinked at e (price P_0) and the marginal-revenue curve to have a vertical break, or gap (fg). The firm will be highly reluctant to raise or lower its price. Moreover, any shift in marginal costs between MC₁ and MC₂ will cut the vertical (dashed) segment of the marginal-revenue curve and produce no change in price P_0 or output Q_0 .



elasticity of demand above and below the going price, there is a gap, or what we can simply treat as a vertical segment, in the marginal-revenue curve. This gap is the dashed segment fg in the combined marginal-revenue curve MR_2fgMR_1 .

Price Inflexibility

This analysis helps explain why prices are generally stable in noncollusive oligopolistic industries. There are both demand and cost reasons.

On the demand side, the kinked-demand curve gives each oligopolist reason to believe that any change in price will be for the worse. If it raises its price, many of its customers will desert it. If it lowers its price, its sales will increase very modestly since rivals will match the lower price. Even if a price cut increases the oligopolist's total revenue somewhat, its costs may increase by a greater amount, depending on the price elasticity of demand. For instance, if its demand is inelastic to the right of Q_0 , as it may well be, then the firm's profit will surely fall. Its total revenue will decline at the same time that the production of a larger output increases its total cost.

On the cost side, the broken marginal-revenue curve suggests that even if an oligopolist's costs change substantially, the firm may have no reason to change its price. In particular, all positions of the marginal-cost curve between MC_1 and MC_2 in Figure 9.4 will result in the firm's deciding on exactly the same price and output. For all those positions, MR equals MC at output Q_0 ; at that output, it will charge price P_0 .

Price Leadership

The uncertainties of the reactions of rivals create a major problem for oligopolists. There are times when wages and other input prices rise beyond the marginal costs associated with MC_1 in Figure 9.4. If no oligopolist dare raise its price, profits for all rivals will be severely squeezed. In many industries a pattern of price leadership has emerged

to handle these situations. **Price leadership** involves an implicit understanding by which oligopolists can coordinate prices without engaging in outright collusion based on formal agreements and secret meetings. Rather, a practice evolves whereby the "dominant firm"—usually the largest or most efficient in the industry—initiates price changes and all other firms more or less automatically follow the leader. Many industries, including farm machinery, cement, copper, newsprint, glass containers, steel, beer, fertilizer, cigarettes, and tin, practice, or have in the recent past practiced, price leadership.

An examination of price leadership in a variety of industries suggests that the price leader is likely to observe the following tactics.

- *Infrequent price changes* Because price changes always carry the risk that rivals will not follow the lead, price adjustments are made only infrequently. The price leader does not respond to minuscule day-to-day changes in costs and demand. Price is changed only when cost and demand conditions have been altered significantly and on an industry basis as the result of, for example, industry wage increases, an increase in excise taxes, or an increase in the price of some basic input such as energy. In the automobile industry, price adjustments traditionally have been made when new models are introduced each fall.
- **Communications** The price leader often communicates impending price adjustments to the industry through speeches by major executives, trade publication interviews, or press releases. By publicizing "the need to raise prices," the price leader seeks agreement among its competitors regarding the actual increase.
- *Avoidance of price wars* Price leaders try to prevent price wars that can damage industry profits. Such wars can lead to successive rounds of price cuts as rivals attempt to maintain their market shares.

price leadership

An implicit understanding that other firms will follow the lead when a certain firm in the industry initiates a price change.

Challenges to Price Leadership

Despite attempts to maintain orderly price leadership, price wars occasionally break out in oligopolistic industries. Sometimes price wars result from attempts to establish new price leaders; other times, they result from attempts to "steal" business from rivals.

Consider the breakfast cereal industry, in which Kellogg traditionally had been the price leader. General Mills countered Kellogg's leadership in 1995 by reducing the prices of its cereals by 11 percent. In 1996, another rival, Post, responded to General Mills' action with a 20 percent price cut. Kellogg then followed with a 20 percent cut of its own. Not to be outdone, Post reduced its prices by another 11 percent. In short, a full-scale price war broke out between General Mills, Post, and Kellogg.

As another example, in late 2002 Burger King set off a price war by offering its bacon cheeseburger for 99¢. McDonald's retaliated by placing a price tag of \$1 on its Big "N" Tasty burger, which competes directly against Burger King's popular and profitable Whopper. Burger King then countered with a "limited-time special" of 99¢ for Whoppers. The limited-time aspect of the offer signaled McDonald's that Burger King was willing to end the price war in the near future. APPLYING THE ANALYSIS Most price wars eventually run their course. When all firms recognize that low prices are severely reducing their profits, they again yield price leadership to one of the industry's dominant firms. That firm then begins to raise prices back to their previous levels, and the other firms willingly follow. Orderly pricing is then restored.

Question:

How might a low-cost price leader "enforce" its leadership through implied threats to rivals?

Collusion

The disadvantages and uncertainties of kinked-demand oligopolies and price leadership make collusion tempting. By controlling price through collusion, oligopolists may be able to reduce uncertainty, increase profits, and perhaps even prohibit the entry of new rivals. Collusion may assume a variety of forms. The most comprehensive form is the **cartel**, a group of producers that typically creates a formal written agreement specifying how much each member will produce and charge. The cartel members must control output—divide up the market—in order to maintain the agreed-upon price. The collusion is *overt*, or open to view, and typically involves a group of foreign nations or foreign producers. More common forms of collusion are *covert*, or hidden from view. They include conspiracies to fix prices, rig bids, and divide up markets. Such conspiracies sometimes occur even though they are illegal.

Joint-Profit Maximization

To see the benefits of a cartel or other form of collusion, assume there are three hypothetical oligopolistic firms (Gypsum, Sheetrock, and GSR) producing, in this instance, gypsum drywall panels for finishing interior walls. Suppose all three firms produce a homogeneous product and have identical cost, demand, and marginal-revenue curves. Figure 9.5 represents the position of each of our three oligopolistic firms.

What price and output combination should, say, Gypsum select? If Gypsum were a pure monopolist, the answer would be clear: Establish output at Q_0 , where marginal revenue equals marginal cost, charge the corresponding price P_0 , and enjoy the maximum profit attainable. However, Gypsum does have two rivals selling identical products, and if Gypsum's assumption that its rivals will match its price of P_0 proves to be incorrect, the consequences could be disastrous for Gypsum. Specifically, if Sheetrock and GSR actually charge prices below P_0 , then Gypsum's demand curve D will shift sharply to the left as its potential customers turn to its rivals, which are now selling the same product at a lower price. Of course, Gypsum can retaliate by cutting its price too, but this will move all three firms down their demand curves, lowering their profits. It may even drive them to a point where average total cost exceeds price and losses are incurred.

So the question becomes, "Will Sheetrock and GSR want to charge a price below P_0 ?" Under our assumptions, and recognizing that Gypsum has little choice except to match any price they may set below P_0 , the answer is no. Faced with the same demand and cost circumstances, Sheetrock and GSR will find it in their interest to produce Q_0 and charge P_0 . This is a curious situation; each firm finds it most profitable to charge the same price, P_0 , but only if its rivals actually do so! How can the three firms ensure the price P_0 and quantity Q_0 solution in which each is keenly interested? How can they avoid the less profitable outcomes associated with either higher or lower prices?

cartel

A formal agreement among producers to set the price and the individual firm's output levels of a product. **FIGURE 9.5 Collusion and the tendency toward joint-profit maximization.** If oligopolistic firms face identical or highly similar demand and cost conditions, they may collude to limit their joint output and to set a single, common price. Thus, each firm acts as if it were a pure monopolist, setting output at Q_0 and charging price P_0 . This price and output combination maximizes each firm's profit (gray area) and thus the joint profits of all.



The answer is evident: They can collude. They can get together, talk it over, and agree to charge the same price, P_0 . In addition to reducing the possibility of price wars, this will give each firm the maximum profit. For society, the result will be the same as would occur if the industry were a pure monopoly composed of three identical plants.

Cartels and Collusion

Undoubtedly the most significant international cartel is the Organization of Petroleum Exporting Countries (OPEC), comprising 13 oil-producing nations (Saudi Arabia, Iran, Venezuela, UAE, Nigeria, Kuwait, Libya, Indonesia, Algeria, Angola, Ecuador, Qatar, and Iraq). OPEC produces 40 percent of the world's oil and supplies 60 percent of all oil traded internationally. In the late 1990s it reacted vigorously to very low oil prices by greatly restricting supply. Some non-OPEC producers supported the cutback in production, and within a 15-month period the price of oil shot up from \$11 a barrel to \$34 a barrel. Fearing a global political and economic backlash from the major industrial nations, OPEC upped the production quotas for its members in mid-2000. The increases in oil supply that resulted reduced the price of oil to about \$25, where it remained through 2002. It is clear that the OPEC cartel has sufficient market power to hold the price of oil substantially above its marginal cost of production. (In the 2005–2008 period, supply uncertainties associated with the Middle East and rising demand for oil in China helped push the price up to over \$147 a barrel!)

Because cartels among domestic firms are illegal in the United States, any collusion that exists is covert or secret. Yet there are numerous examples of collusion, as shown by evidence from antitrust (antimonopoly) cases. In 1993 Borden,

APPLYING THE ANALYSIS Pet, and Dean Food, among others, either pleaded guilty to or were convicted of rigging bids on the prices of milk products sold to schools and military bases. By phone or at luncheons, company executives agreed in advance on which firm would submit the low bid for each school district or military base. In 1996 American agribusiness Archer Daniels Midland and three Japanese and South Korean firms were found to have conspired to fix the worldwide price and sales volume of a livestock feed additive. Executives for the firms secretly met in Hong Kong, Paris, Mexico City, Vancouver, and Zurich to discuss their plans.

There are many other relatively recent examples of price fixing: ConAgra and Hormel agreed to pay more than \$21 million to settle their roles in a nationwide price-fixing case involving catfish. The U.S. Justice Department fined UCAR International \$110 million for scheming with rivals to fix prices and divide the world market for graphite electrodes used in steel mills. The auction houses Sotheby's and Christy's were found guilty of conspiring over a 6-year period to set the same commission rates for sellers at auctions. Bayer AG pleaded guilty to, and was fined \$66 million for, taking part in a conspiracy to divide up the market and set prices for chemicals used in rubber manufacturing.

Question:

In what way might mergers be an alternative to illegal collusion? In view of your answer, why is it important to enforce laws that outlaw mergers that substantially reduce competition?

Obstacles to Collusion

Normally, cartels and similar collusive arrangements are difficult to establish and maintain. Below are several barriers to collusion beyond the antitrust laws.

Demand and Cost Differences When oligopolists face different costs and demand curves, it is difficult for them to agree on a price. This is particularly the case in industries where products are differentiated and change frequently. Even with highly standardized products, firms usually have somewhat different market shares and operate with differing degrees of productive efficiency. Thus, it is unlikely that even homogeneous oligopolists would have the same demand and cost curves.

In either case, differences in costs and demand mean that the profit-maximizing price will differ among firms; no single price will be readily acceptable to all, as we assumed was true in Figure 9.5. So price collusion depends on compromises and concessions that are not always easy to obtain and hence act as an obstacle to collusion.

Number of Firms Other things equal, the larger the number of firms, the more difficult it is to create a cartel or some other form of price collusion. Agreement on price by three or four producers that control an entire market may be relatively easy to accomplish. But such agreement is more difficult to achieve where there are, say, 10 firms, each with roughly 10 percent of the market, or where the Big Three have 70 percent of the market while a competitive fringe of 8 or 10 smaller firms battles for the remainder.

Cheating As the game-theory model makes clear, there is a temptation for collusive oligopolists to engage in secret price cutting to increase sales and profit. The difficulty with such cheating is that buyers who are paying a high price for a product may become aware of the lower-priced sales and demand similar treatment. Or buyers receiving a price concession from one producer may use the concession as a wedge to get even larger price concessions from a rival producer. Buyers' attempts to play producers against one another may precipitate price wars among the producers. Although secret price concessions are potentially profitable, they threaten collusive oligopolies over time. Collusion is more likely to succeed when cheating is easy to detect and punish. Then the conspirators are less likely to cheat on the price agreement.

Recession Long-lasting recession usually serves as an enemy of collusion because slumping markets increase average total cost. In technical terms, as the oligopolists' demand and marginal-revenue curves shift to the left in Figure 9.5 in response to a recession, each firm moves leftward and upward to a higher operating point on its average-total-cost curve. Firms find they have substantial excess production capacity, sales are down, unit costs are up, and profits are being squeezed. Under such conditions, businesses may feel they can avoid serious profit reductions (or even losses) by cutting price and thus gaining sales at the expense of rivals.

Potential Entry The greater prices and profits that result from collusion may attract new entrants, including foreign firms. Since that would increase market supply and reduce prices and profits, successful collusion requires that colluding oligopolists block the entry of new producers.

Oligopoly and Advertising

We have noted that oligopolists would rather not compete on the basis of price and may become involved in price collusion. Nonetheless, each firm's share of the total market is typically determined through product development and advertising, for two reasons:

- Product development and advertising campaigns are less easily duplicated than price cuts. Price cuts can be quickly and easily matched by a firm's rivals to cancel any potential gain in sales derived from that strategy. Product improvements and successful advertising, however, can produce more permanent gains in market share because they cannot be duplicated as quickly and completely as price reductions.
- Oligopolists have sufficient financial resources to engage in product development and advertising. For most oligopolists, the economic profits earned in the past can help finance current advertising and product development.

In 2007, firms spent an estimated \$285 billion on advertising in the United States. *Advertising is prevalent in both monopolistic competition and oligopoly.* Table 9.1 lists the 10 leading U.S. advertisers in 2006.

Company	Advertising Spending Millions of \$
Procter & Gamble	\$4898
AT&T	3345
General Motors	3296
Time Warner	3089
Verizon	2822
Ford Motor	2577
GlaxoSmithKline	2444
Walt Disney	2320
Johnson & Johnson	2291
Unilever	2098

TABLE 9.1 The Largest U.S. Advertisers, 2006

Source: Advertising Age, www.adage.com.

Advertising may affect prices, competition, and efficiency either positively or negatively, depending on the circumstances. While our focus here is on advertising by oligopolists, the analysis is equally applicable to advertising by monopolistic competitors.

Positive Effects of Advertising

In order to make rational (efficient) decisions, consumers need information about product characteristics and prices. Media advertising may be a low-cost means for consumers to obtain that information. Suppose you are in the market for a high-quality camera and there is no advertising of such a product in newspapers or magazines. To make a rational choice, you may have to spend several days visiting stores to determine the availability, prices, and features of various brands. This search entails both direct costs (gasoline, parking fees) and indirect costs (the value of your time). By providing information about the available options, advertising reduces your search time and minimizes these direct and indirect costs.

By providing information about the various competing goods that are available, advertising diminishes monopoly power. In fact, advertising is frequently associated with the introduction of new products designed to compete with existing brands. Could Toyota and Honda have so strongly challenged U.S. auto producers without advertising? Could FedEx have sliced market share away from UPS and the U.S. Postal Service without advertising?

Viewed this way, advertising is an efficiency-enhancing activity. It is a relatively inexpensive means of providing useful information to consumers and thus lowering their search costs. By enhancing competition, advertising results in greater economic efficiency. By facilitating the introduction of new products, advertising speeds up technological progress. By increasing sales and output, advertising can reduce long-run average total cost by enabling firms to obtain economies of scale.

Potential Negative Effects of Advertising

Not all the effects of advertising are positive, of course. Much advertising is designed simply to manipulate or persuade consumers—that is, to alter their preferences in favor of the advertiser's product. A television commercial that indicates that a popular personality drinks a particular brand of soft drink—and therefore that you should too—conveys little or no information to consumers about price or quality. In addition, advertising is sometimes based on misleading and extravagant claims that confuse consumers rather than enlighten them. Indeed, in some cases advertising may well persuade consumers to pay high prices for much-acclaimed but inferior products, forgoing better but unadvertised products selling at lower prices. Example: *Consumer Reports* has found that heavily advertised premium motor oils and fancy additives provide no better engine performance and longevity than do cheaper brands.

Firms often establish substantial brand-name loyalty and thus achieve monopoly power via their advertising (see Global Snapshot 9.1). As a consequence, they are able to increase their sales, expand their market shares, and enjoy greater profits. Larger profits permit still more advertising and further enlargement of the firm's market share and profit. In time, consumers may lose the advantages of competitive markets and face the disadvantages of monopolized markets. Moreover, new entrants to the industry need to incur large advertising costs in order to establish their products in the marketplace; thus, advertising costs may be a barrier to entry.

Advertising can also be self-canceling. The advertising campaign of one fast-food hamburger chain may be offset by equally costly campaigns waged by rivals, so each firm's demand actually remains unchanged. Few, if any, extra burgers will be purchased,

GLOBAL SNAPSHOT 9.1

The World's Top 10 Brand Names

Here are the world's top 10 brands, based on four criteria: the brand's market share within its category, the brand's world 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.



and all firms will experience higher costs, and either their profits will fall or, through successful price leadership, their product prices will rise.

When advertising either leads to increased monopoly power or is self-canceling, economic inefficiency results.

Oligopoly and Efficiency

Is oligopoly, then, an efficient market structure from society's standpoint? How do the price and output decisions of the oligopolist measure up to the triple equality P = MC = minimum ATC that occurs in pure competition?

Inefficiency

Many economists believe that the outcome of some oligopolistic markets is approximately as shown in Figure 9.5. This view is bolstered by evidence that many oligopolists sustain sizable economic profits year after year. In that case, the oligopolist's production occurs where price exceeds marginal cost and average total cost. Moreover, production is below the output at which average total cost is minimized. In this view, neither productive efficiency (P = minimum ATC) nor allocative efficiency (P = MC) is likely to occur under oligopoly. A few observers assert that oligopoly is actually less desirable than pure monopoly because government usually regulates pure monopoly in the United States to guard against abuses of monopoly power. Informal collusion among oligopolists may yield price and output results similar to those under pure monopoly yet give the outward appearance of competition involving independent firms.

Qualifications

We should note, however, three qualifications to this view:

- *Increased foreign competition* In recent decades foreign competition has increased rivalry in a number of oligopolistic industries—steel, automobiles, photographic film, electric shavers, outboard motors, and copy machines, for example. This has helped to break down such cozy arrangements as price leadership and to stimulate much more competitive pricing.
- *Limit pricing* Recall that some oligopolists may purposely keep prices below the shortrun profit-maximizing level in order to bolster entry barriers. In essence, consumers and society may get some of the benefits of competition—prices closer to marginal cost and minimum average total cost—even without the competition that free entry would provide.
- *Technological advance* Over time, oligopolistic industries may foster more rapid product development and greater improvement of production techniques than would be possible if they were purely competitive. Oligopolists have large economic profits from which they can fund expensive research and development (R&D). Moreover, the existence of barriers to entry may give the oligopolist some assurance that it will reap the rewards of successful R&D. Oligopolists account for the bulk of the more than \$200 billion that U.S. businesses spend on R&D each year. Thus, the short-run economic inefficiencies of oligopolists may be partly or wholly offset by the oligopolists' contributions to better products, lower prices, and lower costs over time.

APPLYING THE ANALYSIS

Oligopoly in the Beer Industry

The beer industry serves as a good case study for oligopoly. This industry was once populated by hundreds of firms and an even larger number of brands. But it now is an oligopoly dominated by a handful of producers.

Since the Second World War, profound changes have increased the level of concentration in the U.S. beer industry. In 1947 more than 400 independent brewing companies resided in the United States. By 1967, the number had declined to 124 and by 1980 it had dropped to just 33. In 1947 the largest five brewers sold only 19 percent of the nation's beer. In 2007, the Big Three brewers (Anheuser-Busch, SABMiller, and Molson/Coors) sold 76 percent. In 2007, Anheuser-Bush (48 percent) and SABMiller (18 percent) alone combined for 66 percent of industry sales. And, in late 2007, SABMiller acquired the U.S. operations of Molson/Coors, turning the Big Three into the Big Two. In 2008, Belgian brewer InBev purchased Anheuser-Busch. The U.S. beer industry clearly meets all the criteria of oligopoly.

Changes on the demand side of the market have contributed to the "shakeout" of small brewers from the industry. First, consumer tastes in the mass market have generally shifted from the stronger-flavored beers of the small brewers to the light products of the larger brewers. Second, there has been a shift from the consumption of beer in taverns to consumption of it in the home. The beer consumed in taverns was mainly "draft" or "tap" beer from kegs, supplied by local and regional brewers that could deliver the kegs in a timely fashion at relatively low transportation cost. But the large increase in the demand for beer consumed at home opened the door for large brewers that sold their beer in bottles and

aluminum cans. The large brewers could ship their beer by truck or rail over long distances and compete directly with the local brewers.

Developments on the supply side of the market have been even more profound. Technological advances speeded up the bottling and canning lines. Today, large brewers can fill and close 2000 cans per line per minute. Large plants are also able to reduce labor costs through the automating of brewing and warehousing. Furthermore, plant construction costs per barrel of production capacity are about one-third less for a 4.5-million-barrel plant than for a 1.5-million-barrel plant. As a consequence of these and other factors, the minimum efficient scale in brewing is a plant size of about 4.5 million barrels. Additionally, studies indicate that further cost savings are available to brewing firms that have two or more separate large breweries in different regions of the country. Between the economies of scale from plant size and these cost savings from multiple plants, cost considerations deter entry to the mainline beer industry.

"Blindfold" taste tests confirm that most mass-produced American beers taste alike. So brewers greatly emphasize advertising. And here Anheuser-Busch InBev and Miller-Coors, which sell national brands, enjoy major cost advantages over producers such as Pabst that have many regional brands (for example, Lonestar, Rainer, Schaefer, and Schmidts). The reason is that national television advertising is less costly *per viewer* than local TV advertising.

Up until the recent combination of Molson/Coors and SABMiller, mergers had not been the dominant factor in explaining the industry consolidation. Rather, that was largely caused by failing smaller breweries' (such as Heileman's) selling out. Dominant firms have expanded by heavily advertising their main brands and by creating new brands such as Lite, Bud Light, Genuine Draft, Keystone, and Icehouse rather than acquiring other brewers. This has sustained significant product differentiation, despite the declining number of major brewers.

The story of the last three decades has been Anheuser-Busch InBev, (A-B), which has greatly expanded its market share. A-B now makes the nation's top two brands: Bud Light and Budweiser account for nearly half the beer sold in the United States. Part of A-B's success owes to the demise of regional competitors. But part also is the result of A-B's strategic prowess. It has constructed state-of-the-art breweries, created effective advertising campaigns, and forged strong relationships with regional distributors. Meanwhile, Miller's market share has declined slightly in recent years. In 2002 Philip Morris sold Miller to London-based SAB. SABMiller, as the firm is now called, redesigned Miller's labeling to enhance its appeal and to expand its presence overseas. Perhaps of greater importance, SABMiller's acquisition of Coors will immediately expand its U.S. market share from 18 percent to 29 percent.

Imported beers such as Heineken, Corona, and Guinness constitute about 9 percent of the market, with individual brands seeming to wax and wane in popularity. Some local or regional microbreweries such as Samuel Adams and Pyramid, which brew "craft" or specialty beers and charge super-premium prices, have whittled into the sales of the major brewers. Craft and specialty beers account for only 6 percent of beer consumed in the United States, but they are the fastest-growing segment of the U.S. industry. A-B, Miller, and Coors have taken notice, responding with specialty brands of their own (for example, Red Wolf, Red Dog, Killarney's, Icehouse, and Blue Moon) and buying stakes in microbrewers Redhook Ale and Celis.

Source: Based on Kenneth G. Elzinga, "Beer," in Walter Adams and James Brock (eds.), *The Structure of American Industry*, 10th ed. (Upper Saddle River, N.J.: Prentice-Hall, 2001), pp. 85–113; and Douglas F. Greer, "Beer: Causes of Structural Change," in Larry Duetsch (ed.), *Industry Studies*, 2d ed. (New York: M. E. Sharpe, 1998), pp. 28–64. Updated data and information are mainly from *Beer Marketer's Insights*, www.beerinsights.com, and the Association of Brewers, www.beertown.com.

Summary

- The distinguishing features of monopolistic competition are (a) there are enough firms in the industry to ensure that each firm has only limited control over price, mutual interdependence is absent, and collusion is nearly impossible;
 (b) products are characterized by real or perceived differences so that economic rivalry entails both price and nonprice competition; and (c) entry to the industry is relatively easy. Many aspects of retailing, and some manufacturing industries in which economies of scale are few, approximate monopolistic competition.
- 2. Monopolistically competitive firms may earn economic profits or incur losses in the short run. The easy entry and exit of firms result in only normal profits in the long run.
- 3. The long-run equilibrium position of the monopolistically competitive producer is less efficient than that of the pure competitor. Under monopolistic competition, price exceeds marginal cost, suggesting an underallocation of resources to the product, and price exceeds minimum average total cost, indicating that consumers do not get the product at the lowest price that cost conditions might allow.
- 4. Nonprice competition provides a way that monopolistically competitive firms can offset the long-run tendency for economic profit to fall to zero. Through product differentiation, product development, and advertising, a firm may strive to increase the demand for its product more than enough to cover the added cost of such nonprice competition. Consumers benefit from the wide diversity of product choice that monopolistic competition provides.
- 5. In practice, the monopolistic competitor seeks the specific combination of price, product, and advertising that will maximize profit.
- 6. Oligopolistic industries are characterized by the presence of few firms, each having a significant fraction of the market. Firms thus situated engage in strategic behavior and are mutually interdependent: The behavior of any one firm directly affects, and is affected by, the actions of rivals. Products may be either virtually uniform or significantly differentiated. Various barriers to entry, including economies of scale, underlie and maintain oligopoly.

- 7. Game theory (a) shows the interdependence of oligopolists' pricing policies, (b) reveals the tendency of oligopolists to collude, and (c) explains the temptation of oligopolists to cheat on collusive arrangements.
- 8. Noncollusive oligopolists may face a kinked-demand curve. This curve and the accompanying marginal-revenue curve help explain the price rigidity that often characterizes oligopolies; they do not, however, explain how the actual prices of products were first established.
- 9. Price leadership is an informal means of overcoming difficulties relating to kinked-demand curves whereby one firm, usually the largest or most efficient, initiates price changes and the other firms in the industry follow the leader.
- 10. Collusive oligopolists such as cartels maximize joint profits—that is, they behave like pure monopolists. Demand and cost differences, a "large" number of firms, cheating through secret price concessions, recessions, and the anti-trust laws are all obstacles to collusive oligopoly.
- Market shares in oligopolistic industries are usually determined on the basis of product development and advertising. Oligopolists emphasize nonprice competition because (a) advertising and product variations are less easy for rivals to match and (b) oligopolists frequently have ample resources to finance nonprice competition.
- 12. Advertising may affect prices, competition, and efficiency either positively or negatively. Positive: It can provide consumers with low-cost information about competing products, help introduce new competing products into concentrated industries, and generally reduce monopoly power and its attendant inefficiencies. Negative: It can promote monopoly power via persuasion and the creation of entry barriers. Moreover, it can be self-canceling when engaged in by rivals; then it boosts costs and creates inefficiency while accomplishing little else.
- 13. Neither productive nor allocative efficiency is realized in oligopolistic markets, but oligopoly may be superior to pure competition in promoting research and development and technological progress.

Terms and Concepts

monopolistic competition product differentiation nonprice competition excess capacity oligopoly homogeneous oligopoly differentiated oligopoly strategic behavior mutual interdependence game theory collusion per se violation kinked-demand curve price leadership cartel

Study Questions Economics

- 1. How does monopolistic competition differ from pure competition in its basic characteristics? How does it differ from pure monopoly? Explain fully what product differentiation may involve. Explain how the entry of firms into its industry affects the demand curve facing a monopolistic competitor and how that, in turn, affects its economic profit. LOI
- 2. Compare the elasticity of the monopolistic competitor's demand with that of a pure competitor and a pure monopolist. Assuming identical long-run costs, compare graphically the prices and outputs that would result in the long run under pure competition and under monopolistic competition. Contrast the two market structures in terms of productive and allocative efficiency. Explain: "Monopolistically competitive industries are characterized by too many firms, each of which produces too little." LO2
- "Monopolistic competition is monopolistic up to the point at which consumers become willing to buy close-substitute products and competitive beyond that point." Explain.
 LOI
- "Competition in quality and service may be just as effective as price competition in giving buyers more for their money." Do you agree? Why? Explain why monopolistically competitive firms frequently prefer nonprice competition to price competition. LOI
- 5. Why do oligopolies exist? List five or six oligopolists whose products you own or regularly purchase. What distinguishes oligopoly from monopolistic competition? LO3
- 6. Explain the general meaning of the following profit payoff matrix for oligopolists C and D. All profit figures are in thousands. **LO4**



- **a.** Use the payoff matrix to explain the mutual interdependence that characterizes oligopolistic industries.
- **b.** Assuming no collusion between C and D, what is the likely pricing outcome?
- **c.** In view of your answer to 6b, explain why price collusion is mutually profitable. Why might there be a temptation to cheat on the collusive agreement?
- 7. What assumptions about a rival's response to price changes underlie the kinked-demand curve for oligopolists? Why is there a gap in the oligopolist's marginal-revenue curve? How does the kinked-demand curve explain price rigidity in oligopoly? **LOS**
- 8. Why might price collusion occur in oligopolistic industries? Assess the economic desirability of collusive pricing. What are the main obstacles to collusion? Speculate as to why price leadership is legal in the United States, whereas price fixing is not. **LO6**
- **9.** Why is there so much advertising in monopolistic competition and oligopoly? How does such advertising help consumers and promote efficiency? Why might it be excessive at times? **LO7**
- 10. Construct a game-theory matrix to illustrate the text example of two firms and their decisions on high versus low advertising budgets and the effects of each on profits. Show a circumstance in which both firms select high advertising budgets even though both would be more profitable with low advertising budgets. Why won't they unilaterally cut their advertising budgets? Explain why this is an example of the prisoner's dilemma. LO4
- What firm dominates the beer industry? What demand and supply factors have contributed to "fewness" in this industry? LO3

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Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.



PART FOUR Resource Markets

10 WAGE DETERMINATION

II INCOME INEQUALITY AND POVERTY



IN THIS CHAPTER YOU WILL LEARN:

- I Why the firm's marginal revenue product curve is its labor demand curve.
- 2 The factors that increase or decrease labor demand.
- **3** The determinants of elasticity of labor demand.
- 4 How wage rates are determined in competitive and monopsonistic labor markets.
- 5 How unions increase wage rates.
- 6 The major causes of wage differentials.

Wage Determination

We now turn from the pricing and production of *goods and services* to the pricing and employment of *resources*. Although firms come in various sizes and operate under highly different market conditions, each has a demand for productive resources. They obtain those resources from households—the direct or indirect owners of land, labor, capital, and entrepreneurial resources. So, referring to the circular flow diagram (Figure 2.2, page 43), we shift our attention from the bottom loop (where businesses supply products that households demand) to the top loop (where businesses demand resources that households supply).

purely competitive labor market

A labor market in which a large number of similarly qualified workers independently offer their labor services to a large number of employers, none of whom can set the wage rate.

derived demand

The demand for a resource that results from the demand for the products it helps produce.

A Focus on Labor

The basic principles we develop in this chapter apply to land, labor, and capital resources, but we will emphasize the pricing and employment of labor. About 70 percent of all income in the United States flows to households in the form of wages and salaries. More than 146 million of us go to work each day in the United States. We have an amazing variety of jobs with thousands of different employers and receive large differences in pay. What determines our hourly wage or annual salary? Why is the salary of, say, a topflight major-league baseball player \$15 million or more a year, whereas the pay for a first-rate schoolteacher is \$50,000? Why are starting salaries for college graduates who major in engineering and accounting so much higher than those for graduates majoring in journalism and sociology?

Demand and supply analysis helps us answer these questions. We begin by examining labor demand and labor supply in a **purely competitive labor market**. In such a market,

- Numerous employers compete with one another in hiring a specific type of labor.
- Each of many workers with identical skills supplies that type of labor.
- Individual employers and individual workers are "wage takers" because neither can control the market wage rate.

Labor Demand

Labor demand is the starting point for any discussion of wages and salaries. Other things equal, the demand for labor is an inverse relationship between the price of labor (hourly wage) and the quantity of labor demanded. As with all resources, labor demand is a **derived demand**: It results from the products that labor helps produce. Labor resources usually do not directly satisfy customer wants but do so indirectly through their use in producing goods and services. Almost nobody wants to consume directly the labor services of a software engineer, but millions of people do want to use the software that the engineer helps create.

Marginal Revenue Product

Because resource demand is derived from product demand, the strength of the demand will depend on the productivity of the labor—its ability to produce goods and services—and the price of the good or service it helps produce. A resource that is highly productive in turning out a highly valued commodity will be in great demand. In contrast, a relatively unproductive resource that is capable of producing only a minimally valued commodity will be in little demand. And no demand whatsoever will exist for a resource that is phenomenally efficient in producing something that no one wants to buy.

Consider the table in Figure 10.1, which shows the roles of marginal productivity and product price in determining labor demand.

Productivity Columns 1 and 2 give the number of units of labor employed and the resulting total product (output). Column 3 provides the marginal product (MP), or additional output, resulting from using each additional unit of labor. Columns 1 through 3 remind us that the law of diminishing returns applies here, causing the marginal product of labor to fall beyond some point. For simplicity, we assume that these diminishing marginal returns—these declines in marginal product—begin with the second worker hired.

(1) Units of Labor	(2) Total Product (Output)	(3) Marginal Product (MP)	(4) Product Price	(5) Total Revenue, (2) × (4)	(6) Marginal Revenue Product (MRP)
0	0	7	\$2	\$0	
I.	7	, 6	2	14	ΨΠ 12
2	13	5	2	26	10
3	18	4	2	36 -	
4	22	3	2	44	6
5	25-	2	2	50 -	0
6	27	1	2	54	2
7	28		2	56 [_]	2

FIGURE 10.1 The purely competitive seller's demand for

labor. The MRP-of-labor curve is the labor demand curve; each of its points relates a particular wage rate (= MRP when profit is maximized) with a corresponding quantity of labor demanded. The downward slope of the D = MRP curve results from the law of diminishing marginal returns.



Product Price The derived demand for labor depends also on the market value (product price) of the good or service. Column 4 in the table in Figure 10.1 adds this price information to the mix. Because we are assuming a competitive product market, product price equals marginal revenue. The firm is a price taker and will sell units of output only at this market price. And this price will also be the firm's marginal revenue. In this case, both price and marginal revenue are a constant \$2.

Multiplying column 2 by column 4 provides the total-revenue data of column 5. These are the amounts of revenue the firm realizes from the various levels of employment. From these total-revenue data we can compute the **marginal revenue product** (**MRP**) of labor—the change in total revenue resulting from the use of each additional unit of labor. In equation form,

$$\begin{array}{l} \text{Marginal} \\ \text{revenue} \\ \text{product} \end{array} = \frac{\text{change in total revenue}}{\text{unit change in labor}} \end{array}$$

The MRPs are listed in column 6 in the table.

WORKED PROBLEMS

W 10.1 Labor demand

marginal revenue product (MRP)

The change in a firm's total revenue when it employs 1 more unit of labor.

marginal resource cost (MRC)

The change in a firm's total cost when it employs 1 more unit of labor.

MRP = MRC rule The principle that to maximize profit a firm should expand employment until the marginal revenue product (MRP) of labor equals the marginal resource cost (MRC) of labor.

Rule for Employing Labor: MRP = MRC

The MRP schedule, shown as columns 1 and 6, is the firm's demand schedule for labor. To understand why, you must first know the rule that guides a profit-seeking firm in hiring any resource: To maximize profit, a firm should hire additional units of labor as long as each successive unit adds more to the firm's total revenue than to the firm's total cost.

Economists use special terms to designate what each additional unit of labor (or any other variable resource) adds to total revenue and what it adds to total cost. We have seen that MRP measures how much each successive unit of labor adds to total revenue. The amount that each additional unit of labor adds to the firm's total cost is called its **marginal resource cost (MRC).** In equation form,

 $\frac{\text{Marginal}}{\text{resource}}_{\text{cost}} = \frac{\text{change in total (labor) cost}}{\text{unit change in labor}}$

So we can restate our rule for hiring resources as follows: It will be profitable for a firm to hire additional units of labor up to the point at which labor's MRP is equal to its MRC. If the number of workers a firm is currently hiring is such that the MRP of the last worker exceeds his or her MRC, the firm can profit by hiring more workers. But if the number being hired is such that the MRC of the last worker exceeds his or her MRC, the firm can profit by hiring more workers. But if the number being hired is such that the MRC of the last worker exceeds his or her MRP, the firm is hiring workers who are not "paying their way" and it can increase its profit by discharging some workers. You may have recognized that this **MRP = MRC rule** is similar to the MR = MC profit-maximizing rule employed throughout our discussion of price and output determination. The rationale of the two rules is the same, but the point of reference is now *inputs* of a resource, not *outputs* of a product.

MRP as Labor Demand Schedule

In a competitive labor market, market supply and market demand establish the wage rate. Because each firm hires such a small fraction of the market supply of labor, an individual firm cannot influence the market wage rate; it is a wage taker, not a wage maker. This means that for each additional unit of labor hired, total labor cost increases by exactly the amount of the constant market wage rate. The MRC of labor exactly equals the market wage rate. Thus, resource "price" (the market wage rate) and resource "cost" (marginal resource cost) are equal for a firm that hires labor in a competitive labor market. Then the MRP = MRC rule tells us that a competitive firm will hire units of labor up to the point at which the market *wage rate* (its MRC) is equal to its MRP.

In terms of the data in columns 1 and 6 of Figure 10.1's table, if the market wage rate is, say, \$13.95, the firm will hire only one worker. This is the outcome because the first worker adds \$14 to total revenue and slightly less—\$13.95—to total cost. In other words, because MRP exceeds MRC for the first worker, it is profitable to hire that worker. For each successive worker, however, MRC (= \$13.95) exceeds MRP (= \$12 or less), indicating that it will not be profitable to hire any of those workers. If the wage rate is \$11.95, by the same reasoning we discover that it will pay the firm to hire both the first and second workers. Similarly, if the wage rate is \$9.95, three will be hired; if it is \$7.95, four; if it is \$5.95, five; and so forth. The MRP schedule therefore constitutes the firm's demand for labor because each point on this schedule (or curve) indicates the quantity of labor units the firm would bire at each possible wage rate. In the graph in Figure 10.1, we show the D = MRP curve based on the data in the table. The

competitive firm's labor demand curve identifies an inverse relationship between the wage rate and the quantity of labor demanded, other things equal. The curve slopes downward because of diminishing marginal returns.¹

Market Demand for Labor

We have now explained the individual firm's demand curve for labor. Recall that the total, or market, demand curve for a *product* is found by summing horizontally the demand curves of all individual buyers in the market. The market demand curve for a particular *resource* is derived in essentially the same way. Economists sum horizontally the individual labor demand curves of all firms hiring a particular kind of labor to obtain the market demand for that labor.

Changes in Labor Demand

What will alter the demand for labor (shift the labor demand curve)? The fact that labor demand is derived from *product demand* and depends on *resource productivity* suggests two "resource demand shifters." Also, our analysis of how changes in the prices of other products can shift a product's demand curve (Chapter 3) suggests another factor: changes in the *prices of other resources*.

Changes in Product Demand

Other things equal, an increase in the demand for a product will increase the demand for a resource used in its production, whereas a decrease in product demand will decrease the demand for that resource.

Let's see how this works. The first thing to recall is that a change in the demand for a product will normally change its price. In the table in Figure 10.1, let's assume that an increase in product demand boosts product price from \$2 to \$3. You should calculate the new labor demand schedule (columns 1 and 6) that would result, and plot it in the graph to verify that the new labor demand curve lies to the right of the old demand curve. Similarly, a decline in the product demand (and price) will shift the labor demand curve to the left. The fact that labor demand changes along with product demand demonstrates that labor demand is derived from product demand.

Example: With no offsetting change in supply, a decrease in the demand for new houses will drive down house prices. Those lower prices will decrease the MRP of construction workers, and therefore the demand for construction workers will fall. The labor demand curve will shift to the left.

Changes in Productivity

Other things equal, an increase in the productivity of a resource will increase the demand for the resource and a decrease in productivity will reduce the demand for the resource. If we doubled the MP data of column 3 in the table in Figure 10.1, the MRP data of column 6 also would double, indicating a rightward shift of the labor demand curve in the graph.

¹ Note that we plot the points in Figure 10.1 halfway between succeeding numbers of labor units. For example, we plot the MRP of the second unit (\$12) not at 1 or 2 but at 1½. This "smoothing" enables us to sketch a continuously downsloping curve rather than one that moves downward in discrete steps as each new unit of labor is hired.

The productivity of any resource may be altered over the long run in several ways:

- *Quantities of other resources* The marginal productivity of any resource will vary with the quantities of the other resources used with it. The greater the amount of capital and land resources used with labor, the greater will be labor's marginal productivity and, thus, labor demand.
- *Technological advance* Technological improvements that increase the quality of other resources, such as capital, have the same effect. The better the *quality* of capital, the greater the productivity of labor used with it. Dockworkers employed with a specific amount of capital in the form of unloading cranes are more productive than dockworkers with the same amount of capital embodied in older conveyor-belt systems.
- *Quality of labor* Improvements in the quality of labor will increase its marginal productivity and therefore its demand. In effect, there will be a new demand curve for a different, more skilled, kind of labor.

Changes in the Prices of Other Resources

Changes in the prices of other resources may change the demand for labor.

Substitute Resources Suppose that labor and capital are substitutable in a certain production process. A firm can produce some specific amount of output using a relatively small amount of labor and a relatively large amount of capital, or vice versa. What happens if the price of machinery (capital) falls? The effect on the demand for labor will be the net result of two opposed effects: the substitution effect and the output effect.

- *Substitution effect* The decline in the price of machinery prompts the firm to substitute machinery for labor. This allows the firm to produce its output at lower cost. So at the fixed wage rate, smaller quantities of labor are now employed. This **substitution effect** decreases the demand for labor. More generally, the substitution effect indicates that a firm will purchase more of an input whose relative price has declined and, conversely, use less of an input whose relative price has increased.
- **Output effect** Because the price of machinery has declined, the costs of producing various outputs also must decline. With lower costs, the firm can profitably produce and sell a greater output. The greater output increases the demand for all resources, including labor. So this **output effect** increases the demand for labor. More generally, the output effect means that the firm will purchase more of one particular input when the price of the other input falls and less of that particular input when the price of the other input rises.
- *Net effect* The substitution and output effects are both present when the price of an input changes, but they work in opposite directions. For a decline in the price of capital, the substitution effect decreases the demand for labor and the output effect increases it. The net change in labor demand depends on the relative sizes of the two effects: If the substitution effect outweighs the output effect, a decrease in the price of capital decreases the demand for labor. If the output effect exceeds the substitution effect, a decrease in the price of capital increases the demand for labor.

Complementary Resources Resources may be complements rather than substitutes in the production process; an increase in the quantity of one of them also requires an increase in the amount of the other used, and vice versa. Suppose a small design firm does computer-assisted design (CAD) with relatively expensive personal computers as its basic piece of capital equipment. Each computer requires exactly one design engineer to operate it; the machine is not automated—it will not run itself and a second engineer would have nothing to do.

substitution effect

The replacement of labor by capital when the price of capital falls.

output effect

An increase in the use of labor that occurs when a decline in the price of capital reduces a firm's production costs and therefore enables it to sell more output. Now assume that these computers substantially decline in price. There can be no substitution effect because labor and capital must be used in *fixed proportions:* one person for one machine. Capital cannot be substituted for labor. But there *is* an output effect. Other things equal, the reduction in the price of capital goods means lower production costs. It will therefore be profitable to produce a larger output. In doing so, the firm will use both more capital and more labor. When labor and capital are complementary, a decline in the price of capital increases the demand for labor through the output effect.

We have cast our analysis of substitute resources and complementary resources mainly in terms of a decline in the price of capital. Obviously, an *increase* in the price of capital causes the opposite effects on labor demand.



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Photo Op Substitute Resources versus Complementary Resources

Automatic teller machines (ATMs) and human tellers are substitute resources, whereas construction equipment and their operators are complementary resources.

Occupational Employment Trends

Changes in labor demand are of considerable significance because they affect employment in specific occupations. Other things equal, increases in labor demand for certain occupational groups result in increases in their employment; decreases in labor demand result in decreases in their employment. For illustration, let's look at occupations that are growing and declining in demand. APPLYING THE ANALYSIS

TABLE 10.1 The

10 Fastest-Growing and Most Rapidly Declining U.S. Occupations, in Percentage Terms, 2006–2016

	Employment, Thousands of Jobs		
Occupation	2006	2016	Percentage Change*
Fastest Growing			
Network systems and data communication analysts	262	402	53.4
Personal and home care aides	767	1156	50.6
Home health aides	787	1171	48.7
Software engineers, applications	507	733	44.6
Veterinary technicians	71	100	41.0
Personal financial advisors	176	248	41.0
Makeup artists	2	3	39.8
Medical assistants	417	565	35.4
Veterinarians	62	64	35.0
Substance abuse and behavioral disorder counselors	83	112	34.3
Most Rapidly Declining			
Photographic processing machine operators	49	25	-49.8
File clerks	234	137	-41.3
Model makers and pattern makers, wood	4	2	-40.3
Telephone operators	27	16	-39.5
Shoe machine operators	4	3	-35.7
Forging machine operators	31	21	-30.4
Electrical coil winders, tapers, and finishers	23	16	-30.5
Fabric and apparel patternmakers	9	7	-28.6
Textile machine operators	122	88	-27.9
Sewing machine operators	233	170	-27.2

 \ast Percentages may not correspond with employment numbers due to rounding of the employment data and the percentages.

Source: Bureau of Labor Statistics, "Employment Projections," www.bls.gov.

Table 10.1 lists the 10 fastest-growing and 10 most rapidly declining U.S. occupations (in percentage terms) for 2006 to 2016, as projected by the Bureau of Labor Statistics. Notice that service occupations dominate the fastest-growing list. In general, the demand for service workers is rapidly outpacing the demand for manufacturing, construction, and mining workers in the United States.

Of the 10 fastest-growing occupations in percentage terms, three—personal and home care aides (people who provide home care for the elderly and those with disabilities), home health care aides (people who provide short-term medical care after discharge from hospitals), and medical assistants—are related to health care. The rising demands for these types of labor are derived from the growing demand for health services, caused by several factors. The aging of the U.S. population has brought with it more medical problems, rising incomes have led to greater expenditures on health care, and the growing presence of private and public insurance has allowed people to buy more health care than most could afford individually.

Two of the fastest-growing occupations are directly related to computers. The increase in the demand for network systems and data communication analysts and for computer software engineers arises from the rapid rise in the demand for computers, computer services, and the Internet. It also results from the rising marginal revenue productivity of these particular workers, given the vastly improved quality of the computer and communications equipment they work with. Moreover, price declines on such equipment have had stronger output effects than substitution effects, increasing the demand for these kinds of labor.

Table 10.1 also lists the 10 U.S. occupations with the greatest projected job loss (in percentage terms) between 2006 and 2016. These occupations are more diverse than the fastest-growing occupations. Four of the ten are related to textiles, apparel, and shoes. The U.S. demand for these goods is increasingly being fulfilled through imports, some of which is related to outsourcing those jobs to workers abroad. Declines in other occupations in the list (for example, file clerks, model and pattern makers, and telephone operators) have resulted from technological advances that have enabled firms to replace workers with automated or computerized equipment. The advent of digital photography explains the projected decline in the employment of people operating photographic processing equipment.

Question:

Name some occupation (other than those listed) that you think will grow in demand over the next decade. Name an occupation that you think will decline in demand. In each case, explain your reasoning.

Elasticity of Labor Demand

The employment changes we have just discussed have resulted from shifts in the locations of labor demand curves. Such changes in demand must be distinguished from changes in the quantity of labor demanded caused by a change in the wage rate. Such a change is caused not by a shift of the demand curve but, rather, by a movement from one point to another on a fixed labor demand curve. Example: In Figure 10.1 we note that an increase in the wage rate from \$5 to \$7 will reduce the quantity of labor demanded from 5 units to 4 units. This is a change in the *quantity of labor demanded* as distinct from a *change in labor demand*.

The sensitivity of labor quantity to changes in wage rates is measured by the **elasticity of labor demand** (or *wage elasticity of demand*). In coefficient form,

 $E_w = \frac{\text{percentage change in labor quantity}}{\text{percentage change in wage rate}}$

When E_w is greater than 1, labor demand is elastic; when E_w is less than 1, labor demand is inelastic; and when E_w equals 1, labor demand is unit-elastic. Several factors interact to determine the wage elasticity of demand.

elasticity of labor demand

A measure of the responsiveness of labor quantity to a change in the wage rate.

ORIGIN OF THE IDEA

O 10.1 Elasticity of resource demand

Ease of Resource Substitutability

The greater the substitutability of other resources for labor, the more elastic is the demand for labor. Example: Because automated voice-mail systems are highly substitutable for telephone receptionists, the demand for receptionists is quite elastic. In contrast, there are few good substitutes for physicians, so demand for them is less elastic or even inelastic.

Time can play a role in the input substitution process. For example, a firm's truck drivers may obtain a substantial wage increase with little or no immediate decline in employment. But over time, as the firm's trucks wear out and are replaced, that wage increase may motivate the company to purchase larger trucks and in that way deliver the same total output with fewer drivers.

Elasticity of Product Demand

The greater the elasticity of product demand, the greater is the elasticity of labor demand. The derived nature of resource demand leads us to expect this relationship. A small rise in the price of a product (caused by a wage increase) will sharply reduce output if product demand is elastic. So a relatively large decline in the amount of labor demanded will result. This means that the demand for labor is elastic.

Ratio of Labor Cost to Total Cost

The larger the proportion of total production costs accounted for by labor, the greater is the elasticity of demand for labor. In the extreme, if labor cost is the only production cost, then a 20 percent increase in wage rates will increase marginal cost and average total cost by 20 percent. If product demand is elastic, this substantial increase in costs will cause a relatively large decline in sales and a sharp decline in the amount of labor demanded. So labor demand is highly elastic. But if labor cost is only 50 percent of production cost, then a 20 percent increase in wage rates will increase costs by only 10 percent. With the same elasticity of product demand, this will cause a relatively small decline in sales and therefore in the amount of labor demanded. In this case the demand for labor is much less elastic.

Market Supply of Labor

Let's now turn to the supply side of a purely competitive labor market. The supply curve for each type of labor slopes upward, indicating that employers as a group must pay higher wage rates to obtain more workers. Employers must do this to bid workers away from other industries, occupations, and localities. Within limits, workers have alternative job opportunities. For example, they may work in other industries in the same locality, or they may work in their present occupations in different cities or states, or they may work in other occupations.

Firms that want to hire these workers must pay higher wage rates to attract them away from the alternative job opportunities available to them. They also must pay higher wages to induce people who are not currently in the labor force—who are perhaps doing household activities or enjoying leisure—to seek employment. In short, assuming that wages are constant in other labor markets, higher wages in a particular labor market entice more workers to offer their labor services in that market. This fact results in a direct relationship between the wage rate and the quantity of labor supplied, as represented by the upward-sloping market supply-of-labor curve S in Figure 10.2a.

FIGURE 10.2 A purely competitive labor market. In a purely competitive labor market (a) the equilibrium wage rate W_c and the number of workers Q_c are determined by labor supply S and labor demand D. Because this market wage rate is given to the individual firm (b) hiring in this market, its labor supply curve s = MRC is perfectly elastic. Its labor demand curve, d, is its MRP curve (here labeled *mrp*). The firm maximizes its profit by hiring workers up to the point where MRP = MRC.



Wage and Employment Determination

What determines the market wage rate and how do firms respond to it? Suppose 200 firms demand a particular type of labor, say, carpenters. These firms need not be in the same industry; industries are defined according to the products they produce and not the resources they employ. Thus, firms producing wood-framed furniture, wood windows and doors, houses and apartment buildings, and wood cabinets will demand carpenters. To find the total, or market, labor demand curve for a particular labor service, we sum horizontally the labor demand curves (the marginal revenue product curves) of the individual firms, as indicated in Figure 10.2. The horizontal summing of the 200 labor demand curves like *d* in Figure 10.2b yields the market labor demand curve *D* in Figure 10.2a.

The intersection of the market labor demand curve D and the market labor supply curve S in Figure 10.2a determines the equilibrium wage rate and the level of employment in this purely competitive labor market. Observe that the equilibrium wage rate is W_c (\$10) and the number of workers hired is Q_c (1000).

To the individual firm (Figure 10.2b) the market wage rate W_c is given at \$10. Each of the many firms employs such a small fraction of the total available supply of this type of labor that no single firm can influence the wage rate. As shown by the horizontal line *s* in Figure 10.2b, the supply of labor faced by an individual firm is perfectly elastic. It can hire as many or as few workers as it wants to at the market wage rate. This fact is clarified in Table 10.2, where we see that the marginal cost of labor MRC is constant at \$10 and is equal to the wage rate. Each additional unit of labor employed adds precisely its own wage rate (here, \$10) to the firm's total resource cost.

Each individual firm will apply the MRP = MRC rule to determine its profitmaximizing level of employment. So the competitive firm maximizes its profit by hiring units of labor to the point at which its wage rate (= MRC) equals MRP. In Figure 10.2b

TABLE 10.2 The Supply of

Labor: Pure Competition in the Hire of Labor

(I) Units of Labor	(2) Wage Rate	(3) Total Labor Cost (Wage Bill)	(4) Marginal Resource (Labor) Cost
0	\$10	\$ 0 _	\$10
I.	10	10	
2	10	20 -	
3	10	30 -	
4	10	40 _	
5	10	50 -	
6	10	60	10

INTERACTIVE GRAPHS

G I0.I Competitive labor market

> monopsony A market structure in which only a single buyer of a good, service, or resource is present.



the employer will hire q_c (5) units of labor, paying each worker the market wage rate W_c (\$10). The other 199 firms (not shown) in this labor market will also each employ 5 workers and pay \$10 per hour. The workers will receive pay based on their contribution to the firm's output and thus revenues.

Monopsony

In the purely competitive labor market, each firm can hire as little or as much labor as it needs at the market wage rate, as reflected in its horizontal labor supply curve. The situation is strikingly different in **monopsony**, a market in which a single employer of labor has substantial buying (hiring) power. Labor market monopsony has the following characteristics:

- There is only a single buyer of a particular type of labor.
- This type of labor is relatively immobile, either geographically or because workers would have to acquire new skills.
- The firm is a "wage maker," because the wage rate it must pay varies directly with the number of workers it employs.

As is true of monopoly power, there are various degrees of monopsony power. In *pure* monopsony such power is at its maximum because only a single employer hires labor in the labor market. The best real-world examples are probably the labor markets in towns that depend almost entirely on one major firm. For example, a silvermining company may be almost the only source of employment in a remote Idaho town. A Wisconsin paper mill, a Colorado ski resort, or an Iowa food processor may provide most of the employment in its locale. In other cases, three or four firms may each hire a large portion of the supply of labor in a certain market and therefore have some monopsony power. Moreover, if they illegally act in concert in hiring labor, they greatly enhance their monopsony power.

Upward-Sloping Labor Supply to Firm

When a firm hires most of the available supply of a certain type of labor, its decision to employ more or fewer workers affects the wage rate it pays to those workers. Specifically, if a firm is large in relation to the size of the labor market, it will have to pay a higher wage rate to obtain more labor. Suppose that only one employer

FIGURE 10.3 Monopsony. In a monopsonistic labor market the employer's marginal resource (labor) cost curve (MRC) lies above the labor supply curve S. Equating MRC with MRP at point b, the monopsonist hires Q_m workers (compared with Q_c under competition). As indicated by point c on S, it pays only wage rate W_m (compared with the competitive wage W_c).



hires a particular type of labor in a certain geographic area. In this pure monopsony situation, the labor supply curve for the *firm* and the total labor supply curve for the *labor market* are identical. The monopsonist's supply curve—represented by curve *S* in Figure 10.3—is upsloping because the firm must pay higher wage rates if it wants to attract and hire additional workers. This same curve is also the monopsonist's average-cost-of-labor curve. Each point on curve *S* indicates the wage rate (cost) per worker that must be paid to attract the corresponding number of workers.

MRC Higher Than the Wage Rate

When a monopsonist pays a higher wage to attract an additional worker, it must pay that higher wage not only to the additional worker, but to all the workers it is currently employing at a lower wage. If not, labor morale will deteriorate, and the employer will be plagued with labor unrest because of wage-rate differences existing for the same job. Paying a uniform wage to all workers means that the cost of an extra worker—the marginal resource (labor) cost (MRC)—is the sum of that worker's wage rate and the amount necessary to bring the wage rate of all current workers up to the new wage level.

Table 10.3 illustrates this point. One worker can be hired at a wage rate of \$6. But hiring a second worker forces the firm to pay a higher wage rate of \$7. The marginal resource cost of the second worker is \$8—the \$7 paid to the second worker plus a \$1 raise for the first worker. From another viewpoint, total labor cost is now \$14 (= $2 \times$ \$7), up from \$6. So the MRC of the second worker is \$8 (= \$14 - \$6), not just the \$7 wage rate paid to that worker. Similarly, the marginal labor cost of the third worker is \$10—the \$8 that must be paid to attract this worker from alternative employment plus \$1 raises, from \$7 to \$8, for the first two workers.

Here is the key point: Because the monopsonist is the only employer in the labor market, its marginal resource (labor) cost exceeds the wage rate. Graphically, the monopsonist's MRC curve lies above the average-cost-of-labor curve, or labor supply curve *S*, as is clearly shown in Figure 10.3.

WORKED PROBLEMS

V 10.2 Labor markets: competition and monopsony

TABLE 10.3 The Supply of Labor: Monopsony in the Hiring of Labor

(I) Units of Labor	(2) Wage Rate	(3) Total Labor Cost (Wage Bill)	(4) Marginal Resource (Labor) Cost
0	\$5	\$ 0	\$ 6
I	6	6 -	\$ °
2	7	14 -	
3	8	24 -	
4	9	36 -	14
5	10	50 -	14
6	11	66	16

Equilibrium Wage and Employment

How many units of labor will the monopsonist hire, and what wage rate will it pay? To maximize profit, the monopsonist will employ the quantity of labor Q_m in Figure 10.3 because at that quantity MRC and MRP are equal (point *b*). The monopsonist next determines how much it must pay to attract these Q_m workers. From the supply curve *S*, specifically point *c*, it sees that it must pay wage rate W_m . Clearly, it need not pay a wage equal to MRP; it can attract and hire exactly the number of workers it wants (Q_m) with wage rate W_m . And that is the wage that it will pay.

Contrast these results with those that would prevail in a competitive labor market. With competition in the hiring of labor, the level of employment would be greater (at Q_c) and the wage rate would be higher (at W_c). Other things equal, the monopsonist maximizes its profit by hiring a smaller number of workers and thereby paying a less-than-competitive wage rate. Society obtains a smaller output, and workers get a wage rate that is less by bc than their marginal revenue product.

INTERACTIVE GRAPHS G 10.2 Monopsony

> APPLYING THE ANALYSIS

Monopsony Power

Fortunately, monopsonistic labor markets are uncommon in the United States. In most labor markets, several potential employers compete for most workers, particularly for workers who are occupationally and geographically mobile. Also, where monopsony labor market outcomes might have otherwise occurred, unions have sprung up to counteract that power by forcing firms to negotiate wages. Nevertheless, economists have found some evidence of monopsony power in such diverse labor markets as the markets for nurses, professional athletes, public school teachers, newspaper employees, and some building-trade workers.

In the case of nurses, the major employers in most locales are a relatively small number of hospitals. Further, the highly specialized skills of nurses are not readily transferable to other occupations. It has been found, in accordance with the monopsony model, that, other things equal, the smaller the number of hospitals in a town or city (that is, the greater the degree of monopsony), the lower the beginning salaries of nurses.

Professional sports leagues also provide a good example of monopsony, particularly as it relates to the pay of first-year players. The National Football League, the National Basketball Association, and Major League Baseball assign first-year players to teams through "player drafts." That device prohibits other teams from competing for a player's services, at least for several years, until the player becomes a "free agent." In this way the league exercises monopsony power, which results in lower salaries than would occur under competitive conditions.

Question:

The salaries of star players often increase substantially when they become free agents. How does that fact relate to monopsony power?

Union Models

Our assumption thus far has been that workers compete with one another in selling their labor services. In some labor markets, however, workers unionize and sell their labor services collectively. In the United States, about 12 percent of wage and salary workers belong to unions. (As shown in Global Snapshot 10.1, this percentage is low relative to some other nations.)

Union efforts to raise wage rates are mainly concentrated on the supply side of the labor market.



GLOBAL SNAPSHOT 10.1

Union Membership

Compared with most other industrialized nations, the percentage of wage and salary earners belonging to unions in the United States is small.



Source: Jelle Visser, "Union Membership in 24 Countries," *Monthly Labor Review,* January 2006, 38–49. Data are for 2003.

exclusive unionism

The union practice of restricting the supply of skilled union labor to increase the wage rate received by union members.

occupational licensing

Government laws that require a worker to satisfy certain specified requirements and obtain a license from a licensing board before engaging in a particular occupation.

Exclusive or Craft Union Model

Unions can boost wage rates by reducing the supply of labor, and over the years organized labor has favored policies to do just that. For example, labor unions have supported legislation that has (1) restricted permanent immigration, (2) reduced child labor, (3) encouraged compulsory retirement, and (4) enforced a shorter workweek.

Moreover, certain types of workers have adopted techniques designed to restrict the number of workers who can join their union. This is especially true of *craft unions*, whose members possess a particular skill, such as carpenters or brick masons or plumbers. Craft unions have frequently forced employers to agree to hire only union members, thereby gaining virtually complete control of the labor supply. Then, by following restrictive membership policies—for example, long apprenticeships, very high initiation fees, and limits on the number of new members admitted—they have artificially restricted labor supply. As indicated in Figure 10.4, such practices result in higher wage rates and constitute what is called **exclusive unionism**. By excluding workers from unions and therefore from the labor supply, craft unions succeed in elevating wage rates.

This craft union model is also applicable to many professional organizations, such as the American Medical Association, the National Education Association, the American Bar Association, and hundreds of others. Such groups seek to limit competition for their services from less-qualified labor suppliers. One way to accomplish that is through **occupational licensing**. Here, a group of workers in a given occupation pressure Federal, state, or municipal government to pass a law that says that some occupational group (for example, barbers, physicians, lawyers, plumbers, cosmetologists, egg graders, pest controllers) can practice their trade only if they meet certain requirements. Those requirements might include level of education, amount of work experience, and the passing of an examination. Members of the licensed occupation typically dominate the licensing board that administers such laws. The result is self-regulation, which can lead to policies that restrict entry to the occupation and reduce labor supply.

The expressed purpose of licensing is to protect consumers from incompetent practitioners—surely a worthy goal. But such licensing, if abused, simply results in above-competitive wages and earnings for those in the licensed occupation (Figure 10.4). Moreover, licensing requirements often include a residency requirement, which inhibits the interstate movement of qualified workers. Some 600 occupations are now licensed in the United States.



FIGURE 10.4 Exclusive or

craft unionism. By reducing the supply of labor (say, from S_1 to S_2) through the use of restrictive membership policies, exclusive unions achieve higher wage rates (W_c to W_u). However, restriction of the labor supply also reduces the number of workers employed (Q_c to Q_u).

Inclusive or Industrial Union Model

Instead of trying to limit their membership, however, most unions seek to organize all available workers. This is especially true of the *industrial unions*, such as those of the automobile workers and steelworkers. Such unions seek as members all available unskilled, semiskilled, and skilled workers in an industry. A union can afford to be exclusive when its members are skilled craftspersons for whom there are few substitutes. But for a union composed of unskilled and semiskilled workers, a policy of limited membership would make available to the employers numerous nonunion workers who are highly substitutable for the union workers.

An industrial union that includes virtually all available workers in its membership can put firms under great pressure to agree to its wage demands. Because of its legal right to strike, such a union can threaten to deprive firms of their entire labor supply. And an actual strike can do just that.

We illustrate such **inclusive unionism** in Figure 10.5. Initially, the competitive equilibrium wage rate is W_c and the level of employment is Q_c . Now suppose an industrial union is formed that demands a higher, above-equilibrium wage rate of, say, W_w . That wage rate W_u would create a perfectly elastic labor supply over the range *ae* in Figure 10.5. If firms wanted to hire any workers in this range, they would have to pay the union-imposed wage rate. If they decide against meeting this wage demand, the union will supply no labor at all, and the firms will be faced with a strike. If firms decide it is better to pay the higher wage rate than to suffer a strike, they will cut back on employment from Q_c to Q_w .

By agreeing to the union's W_u wage demand, individual employers become wage takers at the union wage rate W_u . Because labor supply is perfectly elastic over range *ae*, the marginal resource (labor) cost is equal to the union wage rate W_u over this range. The Q_u level of employment is the result of employers' equating this MRC (now equal to the union wage rate) with MRP, according to our profitmaximizing rule.

Note from point *e* on labor supply curve *S* that Q_e workers desire employment at wage W_u . But as indicated by point *b* on labor demand curve *D*, only Q_u workers are employed. The result is a surplus of labor of $Q_e - Q_u$ (also shown by distance *eb*). In a

FIGURE 10.5 Inclusive or industrial unionism. By organizing virtually all available workers in order to control the supply of labor, inclusive industrial unions may impose a wage rate, such as W_u , that is above the competitive wage rate W_c . In effect, this changes the labor supply curve from *S* to *aeS*. At wage rate W_u , employers will cut employment from Q_c to Q_u .



Quantity of labor

inclusive unionism The union practice of including as members all workers employed in an industry. purely competitive labor market without the union, the effect of a surplus of unemployed workers would be lower wages. Specifically, the wage rate would fall to the equilibrium level W_c , where the quantity of labor supplied equals the quantity of labor demanded (each, Q_c). But this drop in wages does not happen because workers are acting collectively through their union. Individual workers cannot offer to work for less than W_u ; nor can employers pay less than that.

Wage Increases and Unemployment

Evidence suggests that union members on average achieve a 15-percent wage advantage over nonunion workers. But when unions are successful in raising wages, their efforts also have another major effect. As Figures 10.4 and 10.5 suggest, the wage-raising actions achieved by both exclusive and inclusive unionism reduce employment in unionized firms. Simply put, a union's success in achieving aboveequilibrium wage rates thus tends to be accompanied by a decline in the number of workers employed. That result acts as a restraining influence on union wage demands. A union cannot expect to maintain solidarity within its ranks if it seeks a wage rate so high that joblessness will result for, say, 20 percent or 30 percent of its members.

Wage Differentials

wage differentials

The differences between the wage received by one worker or group of workers and that received by another worker or group of workers. Hourly wage rates and annual salaries differ greatly among occupations. In Table 10.4 we list average annual salaries for a number of occupations to illustrate such **wage differentials.** For example, observe that aircraft pilots on average earn six times as much as retail salespersons. Not shown, there are also large wage differentials within some of the occupations listed. For example, some highly experienced pilots earn several times as much income as pilots just starting their careers. And, although average wages for retail salespersons are relatively low, some top salespersons

TABLE 10.4 Average Annual Wages in Selected Occupations, 2007

Occupation	Average Annual Wages
Surgeons	\$191,410
Aircraft pilots	148,810
Petroleum engineers	113,890
Financial managers	106,200
Law professors	95,510
Chemical engineers	84,240
Dental hygienists	64,910
Registered nurses	62,480
Police officers	50,670
Electricians	48,100
Travel agents	32,190
Barbers	25,860
Retail salespersons	24,530
Recreation workers	23,790
Teacher aides	22,820
Fast-food cooks	16,860

Source: Bureau of Labor Statistics, www.bls.gov.
selling on commission make several times the average wages listed for their occupation.

What explains wage differentials such as these? Once again, the forces of demand and supply are highly revealing. As we demonstrate in Figure 10.6, wage differentials can arise on either the supply or the demand side of labor markets. Panels (a) and (b) in Figure 10.6 represent labor markets for two occupational groups that have identical *labor supply curves*. Labor market (a) has a relatively high equilibrium wage (W_a) because labor demand is very strong. In labor market (b) the equilibrium wage is relatively low (W_b) because labor demand is weak. Clearly, the wage differential between occupations (a) and (b) results solely from differences in the magnitude of labor demand.

Contrast that situation with panels (c) and (d) in Figure 10.6, where the *labor demand curves* are identical. In labor market (c) the equilibrium wage is relatively high (W_c) because labor supply is highly restricted. In labor market (d) labor supply is highly abundant, so the equilibrium wage (W_d) is relatively low. The wage differential between (c) and (d) results solely from the differences in the magnitude of labor supply.

Although Figure 10.6 provides a good starting point for understanding wage differentials, we need to know *why* demand and supply conditions differ in various labor markets. There are several reasons.



FIGURE 10.6 Labor demand, labor supply, and wage

differentials. The wage differential between labor markets (a) and (b) results solely from differences in labor demand. In labor markets (c) and (d), differences in labor supply are the sole cause of the wage differential.

Marginal Revenue Productivity

The strength of labor demand—how far rightward the labor demand curve is located—differs greatly among occupations due to differences in how much various occupational groups contribute to the revenue of their respective employers. This revenue contribution, in turn, depends on the workers' productivity and the strength of the demand for the products they are helping to produce. Where labor is highly productive and product demand is strong, labor demand also is strong and, other things equal, pay is high. Top professional athletes, for example, are highly productive at producing sports entertainment, for which millions of people are willing to pay billions of dollars over the course of a season. So the marginal revenue productivity of these top players is exceptionally high, as are their salaries (as represented in Figure 10.6a). In contrast, in most occupations workers generate much more modest revenue for their employers, so their pay is lower (as in Figure 10.6b).

Noncompeting Groups

On the supply side of the labor market, workers are not homogeneous; they differ in their mental and physical capacities and in their education and training. At any given time the labor force is made up of many noncompeting groups of workers, each representing several occupations for which the members of that particular group qualify. In some groups qualified workers are relatively few, whereas in others they are plentiful. And workers in one group do not qualify for the occupations of other groups.

Ability Only a few workers have the ability or physical attributes to be brain surgeons, concert violinists, top fashion models, research chemists, or professional athletes. Because the supply of these particular types of labor is very small in relation to labor demand, their wages are high (as in Figure 10.6c). The members of these and similar groups do not compete with one another or with other skilled or semiskilled workers. The violinist does not compete with the surgeon, nor does the surgeon compete with the violinist or the fashion model.

Education and Training Another source of wage differentials is differing amounts of **human capital**, which is the personal stock of knowledge, know-how, and skills that enables a person to be productive and thus to earn income. Such stocks result from investments in human capital. Like expenditures on machinery and equipment, productivity-enhancing expenditures on education or training are investments. In both cases, people incur *present costs* with the intention that those expenditures will lead to a greater flow of *future earnings*.

Figure 10.7 indicates that workers who have made greater investments in education achieve higher incomes during their careers. The reason is twofold: (1) There are fewer such workers, so their supply is limited relative to less-educated workers, and (2) more educated workers tend to be more productive and thus in greater demand. Figure 10.7 also indicates that the incomes of better-educated workers generally rise more rapidly than those of poorly educated workers. The primary reason is that employers provide more on-the-job training to the bettereducated workers, boosting their marginal revenue productivity and therefore their earnings.

Although education yields higher incomes, it carries substantial costs. A college education involves not only direct costs (tuition, fees, books) but indirect or opportunity

human capital

The personal stock of knowledge, know-how, and skills that enables a person to be productive and thus to earn income.

ORIGIN OF THE IDEA O 10.3 Human capital



FIGURE 10.7 Education levels and average annual income.

Annual income by age is higher for workers with more education. Investment in education yields a return in the form of earnings differences enjoyed over one's work life.

Source: U.S. Bureau of the Census, **www. census.gov.** Data are for 2006 and include both men and women.

costs (forgone earnings) as well. Does the higher pay received by better-educated workers compensate for these costs? The answer is yes. Rates of return are estimated to be 10 to 13 percent for investments in secondary education and 8 to 12 percent for investments in college education. One generally accepted estimate is that each year of schooling raises a worker's wage by about 8 percent. Currently, college graduates on average earn about \$1.70 for each \$1 earned by high school graduates.

My Entire Life

For some people, high earnings have little to do with actual hours of work and much to do with their tremendous skill, which reflects their accumulated stock of human capital. The point is demonstrated in the following story: It is said that a tourist once spotted the famous Spanish artist Pablo Picasso (1881–1973) in a Paris café. The tourist asked Picasso if he would do a sketch of his wife for pay. Picasso sketched the wife in a matter of minutes and said, "That will be 10,000 francs [roughly \$2000]." Hearing the high price, the tourist became irritated, saying, "But that took you only a few minutes."

"No," replied Picasso, "it took me my entire life!"

Question:

In general, how do the skill requirements of the highest-paying occupations in Table 10.4 compare with the skill requirements of the lowest-paying occupations?

ILLUSTRATING THE IDEA

compensating differences Wage differentials

received by workers to compensate them for nonmonetary disparities in their jobs.

Compensating Differences

If the workers in a particular noncompeting group are equally capable of performing several different jobs, you might expect the wage rates to be identical for all these jobs. Not so. A group of high school graduates may be equally capable of becoming salesclerks or general construction workers, but these jobs pay different wages. In virtually all locales, construction laborers receive much higher wages than salesclerks. These wage differentials are called **compensating differences** because they must be paid to compensate for nonmonetary differences in various jobs.

The construction job involves dirty hands, a sore back, the hazard of accidents, and irregular employment, both seasonally and cyclically. The retail sales job means clean clothing, pleasant air-conditioned surroundings, and little fear of injury or lay-off. Other things equal, it is easy to see why workers would rather pick up a credit card than a shovel. So the amount of labor that is supplied to construction firms (as in Figure 10.6c) is smaller than that which is supplied to retail shops (as in Figure 10.6d). Construction firms must pay higher wages than retailers to compensate for the unattractive nonmonetary aspects of construction jobs.

Compensating differences play an important role in allocating society's scarce labor resources. If very few workers want to be garbage collectors, then society must pay high wages to garbage collectors to get the garbage collected. If many more people want to be salesclerks, then society need not pay them as much as it pays garbage collectors to get those services performed.

APPLYING THE ANALYSIS

The Minimum Wage

Since the passage of the Fair Labor Standards Act in 1938, the United States has had a Federal minimum wage. That wage has ranged between 35 and 50 percent of the average wage paid to manufacturing workers and was \$5.85 per hour in 2007 and is scheduled to rise to \$6.55 in July 2008 and \$7.25 in July 2009. Numerous states, however, have minimum wages considerably above the Federal mandate. The purpose of minimum wages is to provide a "wage floor" that will help less-skilled workers earn enough income to escape poverty.

Critics, reasoning in terms of Figure 10.5, contend that an above-equilibrium minimum wage (say, W_u) will simply cause employers to hire fewer workers. Downsloping labor demand curves are a reality. The higher labor costs may even force some firms out of business. In either case, some of the poor, low-wage workers whom the minimum wage was designed to help will find themselves out of work. Critics point out that a worker who is *unemployed* and desperate to find a job at a minimum wage of \$6.55 per hour is clearly worse off than he or she would be if *employed* at a market wage rate of, say, \$6.10 per hour.

A second criticism of the minimum wage is that it is "poorly targeted" to reduce household poverty. Critics point out that much of the benefit of the minimum wage accrues to workers, including many teenagers, who do not live in impoverished households.

Advocates of the minimum wage say that critics analyze its impact in an unrealistic context, specifically a competitive labor market (Figure 10.2). But in

a less-competitive, low-pay labor market where employers possess some monopsony power (Figure 10.3), the minimum wage can increase wage rates without causing significant unemployment. Indeed, a higher minimum wage may even produce more jobs by eliminating the motive that monopsonistic firms have for restricting employment. For example, a minimum-wage floor of W_c in Figure 10.3 would change the firm's labor supply curve to $W_c aS$ and prompt the firm to increase its employment from Q_m workers to Q_c workers.

Moreover, even if the labor market is competitive, the higher wage rate might prompt firms to find more productive tasks for low-paid workers, thereby raising their productivity. Alternatively, the minimum wage may reduce *labor turnover* (the rate at which workers voluntarily quit). With fewer low-productive trainees, the *average* productivity of the firm's workers would rise. In either case, the alleged negative employment effects of the minimum wage might not occur.

Which view is correct? Unfortunately, there is no clear answer. All economists agree that firms will not hire workers who cost more per hour than the value of their hourly output. So there is some minimum wage so high that it would severely reduce employment. Consider \$20 an hour, as an absurd example. Economists generally think a 10 percent increase in the minimum wage will reduce employment of unskilled workers by about 1 to 3 percent. But no current consensus exists on the employment effect of the *present level* of the minimum wage.

The overall effect of the minimum wage is thus uncertain. There seems to be a consensus emerging that, on the one hand, the employment and unemployment effects of the minimum wage are not as great as many critics fear. On the other hand, because a large part of its effect is dissipated on nonpoverty families, the minimum wage is not as strong an antipoverty tool as many supporters contend.

Voting patterns and surveys make it clear, however, that the minimum wage has strong political support. Perhaps this stems from two realities: (1) More workers are believed to be helped than hurt by the minimum wage, and (2) the minimum wage gives society some assurance that employers are not "taking undue advantage" of vulnerable, low-skilled workers.

Question: Have you ever worked for the minimum wage? If so, for how long? Would you favor increasing the minimum wage by \$1? By \$2? By \$5? Explain your reasoning.

Summary

- 1. The demand for labor is derived from the product it helps produce. That means the demand for labor will depend on its productivity and on the market value (price) of the good it is producing.
- Because the firm equates the wage rate and MRP in determining its profit-maximizing level of employment, the marginal revenue product curve is the firm's labor demand

curve. Thus, each point on the MRP curve indicates how many labor units the firm will hire at a specific wage rate.

3. The competitive firm's labor demand curve slopes downward because of the law of diminishing returns. Summing horizontally the demand curves of all the firms hiring that resource produces the market demand curve for labor.

- 4. The demand curve for labor will shift as the result of (a) a change in the demand for, and therefore the price of, the product the labor is producing; (b) changes in the productivity of labor; and (c) changes in the prices of substitutable and complementary resources.
- 5. The elasticity of demand for labor measures the responsiveness of labor quantity to a change in the wage rate. The coefficient of the elasticity of labor demand is

$$E_w = \frac{\text{percentage change in labor quantity}}{\text{percentage change in wage rate}}$$

When E_w is greater than 1, labor demand is elastic; when E_w is less than 1, labor demand is inelastic; and when E_w equals 1, labor demand is unit-elastic.

- 6. The elasticity of labor demand will be greater (a) the greater the ease of substituting other resources for labor, (b) the greater the elasticity of demand for the product, and (c) the larger the proportion of total production costs attributable to labor.
- 7. Specific wage rates depend on the structure of the particular labor market. In a competitive labor market the equilibrium wage rate and level of employment are determined at the intersection of the labor supply curve and labor demand curve. For the individual firm, the market wage rate establishes a horizontal labor supply curve, meaning that the wage rate equals the firm's constant marginal resource

cost. The firm hires workers to the point where its MRP equals its MRC.

- 8. Under monopsony, the marginal resource cost curve lies above the resource supply curve because the monopsonist must bid up the wage rate to hire extra workers and must pay that higher wage rate to all workers. The monopsonist hires fewer workers than are hired under competitive conditions, pays less-than-competitive wage rates (has lower labor costs), and thus obtains greater profit.
- 9. A union may raise competitive wage rates by (a) restricting the supply of labor through exclusive unionism or (b) directly enforcing an above-equilibrium wage rate through inclusive unionism. On average, unionized workers realize wage rates 15 percent higher than those of comparable nonunion workers.
- 10. Wage differentials are largely explainable in terms of (a) marginal revenue productivity of various groups of workers; (b) noncompeting groups arising from differences in the capacities and education of different groups of workers; and (c) compensating wage differences, that is, wage differences that must be paid to offset nonmonetary differences in jobs.
- 11. Economists disagree about the desirability of the minimum wage. While it raises the income of some workers, it reduces the income of other workers whose skills are not sufficient to justify being paid the mandated wage.

Terms and Concepts

purely competitive labor market derived demand marginal revenue product (MRP) marginal resource cost (MRC) MRP = MRC rule substitution effect output effect elasticity of labor demand monopsony exclusive unionism occupational licensing inclusive unionism wage differentials human capital compensating differences

Study Questions Connect

- 1. Explain the meaning and significance of the fact that the demand for labor is a derived demand. Why do labor demand curves slope downward? **LOI**
- 2. On the following page, complete the labor demand table for a firm that is hiring labor competitively and selling its product in a purely competitive market. LOI
- **a.** How many workers will the firm hire if the market wage rate is \$11.95? \$19.95? Explain why the firm will not hire a larger or smaller number of units of labor at each of these wage rates.
- **b.** Show in schedule form and graphically the labor demand curve of this firm.

Units of Labor	Total Product	Marginal Product	Product Price	Total Revenue	Marginal Revenue Product
0	0		\$2	\$	\$
I	17		2		Ψ
2	31		2		
3	43		2		
4	53		2		
5	60		2		
6	65		2		

- **3.** Suppose that marginal product tripled while product price fell by one-half in the table in Figure 10.1. What would be the new MRP values in the table? What would be the net impact on the location of the labor demand curve in Figure 10.1? **LO2**
- 4. In 2002 Boeing reduced employment by 33,000 workers due to reduced demand for aircraft. What does this decision reveal about how it viewed its marginal revenue product (MRP) and marginal resource cost (MRC)? Why didn't Boeing reduce employment by more than 33,000 workers? By less than 33,000 workers? LO2
- 5. How will each of the following affect the demand for resource A, which is being used to produce commodity Z? Where there is any uncertainty as to the outcome, specify the causes of that uncertainty. LO2
 - **a.** An increase in the demand for product Z.
 - **b.** An increase in the price of substitute resource B.
 - **c.** A technological improvement in the capital equipment with which resource A is combined.
 - **d.** A fall in the price of complementary resource C.
 - **e.** A decline in the elasticity of demand for product *Z* due to a decline in the competitiveness of product market *Z*.
- 6. What effect would each of the following factors have on elasticity of demand for resource A, which is used to produce product Z? LO3
 - **a.** There is an increase in the number of resources substitutable for A in producing Z.
 - **b.** Due to technological change, much less of resource A is used relative to resources B and C in the production process.
 - c. The elasticity of demand for product Z greatly increases.
- 7. Florida citrus growers say that the recent crackdown on illegal immigration is increasing the market wage rates necessary to get their oranges picked. Some are turning to \$100,000 to \$300,000 mechanical harvesting machines known as "trunk, shake, and catch" pickers, which vigorously shake oranges from the trees. If widely

adopted, how will this substitution affect the demand for human orange pickers? What does that imply about the relative strengths of the substitution and output effects? **LO2**

- Why is a firm in a purely competitive labor market a *wage taker*? What would happen if it decided to pay less than the going market wage rate? LO4
- Complete the following labor supply table for a firm hiring labor competitively: LO4

Units of Labor	Wage Rate	Total Labor Cost	Marginal Resource (Labor) Cost
0	\$14	\$	¢
I.	14		Ψ
2	14		
3	14		
4	14		
5	14		
6	14		

- **a.** Show graphically the labor supply and marginal resource (labor) cost curves for this firm. Explain the relationship of these curves to one another.
- **b.** Plot the labor demand data of question 2 on the graph used in part *a* above. What are the equilibrium wage rate and level of employment? Explain.
- 10. Assume a firm is a monopsonist that can hire its first worker for \$6 but must increase the wage rate by \$3 to attract each successive worker. Draw the firm's labor supply and marginal resource cost curves and explain their relationships to one another. On the same graph, plot the labor demand data of question 2. What are the equilibrium wage rate and level of employment? Why do these differ from your answer to question 9? LO4

- **11.** Contrast the methods used by inclusive unions and exclusive unions to raise union wage rates. **LO5**
- **12.** What is meant by the terms "investment in human capital" and "compensating wage differences"? Use these concepts to explain wage differentials. **LO6**
- 13. Why might an increase in the minimum wage in the United States simply send some jobs abroad? Relate your answer to elasticity of labor demand. LO3

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnellbriefmicrole.com

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.

IN THIS CHAPTER YOU WILL LEARN:

- I How income inequality in the United States is measured and described.
- 2 The extent and sources of income inequality.
- 3 How income inequality has changed since 1970.
- 4 The economic arguments for and against income inequality.
- 5 How poverty is measured and its incidence by age, gender, ethnicity, and other characteristics.
- 6 The major components of the incomemaintenance program in the United States.



Income Inequality and Poverty

Evidence that suggests wide income disparity in the United States is easy to find. In 2007 talk-show host Oprah Winfrey earned an estimated \$260 million, golfer Tiger Woods earned \$100 million, and rapper and music executive Jay-Z earned \$83 million. In contrast, the salary of the president of the United States is \$400,000, and the typical schoolteacher earns \$47,000. A full-time minimum-wage worker at a fast-food restaurant makes about \$11,000. Cash welfare payments to a mother with two children average \$5000.

In 2006 about 36.5 million Americans—or 12.3 percent of the population—lived in poverty. An estimated 500,000 people were homeless in that year. The richest fifth of American households received about 50.5 percent of total income, while the poorest fifth received less than 4 percent.

What are the sources of income inequality? Is income inequality rising or falling? Is the United States making progress against poverty? What are the major income-maintenance programs in the United States? Is the current welfare system effective? These are some of the questions we will answer in this chapter.

income inequality The unequal distribution of an economy's total income among households or families.

Lorenz curve

A curve that shows an economy's distribution of income by measuring the cumulated percentage of income receivers along the horizontal axis and the cumulated percentage of income they receive along the vertical axis.

Facts about Income Inequality

Average household income in the United States is among the highest in the world; in 2006, it was \$66,570 per household (one or more persons occupying a housing unit). But that average tells us nothing about income inequality. To learn about that, we must examine how income is distributed around the average.

Distribution by Income Category

One way to measure **income inequality** is to look at the percentages of households in a series of income categories. Table 11.1 shows that about 25.2 percent of all households had annual before-tax incomes of less than \$25,000 in 2006, while another 19.1 percent had annual incomes of \$100,000 or more. The data in the table suggest a wide dispersion of household income in the United States.

Distribution by Quintiles (Fifths)

A second way to measure income inequality is to divide the total number of individuals, households, or families (two or more persons related by birth, marriage or adoption) into five numerically equal groups, or *quintiles*, and examine the percentage of total personal (before-tax) income received by each quintile. We do this for households in the table in Figure 11.1, where we also provide the upper income limit for each quintile. Any amount of income greater than that listed in each row of column 3 would place a household into the next-higher quintile.

The Lorenz Curve and Gini Ratio

We can display the quintile distribution of personal income through a **Lorenz curve**. In Figure 11.1, we plot the cumulative percentage of households on the horizontal axis and the cumulative percentage of income they obtain on the vertical axis. The diagonal line 0*e* represents a *perfectly equal distribution of income* because each point along that line indicates that a particular percentage of households receive the same percentage of income. In other words, points representing 20 percent of all households receiving 20 percent of total income, 40 percent receiving 40 percent, 60 percent receiving 60 percent, and so on, all lie on the diagonal line.

TABLE 11.1 The Distribution of U.S. Income by Households, 2006

(I) Personal Income Category	(2) Percentage of All Households in This Category
Under \$10,000	7.5
\$10,000-\$14,999	5.9
\$15,000-\$24,999	11.8
\$25,000-\$34,999	11.5
\$35,000-\$49,999	14.6
\$50,000-\$74,999	18.2
\$75,000–\$99,999	11.3
\$100,000 and above	19.1
	100.0

Source: Bureau of the Census, **www.census.gov**. Numbers do not add to 100 percent due to rounding. FIGURE 11.1 The Lorenz curve and Gini ratio. The Lorenz curve is a convenient way to show the degree of income inequality (here, household income by quintile in 2006). The area between the diagonal (the line of perfect equality) and the Lorenz curve represents the degree of inequality in the distribution of total income. This inequality is measured numerically by the Gini ratio—area A (shown in gold) divided by area A + B (the gold + gray area). The Gini ratio for the distribution shown is 0.470.

(I) Quintile	(2) Percentage of Total Income*	(3) Upper Income Limit
Lowest 20%	3.4	\$20,035
Second 20%	8.6	37,774
Third 20%	14.5	60,000
Fourth 20%	22.9	97,032
Highest 20%	50.5	No limit
Total	100.0	

* Numbers do not add to 100 percent due to rounding. Source: Bureau of the Census, **www.census.gov.**



By plotting the quintile data from the table in Figure 11.1, we obtain the Lorenz curve for 2006. Observe from point *a* that the bottom 20 percent of all households received 3.4 percent of the income; the bottom 40 percent received 12 percent (= 3.4 + 8.6), as shown by point *b*; and so forth. The gold area between the diagonal line and the Lorenz curve is determined by the extent that the Lorenz curve sags away from the diagonal and indicates the degree of income inequality. If the actual income distribution were perfectly equal, the Lorenz curve and the diagonal would coincide and the gold area would disappear.

At the opposite extreme is complete inequality, where all households but one have zero income. In that case, the Lorenz curve would coincide with the horizontal axis from 0 to point f (at 0 percent of income) and then would move immediately up from f to point e along the vertical axis (indicating that a single household has 100 percent of the total income). The entire area below the diagonal line (triangle 0ef) would indicate this extreme degree of inequality. So the farther the Lorenz curve sags away from the diagonal, the greater is the degree of income inequality.

We can easily transform the visual measurement of income inequality described by the Lorenz curve into the **Gini ratio**—a numerical measure of the overall dispersion of income:

> Gini ratio = $\frac{\text{area between Lorenz curve and diagonal}}{\text{total area below the diagonal}}$ = $\frac{A \text{ (gold area)}}{A + B \text{ (gold + gray area)}}$

For the distribution of household income shown in Figure 11.1, the Gini ratio is 0.470. As the area between the Lorenz curve and the diagonal gets larger, the Gini ratio rises to reflect greater inequality. (Test your understanding of this idea by confirming that the Gini ratio for complete income equality is zero and for complete inequality is 1.)

WORKED PROBLEMS

Lorenz curve

Gini ratio

A numerical measure of the overall dispersion of income among an economy's income receivers. Because Gini ratios are numerical, they are easier to use than Lorenz curves for comparing the income distributions of different ethnic groups and countries. For example, in 2006 the Gini ratio of U.S. household income for African Americans was 0.486; for Asians, 0.476; for whites, 0.462; and for Hispanics, 0.448.¹ Gini ratios for various nations range from 0.743 (Namibia) to 0.249 (Japan). Examples within this range include Sweden, 0.250; Italy, 0.350; Mexico, 0.481; and South Africa, 0.578.²

Income Mobility: The Time Dimension

The income data used so far have a major limitation: The income accounting period of 1 year is too short to be very meaningful. Because the Census Bureau data portray the distribution of income in only a single year, they may conceal a more equal distribution over a few years, a decade, or even a lifetime. If Brad earns \$1000 in year 1 and \$100,000 in year 2, while Jenny earns \$100,000 in year 1 and only \$1000 in year 2, do we have income inequality? The answer depends on the period of measurement. Annual data would reveal great income inequality, but there would be complete equality over the 2-year period.

This point is important because evidence suggests considerable "churning around" in the distribution of income over time. Such movement of individuals or households from one income quintile to another over time is called **income mobility**. For most income receivers, income starts at a relatively low level during youth, reaches a peak during middle age, and then declines. It follows that if all people receive exactly the same stream of income over their lifetimes, considerable income inequality would still exist in any specific year because of age differences. In any single year, the young and the old would receive low incomes while the middle-aged receive high incomes.

If we change from a "snapshot" view of income distribution in a single year to a "time exposure" portraying incomes over much longer periods, we find considerable movement of income receivers among income classes. Between 1996 and 2005, the median income of half of the individuals in the lowest quintile of the U.S. income distribution moved to a higher income quintile. Almost 25 percent made it to the middle fifth and 5 percent achieved the top quintile. The income mobility moved in both directions. About 57 percent of the top 1 percent of income receivers in 1996 had dropped out of that category by 2005. Overall, income mobility between 1996 and 2005 was the same as it was the previous 10 years. All this correctly suggests that income is more equally distributed over a 5–, 10–, or 20–year period than in any single year.³

In short, there is significant individual and household income mobility over time; for many people, "low income" and "high income" are not permanent conditions.

Effect of Government Redistribution

The income data in the table in Figure 11.1 include wages, salaries, dividends, and interest. They also include all cash transfer payments such as Social Security, unemployment compensation benefits, and welfare assistance to needy households. The data are before-tax data and therefore do not take into account the effects of personal income

income mobility The extent to which

income receivers move from one part of the income distribution to another over some period of time.

¹U.S. Census Bureau, *Historical Income Tables*, www.census.gov.

² World Bank, *World Development Indicators*, 2007, www.worldbank.org.

³ U.S. Department of the Treasury, *Income Mobility in the U.S. from 1996–2005*, November 13, 2007, pp. 1–22.

noncash transfers

Government transfer payments in the form of goods and services (or vouchers to obtain them) rather than money.

and payroll (Social Security) taxes that are levied directly on income receivers. Nor do they include government-provided in-kind or **noncash transfers**, which make available specific goods or services rather than cash. Noncash transfers include such things as medical care, housing subsidies, subsidized school lunches, and food stamps. Such transfers are much like income because they enable recipients to "purchase" goods and services.

One economic function of government is to redistribute income, if society so desires. Figure 11.2 and its table reveal that government significantly redistributes income from higher- to lower-income households through taxes and transfers. Note that the U.S. distribution of household income before taxes and transfers are taken into account (dark green Lorenz curve) is substantially less equal than the distribution after taxes and transfers (light green Lorenz curve). Without government redistribution, the lowest 20 percent of households in 2005 would have received only 1.5 percent of total income. *With* redistribution, they received 4.4 percent, or three times as much.⁴

Which contributes more to redistribution, government taxes or government transfers? The answer is transfers. Because the U.S. tax system is only modestly progressive, after-tax data would reveal only about 20 percent less inequality. Roughly 80 percent of the reduction in income inequality is attributable to transfer payments, which account for more than 75 percent of the income of the lowest quintile. Together with growth of job opportunities, transfer payments have been the most important means of alleviating poverty in the United States.

⁴ The "before" data in this table differ from the data in Figure 11.1 because the latter include cash transfers. Also, the data in Figure 11.2 are based on a broader concept of income than are the data in Figure 11.1.

FIGURE 11.2 The impact of taxes and transfers on U.S. income inequality. The distribution of income is significantly more equal after taxes and transfers are taken into account than before. Transfers account for most of the lessening of inequality and provide most of the income received by the lowest quintile of households.

	Percent Income Re	Percentage of Total Income Received, 2005*				
Quintile	(I) Before Taxes and Transfers	(2) After Taxes and Transfers				
Lowest 20 percent	1.5	4.4				
Second 20 percent	7.3	9.9				
Third 20 percent	14.0	15.3				
Fourth 20 percent	23.4	23.1				
Highest 20 percent	53.8	47.3				

*The data include all money income from private sources, including realized capital gains and employer-provided health insurance. The "after taxes and transfers" data include the value of noncash transfers as well as cash transfers. Numbers may not add to 100 percent due to rounding.

Source: Bureau of the Census, www.census.gov.



Causes of Income Inequality

There are several causes of income inequality in the United States. In general, the market system is permissive of a high degree of income inequality because it rewards individuals on the basis of the contributions that they, or the resources that they own, make in producing society's output.

More specifically, the factors that contribute to income inequality are the following.

Ability

People have different mental, physical, and aesthetic talents. Some have inherited the exceptional mental qualities that are essential to such high-paying occupations as medicine, corporate finance, and law. Others are blessed with the physical capacity and coordination to become highly paid professional athletes. A few have the talent to become great artists or musicians or have the beauty to become top fashion models. Others have very weak mental endowments and may work in low-paying occupations or may be incapable of earning any income at all. The intelligence and skills of most people fall somewhere in between.

Education and Training

Native ability alone rarely produces high income; people must develop and refine their capabilities through education and training. Individuals differ significantly in the amount of education and training they obtain and thus in their capacity to earn income. Such differences may be a matter of choice: Chin enters the labor force after graduating from high school, while Rodriguez takes a job only after earning a college degree. Other differences may be involuntary: Chin and her parents may simply be unable to finance a college education.

People also receive varying degrees of on-the-job training, which also contributes to income inequality. Some workers learn valuable new skills each year on the job and therefore experience significant income growth over time; others receive little or no on-the-job training and earn no more at age 50 than they did at age 30. Moreover, firms tend to select for advanced on-the-job training the workers who have the most formal education. That added training magnifies the education-based income differences between less-educated and better-educated individuals.

Discrimination

Discrimination in education, hiring, training, and promotion undoubtedly causes some income inequality. If discrimination confines certain racial, ethnic, or gender groups to lower-pay occupations, the supply of labor in those occupations will increase relative to demand and hourly wages and income in those lower-paying jobs will decline. Conversely, labor supply will be artificially reduced in the higherpay occupations populated by "preferred" workers, raising their wage rates and income. In this way, discrimination can add to income inequality. In fact, economists cannot account for all racial, ethnic, and gender differences in work earnings on the basis of differences in years of education, quality of education, occupations, and annual hours of work. Many economists attribute the unexplained residual to discrimination.

Economists, however, do not see discrimination by race, gender, and ethnicity as a dominant factor explaining income inequality. The income distributions *within* racial or ethnic groups that historically have been targets of discrimination—for example, African Americans—are similar to the income distribution for whites. Other factors besides

discrimination are obviously at work. Nevertheless, discrimination is an important concern since it harms individuals and reduces society's overall output and income.

Preferences and Risks

Incomes also differ because of differences in preferences for market work relative to leisure, market work relative to work in the household, and types of occupations. People who choose to stay home with children, work part-time, or retire early usually have less income than those who make the opposite choices. Those who are willing to take arduous, unpleasant jobs (for example, underground mining or heavy construction), to work long hours with great intensity, or to "moonlight" will tend to earn more.

Individuals also differ in their willingness to assume risk. We refer here not only to the race-car driver or the professional boxer but also to the entrepreneur. Although many entrepreneurs fail, many of those who develop successful new products or services realize very substantial incomes. That contributes to income inequality.

Unequal Distribution of Wealth

Income is a *flow;* it represents a stream of wage and salary earnings, along with rent, interest, and profits, as depicted in Chapter 2's circular flow diagram. In contrast, wealth is a *stock*, reflecting at a particular moment the financial and real assets an individual has accumulated over time. A retired person may have very little income and yet own a home, mutual fund shares, and a pension plan that add up to considerable wealth. A new college graduate may be earning a substantial income as an accountant, middle manager, or engineer but have yet to accumulate significant wealth.

The ownership of wealth in the United States is more unequal than the distribution of income. According to the most recent (2004) Federal Reserve wealth data, the wealthiest 10 percent of families owned 70 percent of the total wealth and the top 1 percent owned 33 percent. The bottom 90 percent held only 30 percent of the total wealth. This wealth inequality leads to inequality in rent, interest, and dividends, which in turn contributes to income inequality. Those who own more machinery, real estate, farmland, stocks and bonds, and savings accounts obviously receive greater income from that ownership than people with less or no such wealth.

Market Power

The ability to "rig the market" on one's own behalf also contributes to income inequality. For example, in *resource* markets, certain unions and professional groups have adopted policies that limit the supply of their services, thereby boosting the incomes of those "on the inside." Also, legislation that requires occupational licensing for, say, doctors, dentists, and lawyers can bestow market power that favors the licensed groups. In *product* markets, "rigging the market" means gaining or enhancing monopoly power, which results in greater profit and thus greater income to the firms' owners.

Luck, Connections, and Misfortune

Other forces also play a role in producing income inequality. Luck and "being in the right place at the right time" have helped individuals stumble into fortunes. Discovering oil on a ranch, owning land along a major freeway interchange, and hiring the right press agent have accounted for some high incomes. Personal contacts and political connections are other potential routes to attaining high income.

In contrast, economic misfortunes such as prolonged illness, serious accident, death of the family breadwinner, or unemployment may plunge a family into the low range of income. The burden of such misfortune is borne very unevenly by the population and thus contributes to income inequality.

Income inequality of the magnitude we have described is not exclusively an American phenomenon. Global Snapshot 11.1 compares income inequality in the United States (here by individuals, not by households) with that in several other nations. Income inequality tends to be greatest in South American nations, where land and capital resources are highly concentrated in the hands of very wealthy families.

GLOBAL SNAPSHOT 11.1

Percentage of Total Income Received by Top One-Tenth of Income Receivers, Selected Nations

The share of income going to the highest 10 percent of income receivers varies among nations.



Income Inequality over Time

Over a period of years, economic growth has raised incomes in the United States: In *absolute* dollar amounts, the entire distribution of income has been moving upward. But incomes may move up in *absolute* terms while leaving the *relative* distribution of income less equal, more equal, or unchanged. Table 11.2 shows how the distribution of household income has changed since 1970. This income is "before tax" and includes cash transfers but not noncash transfers.

Rising Income Inequality since 1970

It is clear from Table 11.2 that the distribution of income by quintiles has become more unequal since 1970. In 2006 the lowest 20 percent of households received

Quintile	1970	1975	1980	1985	1990	1995	2000	2006
Lowest 20%	4.1	4.4	4.3	4.0	3.9	3.7	3.6	3.4
Second 20%	10.8	10.5	10.3	9.7	9.6	9.1	8.9	8.6
Third 20%	17.4	17.1	16.9	16.3	15.9	15.2	14.8	14.5
Fourth 20%	24.5	24.8	24.9	24.6	24.0	23.3	23.0	22.9
Highest 20%	43.3	43.2	43.7	45.3	46.6	48.7	49.8	50.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Тор 5%	16.6	15.9	15.8	17.0	18.6	21.0	22.1	22.3

*Numbers may not add to 100 percent due to rounding.

Source: Bureau of the Census, www.census.gov.

3.4 percent of total before-tax income, compared with 4.1 in 1970. Meanwhile, the income share received by the highest 20 percent rose from 43.3 in 1970 to 50.5 percent in 2006. Also, the percentage of income received by the top 5 percent of households rose significantly over the 1970–2006 period.

Causes of Growing Inequality

Economists suggest several major explanations for the growing U.S. income inequality of the past several decades.

Greater Demand for Highly Skilled Workers Perhaps the most significant contributor to the growing income inequality has been an increasing demand by many firms for workers who are highly skilled and well educated. Moreover, several industries requiring highly skilled workers have either recently emerged or expanded greatly, such as the computer software, business consulting, biotechnology, health care, and Internet industries. Because highly skilled workers remain relatively scarce, their wages have been bid up. Consequently, the wage differences between them and less-skilled workers have increased. In fact, between 1980 and 2005, the wage difference between college graduates and high school graduates rose from 28 percent to 47 percent for women and from 22 percent to 43 percent for men.

The rising demand for skill also has shown up in rapidly rising pay for chief executive officers (CEOs), sizable increases in income from stock options, substantial increases in income for professional athletes and entertainers, and huge fortunes for successful entrepreneurs. This growth of "superstar" pay also has contributed to rising income inequality.

Demographic Changes The entrance of large numbers of less-experienced and less-skilled "baby boomers" into the labor force during the 1970s and 1980s may have contributed to greater income inequality in those two decades. Because younger workers tend to earn less income than older workers, their growing numbers contributed to income inequality. There also has been a growing tendency for men and women with high earnings potential to marry each other, thus increasing family income among the highest income quintiles. Finally, the number of households headed by single or divorced women has increased greatly. That trend has increased income inequality because such households lack a second major wage earner and also because the poverty rate for female-headed households is very high.

TABLE 11.2

Percentage of Total Before-Tax Income Received by Each One-Fifth and by the Top 5 percent of Households, Selected Years*

International Trade, Immigration, and Decline in Unionism

Other factors are probably at work as well. Stronger international competition from imports has reduced the demand for and employment of less-skilled (but highly paid) workers in such industries as the automobile and steel industries. The decline in such jobs has reduced the average wage for less-skilled workers. It also has swelled the ranks of workers in already low-paying industries, placing further downward pressure on wages there.

Similarly, the transfer of jobs to lower-wage workers in developing countries has exerted downward wage pressure on less-skilled workers in the United States. Also, an upsurge in immigration of unskilled workers has increased the number of low-income households in the United States. Finally, the decline in unionism in the United States has undoubtedly contributed to wage inequality since unions tend to equalize pay within firms and industries.

Two cautions: First, when we note growing income inequality, we are not saying that the "rich are getting richer and the poor are getting poorer" in terms of absolute income. Both the rich and the poor are experiencing rises in real income. Rather, what has happened is that, while incomes have risen in all quintiles, income growth has been fastest in the top quintile. Second, increased income inequality is not solely a U.S. phenomenon. The recent rise of inequality also has occurred in several other industrially advanced nations.

The Lorenz curve can be used to contrast the distribution of income at different points in time. If we plotted Table 11.2's data as Lorenz curves, we would find that the curve shifted away from the diagonal between 1970 and 2006. The Gini ratio rose from 0.394 in 1970 to 0.470 in 2006.

APPLYING THE ANALYSIS

Laughing at Shrek

Some economists say that the distribution of annual *consumption* is more meaningful for examining inequality of well-being than is the distribution of annual *income*. In a given year, people's consumption of goods and services may be above or below their income because they can save, draw down past savings, use credit cards, take out home mortgages, spend from inheritances, give money to charities, and so on. A recent study of the distribution of consumption finds that annual consumption inequality is less than income inequality. Moreover, consumption inequality has remained relatively constant over several decades, even though income inequality has increased.*

The Economist magazine extends the argument even further, pointing out that despite the recent increase in income inequality, the products consumed by the rich and the poor are far closer in functionality today than at any other time in history:

More than 70 percent of Americans under the official poverty line own at least one car. And the distance between driving a used Hyundai Elantra and new Jaguar XJ is well nigh undetectable compared with the difference between motoring and hiking through the muck ... A wide screen plasma television is lovely, but you do not need one to laugh at "Shrek"... Those intrepid souls who make vast fortunes turning out ever higher-quality goods at ever lower prices widen the income gap while reducing the differences that really matter.[†]

Economists generally agree that products and experiences once reserved exclusively for the rich in the United States have, in fact, become more commonplace for nearly all income classes. But skeptics argue that *The Economist's* argument is too simplistic. Even though both are water outings, there is a fundamental difference between yachting among the Greek isles on your private yacht and paddling on a local pond in your kayak.

Question:

How do the ideas of income inequality, consumption inequality, and wealth inequality differ? * Dirk Krueger and Fabrizio Perri, "Does Income Inequality Lead to Consumption Inequality?" *Review of Economic Studies*, 2006, pp. 163–193.

[†]The Economist, "Economic Focus: The New (Improved) Gilded Age," December 22, 2007, p. 122.



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Photo Op The Rich and the Poor in America

Wide disparities of income and wealth exist in the United States.

Equality versus Efficiency

The main policy issue concerning income inequality is how much is necessary and justified. While there is no general agreement on the justifiable amount, we can gain insight by exploring the economic cases for and against greater equality.

The Case for Equality: Maximizing Total Utility

The basic economic argument for an equal distribution of income is that income equality maximizes the total consumer satisfaction (utility) from any particular level of output and income. The rationale for this argument is shown in Figure 11.3, in which we assume that the money incomes of two individuals, Anderson and Brooks,

FIGURE 11.3 The utility-maximizing distribution of income. With identical marginal-utility-of-income curves MU_A and MU_B , Anderson and Brooks will maximize their combined utility when any amount of income (say, \$10,000) is equally distributed. If income is unequally distributed (say, \$2500 to Anderson and \$7500 to Brooks), the marginal utility derived from the last dollar will be greater for Anderson than for Brooks, and a redistribution toward equality will result in a net increase in total utility. The utility gained by equalizing income at \$5000 each, shown by the blue area below curve MU_A in panel (a), exceeds the utility lost, indicated by the red area below curve MU_B in (b).



law of diminishing

marginal utility The principle that the amount of extra satisfaction (marginal utility) from consuming a product declines as more of it is consumed. are subject to the **law of diminishing marginal utility.** In any time period, income receivers spend the first dollars received on the products they value most—products whose marginal utility (extra satisfaction) is high. As a consumer's most-pressing wants become satisfied, he or she then spends additional dollars of income on less-important, lower-marginal-utility goods. So marginal-utility-from-income curves slope downward, as in Figure 11.3. The identical diminishing curves (MU_A and MU_B) reflect the assumption that Anderson and Brooks have the same capacity to derive utility from income. Each point on one of the curves measures the marginal utility of the last dollar of a particular level of income.

Now suppose that there is \$10,000 worth of income (output) to be distributed between Anderson and Brooks. According to proponents of income equality, the optimal distribution is an equal distribution, which causes the marginal utility of the last dollar spent to be the same for both persons. We can confirm this by demonstrating that if the income distribution is initially unequal, then distributing income more equally can increase the combined utility of the two individuals.

Suppose that the \$10,000 of income initially is distributed such that Anderson gets \$2500 and Brooks \$7500. The marginal utility, a, from the last dollar received by Anderson is high and the marginal utility, b, from Brooks' last dollar of income is low. If a single dollar of income is shifted from Brooks to Anderson—that is, toward greater equality—then Anderson's utility increases by a and Brooks' utility decreases by b. The combined utility then increases by a minus b (Anderson's large gain minus Brooks' small loss). The transfer of another dollar from Brooks to Anderson again increases their combined utility, this time by a slightly smaller amount. Continued transfer of

dollars from Brooks to Anderson increases their combined utility until the income is evenly distributed and both receive \$5000. At that time their marginal utilities from the last dollar of income are equal (at a' and b'), and any further income redistribution beyond the \$2500 already transferred would begin to create inequality and decrease their combined utility.

The area under the MU curve and to the left of the individual's particular level of income represents the total utility (the sum of the marginal utilities) of that income. Therefore, as a result of the transfer of the \$2500, Anderson has gained utility represented by the blue area below curve MU_A and Brooks has lost utility represented by the red area below curve MU_B . The blue area exceeds the red area, so income equality yields greater combined total utility than does the initial income inequality.

The Case for Inequality: Incentives and Efficiency

Although the logic of the argument for equality is sound, critics attack its fundamental assumption that there is some fixed amount of output produced and therefore income to be distributed. Critics of income equality argue that the way in which income is distributed is an important determinant of the amount of output or income that is produced and is available for distribution.

Suppose once again in Figure 11.3 that Anderson earns \$2500 and Brooks earns \$7500. In moving toward equality, society (the government) must tax away some of Brooks' income and transfer it to Anderson. This tax and transfer process diminishes the income rewards of high-income Brooks and raises the income rewards of low-income Anderson; in so doing, it reduces the incentives of both to earn high incomes. Why should high-income Brooks work hard, save and invest, or undertake entrepreneurial risks when the rewards from such activities will be reduced by taxation? And why should low-income Anderson be motivated to increase his income through market activities when the government stands ready to transfer income to him? Taxes are a reduction in the rewards from increased productive effort; redistribution through transfers is a reward for diminished effort.

In the extreme, imagine a situation in which the government levies a 100 percent tax on income and distributes the tax revenue equally to its citizenry. Why would anyone work hard? Why would anyone work at all? Why would anyone assume business risk? Or why would anyone save (forgo current consumption) in order to invest? The economic incentives to "get ahead" will have been removed, greatly reducing society's total production and income. That is, the way income is distributed affects the size of that income. The basic argument for income inequality is that inequality is essential to maintain incentives to produce output and income—to get the output produced and income generated year after year.

The Equality-Efficiency Trade-Off

At the essence of the income equality-inequality debate is a fundamental trade-off between equality and efficiency. In this **equality-efficiency trade-off**, greater income equality (achieved through redistribution of income) comes at the opportunity cost of reduced production and income. And greater production and income (through reduced redistribution) comes at the expense of less equality of income. The trade-off obligates society to choose how much redistribution it wants, in view of the costs. If society decides it wants to redistribute income, it needs to determine methods that minimize the adverse effects on economic efficiency.

equality-efficiency trade-off

The decrease in economic efficiency that may accompany an increase in income equality. ILLUSTRATING THE IDEA

Slicing the Pizza

The equality-efficiency trade-off might better be understood through an analogy. Assume that society's income is a huge pizza, baked year after year, *with the sizes of the pieces going to people on the basis of their contribution to making it*. Now suppose that for fairness reasons, society decides some people are getting pieces that are too large and others are getting pieces too small. But when society redistributes the pizza to make the sizes more equal, they discover the result is a smaller pizza than before. Why participate in making the pizza if you get a decent-size piece without contributing?

The shrinkage of the pizza represents the efficiency loss—the loss of output and income—caused by the harmful effects of the redistribution on incentives to work, to save and invest, and to accept entrepreneurial risk. The shrinkage also reflects the resources that society must divert to the bureaucracies that administer the redistribution system.

How much pizza shrinkage will society accept while continuing to agree to the redistribution? If redistributing pizza to make it less unequal reduces the size of the pizza, what amount of pizza loss will society tolerate? Is a loss of 10 percent acceptable? 25 percent? 75 percent? This is the basic question in any debate over the ideal size of a nation's income redistribution program.

Question:

Why might "equality of opportunity" be a more realistic and efficient goal than "equality of income outcome"?

The Economics of Poverty

We now turn from the broader issue of income distribution to the more specific issue of very low income, or "poverty." A society with a high degree of income inequality can have a high, moderate, or low amount of poverty. In fact, it could have no poverty at all. We therefore need a separate examination of poverty.

Definition of Poverty

Poverty is a condition in which a person or family does not have the means to satisfy basic needs for food, clothing, shelter, and transportation. The means include currently earned income, transfer payments, past savings, and property owned. The basic needs have many determinants, including family size and the health and age of its members.

The Federal government has established minimum income thresholds below which a person or a family is "in poverty." In 2006 an unattached individual receiving less than \$9800 per year was said to be living in poverty. For a family of four, the poverty line was \$20,000; for a family of six, it was \$26,800. Based on these thresholds, in 2006 about 36.5 million Americans lived in poverty. In 2006 the **poverty rate**—the percentage of the population living in poverty—was 12.3 percent.

Incidence of Poverty

The poor are heterogeneous: They can be found in all parts of the nation; they are whites and nonwhites, rural and urban, young and old. But as Figure 11.4 indicates,

poverty rate

The percentage of the population with incomes below the official poverty income levels established by the Federal government.



FIGURE 11.4 Poverty rates among selected population groups, 2006. Poverty is disproportionately borne by African Americans, Hispanics, children, foreignborn residents who are not citizens, and families headed by women. People who are employed full-time or are married tend to have low poverty rates. Source: Bureau of the Census, www.census.gov.

poverty is far from randomly distributed. For example, the poverty rate for African Americans is above the national average, as is the rate for Hispanics, while the rate for whites and Asians is below the average. In 2006 the poverty rates for African Americans and Hispanics were 24.3 and 20.6 percent, respectively; the rate for whites and Asians, each was 10.3 percent.

Figure 11.4 shows that female-headed households, foreign-born noncitizens, and children under 18 years of age have very high incidences of poverty. Marriage and fulltime, year-round work are associated with low poverty rates, and, because of the Social Security system, the incidence of poverty among the elderly is less than that for the population as a whole.

The high poverty rate for children is especially disturbing because poverty tends to breed poverty. Poor children are at greater risk for a range of long-term problems, including poor health and inadequate education, crime, drug use, and teenage pregnancy. Many of today's impoverished children will reach adulthood unhealthy and illiterate and unable to earn above-poverty incomes.

As many as half of people in poverty are poor for only 1 or 2 years before climbing out of poverty. But poverty is much more long-lasting among some groups than among others. In particular, African-American and Hispanic families, families headed by women, persons with little education and few labor market skills, and people who are dysfunctional because of drug use, alcoholism, or mental illness are more likely than others to remain in poverty. Also, long-lasting poverty is heavily present in depressed areas of cities, parts of the Deep South, and some Indian reservations.

Poverty Trends

As Figure 11.5 shows, the total poverty rate fell significantly between 1959 and 1969, stabilized at 11 to 13 percent over the next decade, and then rose in the early 1980s. In 1993 the rate was 15.1 percent, the highest since 1983. Between 1993 and 2000 the rate turned downward, falling to 11.3 percent in 2000. Because of recession and slow recovery, the rate rose to 11.7 percent in 2001, 12.1 percent in 2002,

FIGURE 11.5 Poverty-rate trends, 1959–2006. Although the national poverty rate declined sharply between 1959 and 1969, it stabilized in the 1970s only to increase significantly in the early 1980s. Between 1993 and 2000 it substantially declined, before rising slightly again in the immediate years following the 2001 recession. Although poverty rates for African Americans and Hispanics are much higher than the average, they significantly declined during the 1990s. Source: Bureau of the Census, **www.census.gov.**



and 12.5 percent in 2003. During the second half of the 1990s, poverty rates plunged for African Americans, Hispanics, and Asians. Nevertheless, in 2006 African Americans and Hispanics still had poverty rates that were roughly double the rates for whites.

Measurement Issues

The poverty rates and trends in Figures 11.4 and 11.5 need to be interpreted cautiously. The official income thresholds for defining poverty are necessarily arbitrary and therefore may inadequately measure the true extent of poverty in the United States.

Some observers say that the high cost of living in major metropolitan areas means that the official poverty thresholds exclude millions of families whose income is slightly above the poverty level but clearly inadequate to meet basic needs for food, housing, and medical care. These observers use city-by-city studies on "minimal income needs" to show there is much more poverty in the United States than is officially measured and reported.

In contrast, some economists point out that using income to measure poverty understates the standard of living of many of the people who are officially poor. When individual, household, or family *consumption* is considered rather than family *income*, some of the poverty in the United States disappears. Some low-income families maintain their consumption by drawing down past savings, borrowing against future income, or selling homes. Moreover, many poverty families receive substantial noncash benefits such as food stamps and rent subsidies that boost their living standards. Such "in-kind" benefits are not included in determining a family's official poverty status.

The U.S. Income-Maintenance System

Regardless of how poverty is measured, economists agree that considerable poverty exists in the United States. Helping those who have very low income is a widely accepted goal of public policy. A wide array of antipoverty programs, including education and training programs, subsidized employment, minimum-wage laws, and antidiscrimination policies, are designed to increase the earnings of the poor. In addition, there are a number of income-maintenance programs devised to reduce poverty, the most important of which are listed in Table 11.3. These programs involve large expenditures and numerous beneficiaries.

The U.S. income-maintenance system consists of two kinds of programs: (1) social insurance and (2) public assistance or "welfare." Both are known as **entitlement programs** because all eligible persons are assured (entitled to) the benefits set forth in the programs.

Social Insurance Programs

Social insurance programs partially replace earnings that have been lost due to retirement, disability, or temporary unemployment; they also provide health insurance for the elderly. The main social insurance programs are Social Security, unemployment compensation, and Medicare. Benefits are viewed as earned rights and do not carry the stigma of public charity. These programs are financed primarily out

entitlement

programs Government programs that guarantee particular levels of transfer payments or noncash benefits to all who fit the programs' critieria.

Program	Basis of Eligibility	Source of Funds	Form of Aid	Expenditures,* Billions	Beneficiaries, Millions
Social Insurance Programs					
Social Security	Age, disability, or death of parent or spouse; lifetime work earnings	Federal payroll tax on employers and employees	Cash	\$594	50
Medicare	Age or disability	Federal payroll tax on employers and employees	Subsidized health insurance	\$408	43
Unemployment compensation	Unemployment	State and Federal payroll taxes on employers	Cash	\$34	8
Public Assistance Programs	5				
Supplemental Security Income (SSI)	Age or disability; income	Federal revenues	Cash	\$37	7
Temporary Assistance for Needy Families (TANF)	Certain families with children; income	Federal-state-local revenues	Cash and services	\$14	4
Food stamps	Income	Federal revenues	Vouchers	\$33	26
Medicaid	Persons eligible for TANF or SSI and medically indigent	Federal-state-local revenues	Subsidized medical services	\$276	58
Earned-income tax credit (EITC)	Low-wage working families	Federal revenues	Refundable tax credit, cash	\$41	22

TABLE 11.3 Characteristics of Major Income-Maintenance Programs

* Expenditures by Federal, state, and local governments; excludes administrative expenses.

Source: Statistical Abstract of the United States, 2004–2005, www.census.gov; other government sources, latest data.

Social Security

A federal pension program (financed by payroll taxes on employers and employees) that replaces part of the earnings lost when workers retire, become disabled, or die.

Medicare

A federal insurance program (financed by payroll taxes on employers and employees) that provides health insurance benefits to those 65 or older.

unemployment compensation

A federal-state social insurance program (financed by payroll taxes on employers) that makes income available to workers who are unemployed.

Supplemental Security Income (SSI)

A federal program (financed by general tax revenues) that provides a uniform nationwide minimum income for the aged, blind, and disabled who do not qualify for benefits under the Social Security program in the United States. of Federal payroll taxes. In these programs the entire population shares the risk of an individual's losing income because of retirement, unemployment, disability, or illness. Workers (and employers) pay a part of their wages to the government while they are working. The workers then receive benefits when they retire or face specified misfortunes.

Social Security and Medicare The major social insurance program known as **Social Security** replaces earnings lost when workers retire, become disabled, or die. This gigantic program (\$594 billion in 2007) is financed by compulsory payroll taxes levied on both employers and employees. Workers currently may retire at age 65 and receive full retirement benefits or retire early at age 62 with reduced benefits. When a worker dies, benefits accrue to his or her family survivors. Special provisions provide benefits for disabled workers.

Social Security covers over 90 percent of the workforce; some 50 million people receive Social Security benefits averaging about \$1082 per month. In 2008, those benefits were financed with a combined Social Security and Medicare payroll tax of 15.3 percent, with the worker and the employer each paying 7.65 percent on the worker's first \$102,000 of earnings. The 7.65 percent tax comprises 6.2 percent for Social Security and 1.45 percent for Medicare. Self-employed workers pay the full 15.3 percent.

Medicare provides hospital insurance for the elderly and disabled and is financed out of the payroll tax. This overall 2.9 percent tax is paid on all work income, not just on the first \$102,000. Medicare also makes available a supplementary low-cost insurance program that helps pay doctor fees.

The number of retirees drawing Social Security and Medicare benefits is rapidly rising relative to the number of workers paying payroll taxes. As a result, Social Security and Medicare face serious long-term funding problems. These fiscal imbalances have spawned calls to reform the programs.

Unemployment Compensation All 50 states sponsor unemployment insurance programs called **unemployment compensation**, a Federal-state program that makes income available to unemployed workers. This insurance is financed by a relatively small payroll tax, paid by employers, that varies by state and by the size of the firm's payroll. After a short waiting period, eligible wage and salary workers who become unemployed can receive benefit payments. The size of the payments varies from state to state. Generally, benefits approximate 33 percent of a worker's wages up to a certain maximum weekly payment, and last for a maximum of 26 weeks. In 2007 benefits averaged about \$277 weekly. During recessions—when unemployment soars—Congress often provides supplemental funds to the states to extend the benefits for additional weeks.

Public Assistance Programs

Public assistance programs (welfare) provide benefits for those who are unable to earn income because of permanent disabilities or have no or very low income and also have dependent children. These programs are financed out of general tax revenues and are regarded as public charity. They include "means tests," which require that individuals and families demonstrate low incomes in order to qualify for aid. The Federal government finances about two-thirds of the welfare program expenditures, and the rest is paid for by the states.

Many needy persons who do not qualify for social insurance programs are assisted through the Federal government's **Supplemental Security Income (SSI)** program.

The purpose of SSI is to establish a uniform, nationwide minimum income for the aged, blind, and disabled who are unable to work and who do not qualify for Social Security aid. Over half the states provide additional income supplements to the aged, blind, and disabled.

The **Temporary Assistance for Needy Families (TANF)** is the basic welfare program for low-income families in the United States. The program is financed through general Federal tax revenues and consists of lump-sum payments of Federal money to states to operate their own welfare and work programs. These lump-sum payments are called TANF funds, and in 2007 about 4 million people (including children) received TANF assistance. TANF expenditures in 2007 were about \$14 billion.

In 1996 TANF replaced the six-decade-old Aid for Families with Dependent Children (AFDC) program. Unlike that welfare program, TANF established work requirements and placed limits on the length of time a family can receive welfare payments. Specifically, the TANF program

- Set a lifetime limit of 5 years on receiving TANF benefits and required able-bodied adults to work after receiving assistance for 2 years.
- Ended food-stamp eligibility for able-bodied persons age 18 to 50 (with no dependent children) who are not working or engaged in job-training programs.
- Tightened the definition of "disabled children" as it applies for eligibility of low-income families for SSI assistance.
- Established a 5-year waiting period on public assistance for new legal immigrants who have not become citizens.

In 1996 about 12.6 million people were welfare recipients, including children, or 4.8 percent of the U.S. population. By the middle of 2007, those totals had declined to 4.5 million and 2 percent of the population. The program has greatly increased the employment rate (= employment/population) for single mothers with children under age 6—a group particularly prone to welfare dependency. Today, that rate is about 13 percentage points higher than it was in 1996.

The **food-stamp program** is designed to provide all low-income Americans with a "nutritionally adequate diet." Under the program, eligible households receive monthly allotments of coupons that are redeemable for food. The amount of food stamps received varies inversely with a family's earned income.

Medicaid helps finance the medical expenses of individuals participating in the SSI and the TANF programs.

The **earned-income tax credit (EITC)** is a tax credit for low-income working families, with or without children. The credit reduces the Federal income taxes that such families owe or provides them with cash payments if the credit exceeds their tax liabilities. The purpose of the credit is to offset Social Security taxes paid by low-wage earners and thus keep the Federal government from "taxing families into poverty." In essence, EITC is a wage subsidy from the Federal government that works out to be as much as \$2 per hour for the lowest-paid workers with families. Under the program, many people owe no income tax and receive direct checks from the Federal government once a year. According to the Internal Revenue Service, 22 million taxpayers received \$41 billion in payments from the EITC in 2006.

Several other welfare programs are not listed in Table 11.3. Most provide help in the form of noncash transfers. Head Start provides education, nutrition, and social services to economically disadvantaged 3- and 4-year-olds. Housing assistance in the form of rent subsidies and funds for construction is available to low-income families. Pell grants provide assistance to college students from low-income families. Temporary Assistance for Needy Families (TANF) The basic welfare program (financed through general tax revenues) for lowincome families in the

United States.

food-stamp program

A federal program (financed through general tax revenues) that permits eligible low-income persons to obtain vouchers that are usable to buy food.

Medicaid

A federal program (financed by general tax revenues) that provides medical benefits to people covered by the Supplemental Security Income (SSI) and Temporary Assistance for Needy Families (TANF) programs.

earned-income tax credit (EITC)

A refundable federal tax credit provided to low-income wage earners to supplement their families' incomes and encourage work.



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Photo Op Social Insurance versus Public Assistance Programs

Beneficiaries of social insurance programs such as Social Security have typically paid for at least a portion of that insurance through payroll taxes. Food stamps and other public assistance are funded from general tax revenue and are generally seen as public charity.

Summary

- 1. The distribution of income in the United States reflects considerable inequality. The richest 20 percent of families receive 50.5 percent of total income, while the poorest 20 percent receive 3.4 percent.
- 2. The Lorenz curve shows the percentage of total income received by each percentage of households. The extent of the gap between the Lorenz curve and a line of total equality illustrates the degree of income inequality.
- 3. The Gini ratio measures the overall dispersion of the income distribution and is found by dividing the area between the diagonal and the Lorenz curve by the entire area below the diagonal. The Gini ratio ranges from zero to 1; higher ratios signify greater degrees of income inequality.
- 4. Recognizing that the positions of individual families in the distribution of income change over time and incorporating the effects of noncash transfers and taxes would reveal less income inequality than do standard census data. Government transfers (cash and noncash) greatly lessen the degree of income inequality; taxes also reduce inequality, but not by nearly as much as transfers.

- 5. Causes of income inequality include differences in abilities, in education and training, and in job tastes, along with discrimination, inequality in the distribution of wealth, and an unequal distribution of market power.
- 6. Census data show that income inequality has increased significantly since 1970. The major cause of recent increases in income inequality is a rising demand for highly skilled workers, which has boosted their earnings significantly.
- 7. The basic argument for income equality is that it maximizes consumer satisfaction (total utility) from a particular level of total income. The main argument for income inequality is that it provides the incentives to work, invest, and assume risk and is necessary for the production of output, which, in turn, creates income that is then available for distribution.
- 8. Current statistics reveal that 12.3 percent of the U.S. population lived in poverty in 2006. Poverty rates are particularly high for female-headed families, young children, African Americans, and Hispanics.
- 9. The present income-maintenance program in the United States consists of social insurance programs (Social Security,

Medicare, and unemployment compensation) and public assistance programs (SSI, TANF, food stamps, Medicaid, and earned-income tax credit).

 In 1996 Congress established the Temporary Assistance for Needy Families (TANF) program, which shifted responsibility for welfare from the Federal government to the states. Among its provisions are work requirements for adults receiving welfare and a 5-year lifelong limit on welfare benefits.

11. A generally strong economy and TANF have reduced the U.S. welfare rolls by more than one-half since 1996.

Terms and Concepts

- income inequality Lorenz curve Gini ratio income mobility noncash transfers law of diminishing marginal utility
- equality-efficiency trade-off poverty rate entitlement programs Social Security Medicare unemployment compensation

Supplemental Security Income (SSI) Temporary Assistance for Needy Families (TANF) food-stamp program Medicaid earned-income tax credit (EITC)

Study Questions Connect

- 1. Use quintiles to briefly summarize the degree of income inequality in the United States. How and to what extent does government reduce income inequality? LOI
- 2. Assume that Al, Beth, Carol, David, and Ed receive incomes of \$500, \$250, \$125, \$75, and \$50, respectively. Construct and interpret a Lorenz curve for this five-person economy. What percentages of total income are received by the richest quintile and by the poorest quintile? LOI
- **3.** How does the Gini ratio relate to the Lorenz curve? Why can't the Gini ratio exceed 1? What is implied about the direction of income inequality if the Gini ratio declines from 0.42 to 0.35? How would one show that change of inequality in the Lorenz diagram? **LOI**
- **4.** Why is the lifetime distribution of income more equal than the distribution in any specific year? **LO2**
- Briefly discuss the major causes of income inequality. What factors have contributed to greater income inequality since 1970? LO2,3
- 6. Should a nation's income be distributed to its members according to their contributions to the production of that total income or according to the members' needs? Should society attempt to equalize income or economic opportunities? Are the issues of equity and equality in the distribution of income synonymous? To what degree, if any, is income inequality equitable? LO4

- 7. Comment on or explain: LO4
 - **a.** Endowing everyone with equal income will make for very unequal enjoyment and satisfaction.
 - **b.** Equality is a "superior good"; the richer we become, the more of it we can afford.
 - **c.** The mob goes in search of bread, and the means it employs is generally to wreck the bakeries.
 - **d.** Some freedoms may be more important in the long run than freedom from want on the part of every individual.
 - e. Capitalism and democracy are really a most improbable mixture. Maybe that is why they need each other—to put some rationality into equality and some humanity into efficiency.
 - **f.** The incentives created by the attempt to bring about a more equal distribution of income are in conflict with the incentives needed to generate increased income.
- 8. How do government statisticians determine the poverty rate? How could the poverty rate fall while the number of people in poverty rises? Which group in each of the following pairs has the higher poverty rate: (a) children or people age 65 or over? (b) African Americans or foreign-born non-citizens? (c) Asians or Hispanics? LOS
- **9.** What are the essential differences between social insurance and public assistance programs? Why is Medicare a social insurance program whereas Medicaid is a public assistance

program? Why is the earned-income tax credit considered to be a public assistance program? **LO6**

10. Prior to the implementation of welfare reforms through the Temporary Assistance for Needy Families (TANF) program, the old system (AFDC) was believed to be creating dependency, robbing individuals and family members of motivation and dignity. How did this reform (TANF) try to address those criticisms? Do you agree with the general

thrust of the reform and with its emphasis on work requirements and time limits on welfare benefits? Has the reform reduced U.S. welfare rolls or increased them? **LO6**

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Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do. Also, you will find one or more Web-based questions that require information from the Internet to answer.



PART FIVE

International Economics

12 INTERNATIONAL TRADE AND EXCHANGE RATES



IN THIS CHAPTER YOU WILL LEARN:

- I Some key facts about U.S. international trade.
- 2 About comparative advantage, specialization, and international trade.
- 3 How exchange rates are determined in currency markets.
- 4 The rebuttals to common arguments for protectionism.
- 5 The role played by free-trade zones and the World Trade Organization (WTO) in promoting international trade.

International Trade and Exchange Rates

Backpackers in the wilderness like to think they are "leaving the world behind," but, like Atlas, they carry the world on their shoulders. Much of their equipment is imported—knives from Switzerland, rain gear from South Korea, cameras from Japan, aluminum pots from England, sleeping bags from China, and compasses from Finland. Moreover, they may have driven to the trailheads in Japanese-made Toyotas or German-made BMWs, sipping coffee from Brazil or snacking on bananas from Honduras.

International trade and the global economy affect all of us daily, whether we are hiking in the wilderness, driving our cars, listening to music, or working at our jobs. We cannot "leave the world behind." We are enmeshed in a global web of economic relationships—trading of goods and services, multinational corporations, cooperative ventures among the world's firms, and ties among the world's financial markets.

Trade Facts

The following facts provide an "executive summary" of U.S. international trade:

- A *trade deficit* occurs when imports exceed exports. The United States has a trade deficit in goods. In 2007, U.S. imports of goods exceeded U.S. exports of goods by \$816 billion.
- A *trade surplus* occurs when exports exceed imports. The United States has a trade surplus in services (such as air transportation services and financial services). In 2007, U.S. exports of services exceeded U.S. imports of services by \$107 billion.
- Principal U.S. exports include chemicals, agricultural products, consumer durables, semiconductors, and aircraft; principal imports include petroleum, automobiles, metals, household appliances, and computers.
- Canada is the United States' most important trading partner quantitatively. In 2007, 22 percent of U.S. exported goods were sold to Canadians, who in turn provided 16 percent of the U.S. imports of goods.
- The United States has a sizable trade deficit with China. In 2007, U.S. imports of goods from China exceeded exports of goods to China by \$257 billion.
- The U.S. dependence on foreign oil is reflected in its trade with members of OPEC. In 2007, the United States imported \$174 billion of goods (mainly oil) from OPEC members, while exporting \$49 billion of goods to those countries.
- The United States leads the world in the combined volume of exports and imports, as measured in dollars. Germany, the United States, China, Japan, and France are the top five exporters by dollar volume (see Global Snapshot 12.1). Currently, the United States provides about nine percent of the world's exports.



GLOBAL SNAPSHOT 12.1

Comparative Exports

Germany, the United States, and China are the world's largest exporters.



- Exports of goods and services make up about 10 percent of total U.S. output. That percentage is much lower than the percentage in many other nations, including Canada, Italy, France, and the United Kingdom (see Global Snapshot 12.2).
- China has become a major international trader, with an estimated \$1.2 trillion billion of exports in 2007. Other Asian economies—including South Korea, Taiwan, and Singapore—are also active in international trade. Their combined exports exceed those of France, Britain, or Italy.
- International trade and finance are often at the center of economic policy.

With this information in mind, let's look more closely at the economics of international trade.



GLOBAL SNAPSHOT 12.2

Exports of Goods and Services as a Percentage of GDP, Selected Countries

Although the United States is the world's second-largest exporter, it ranks relatively low among trading nations in terms of exports as a percentage of GDP.



Comparative Advantage and Specialization

Given the presence of an *open economy*—one that includes the international sector—the United States produces more of certain goods (exports) and fewer of other goods (imports) than it would otherwise. Thus U.S. labor and other resources are shifted toward export industries and away from import industries. For example, the United States uses more resources to make computers and to grow wheat and less to make sporting goods and clothing. So we ask: "Do shifts of resources like these make economic sense? Do they enhance U.S. total output and thus the U.S. standard of living?"

The answers are affirmative. Specialization and international trade increase the productivity of a nation's resources and allow for greater total output than would otherwise be possible. This idea is not new. Adam Smith had this to say in 1776:

It is the maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy. The taylor does not attempt to make his own shoes, but buys them of the shoemaker. The shoemaker does not attempt to make his own clothes, but employs a taylor. The farmer attempts to make neither the one nor the other, but employs those different artificers....

What is prudence in the conduct of every private family, can scarce be folly in that of a great kingdom. If a foreign country can supply us with a commodity cheaper than we can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage.¹

Nations specialize and trade for the same reasons that individuals do: Specialization and exchange result in greater overall output and income. In the early 1800s British economist David Ricardo expanded on Smith's idea by observing that it pays for a person or a country to specialize and trade even if a nation is more productive than a potential trading partner in *all* economic activities. We demonstrate Ricardo's principle in the examples that follow.

A CPA and a House Painter

Consider the certified public accountant (CPA) who is also a skilled house painter. Suppose the CPA is a swifter painter than the professional painter she is thinking of hiring. Also suppose that she can earn \$50 per hour as an accountant but would have to pay the painter \$15 per hour. And say it would take the accountant 30 hours to paint her house but the painter would take 40 hours.

Should the CPA take time from her accounting to paint her own house, or should she hire the painter? The CPA's opportunity cost of painting her house is \$1500 (=30 hours of sacrificed CPA time \times \$50 per CPA hour). The cost of hiring the painter is only \$600 (=40 hours of painting \times \$15 per hour of painting). Although the CPA is better at both accounting and painting, she will get her house painted at lower cost by specializing in accounting and using some of her earnings from accounting to hire a house painter.

Similarly, the house painter can reduce his cost of obtaining accounting services by specializing in painting and using some of his income to hire the CPA to prepare his income tax forms. Suppose it would take the painter 10 hours to prepare his tax return, while the CPA could handle the task in 2 hours. The house painter would sacrifice \$150 of income (=10 hours of painting time \times \$15 per hour) to do something he could hire the CPA to do for \$100 (=2 hours of CPA time \times \$50 per CPA hour). By using the CPA to prepare his tax return, the painter lowers the cost of getting his tax return prepared.

What is true for our CPA and house painter is also true for nations. Specializing enables nations to reduce the cost of obtaining the goods and services they desire.

Question:

How might the specialization described above change once the CPA retires? What generalization about the permanency of a particular pattern of specialization can you draw from your answer? ILLUSTRATING THE IDEA

¹ Adam Smith, *The Wealth of Nations* (New York: Modern Library, 1937), p. 424. (Originally published in 1776.)

Comparative Advantage: Production Possibilities Analysis

Our simple example shows that the reason specialization is economically desirable is that it results in more efficient production. Now let's put specialization into the context of trading nations and use the familiar concept of the production possibilities table for our analysis.

Assumptions and Comparative Costs Suppose the production possibilities for one product in Mexico and for one product in the United States are as shown in Tables 12.1 and 12.2. Both tables reflect constant costs. Each country must give up a constant amount of one product to secure a certain increment of the other product. (This assumption simplifies our discussion without impairing the validity of our conclusions. Later we will allow for increasing costs.)

Also for simplicity, suppose that the labor forces in the United States and Mexico are of equal size. The data then tell us that the United States has an *absolute advantage* in producing both products. If the United States and Mexico use their entire (equalsize) labor forces to produce avocados, the United States can produce 90 tons compared with Mexico's 60 tons. Similarly, the United States can produce 30 tons of soybeans compared to Mexico's 15 tons. There are greater production possibilities in the United States, using the same number of workers as in Mexico. So labor productivity (output per worker) in the United States exceeds that in Mexico in producing both products.

Although the United States has an absolute advantage in producing both goods, gains from specialization and trade are possible. Specialization and trade are mutually beneficial or "profitable" to the two nations if the *comparative* costs of producing the two products within the two nations differ. What are the comparative costs of avocados and soybeans in Mexico? By comparing production alternatives A and B in Table 12.1, we see that Mexico must sacrifice 5 tons of soybeans (=15 - 10) to produce 20 tons of avocados (=20 - 0). Or, more simply, in Mexico it costs 1 ton of soybeans (S) to produce 4 tons of avocados (A); that is, $1S \equiv 4A$. (The " \equiv " sign simply means "equivalent to.") Because we assumed constant costs, this domestic opportunity cost will not change as Mexico expands the output of either product. This is evident from production possibilities B and C, where we see that 4 more tons of avocados (=24 - 20) cost 1 unit of soybeans (=10 - 9).

TABLE 12.1 Mexico's	Production Alternatives						
Table (in Tons)	Product	Α	В	С	D	Е	
	Avocados	0	20	24	40	60	
	Soybeans	15	10	9	5	0	

TABLE 12.2U.S.Production PossibilitiesTable (in Tons)

	Production Alternatives						
Product	R	S	т	U	V		
Avocados	0	30	33	60	90		
Soybeans	30	20	19	10	0		
Similarly, in Table 12.2, comparing U.S. production alternatives R and S reveals that in the United States it costs 10 tons of soybeans (=30 - 20) to obtain 30 tons of avocados (=30 - 0). That is, the domestic (internal) comparative-cost ratio for the two products in the United States is $1S \equiv 3A$. Comparing production alternatives S and T reinforces this conclusion: an extra 3 tons of avocados (=33 - 30) comes at the sacrifice of 1 ton of soybeans (=20 - 19).

The comparative costs of the two products within the two nations are obviously different. Economists say that the United States has a **comparative advantage** over Mexico in soybeans. The United States must forgo only 3 tons of avocados to get 1 ton of soybeans, but Mexico must forgo 4 tons of avocados to get 1 ton of soybeans. In terms of opportunity costs, soybeans are relatively cheaper in the United States. *A nation has a comparative advantage in some product when it can produce that product at a lower opportunity cost than can a potential trading partner*. Mexico, in contrast, has a comparative advantage in avocados. While 1 ton of avocados costs $\frac{1}{3}$ ton of soybeans in the United States, it costs only $\frac{1}{4}$ ton of soybeans in Mexico. Comparatively speaking, avocados are cheaper in Mexico. We summarize the situation in Table 12.3. Be sure to give it a close look.

Because of these differences in comparative costs, Mexico should produce avocados and the United States should produce soybeans. If both nations specialize according to their comparative advantages, each can achieve a larger total output with the same total input of resources. Together they will be using their scarce resources more efficiently.

Terms of Trade The United States can shift production between soybeans and avocados at the rate of 1S for 3A. Thus, the United States would specialize in soybeans only if it could obtain *more than* 3 tons of avocados for 1 ton of soybeans by trading with Mexico. Similarly, Mexico can shift production at the rate of 4A for 1S. So it would be advantageous to Mexico to specialize in avocados if it could get 1 ton of soybeans for *less than* 4 tons of avocados.

Suppose that through negotiation the two nations agree on an exchange rate of 1 ton of soybeans for $3\frac{1}{2}$ tons of avocados. These **terms of trade** are mutually beneficial to both countries, since each can "do better" through such trade than through domestic production alone. The United States can get $3\frac{1}{2}$ tons of avocados by sending 1 ton of soybeans to Mexico, while it can get only 3 tons of avocados by shifting its own resources domestically from soybeans to avocados. Mexico can obtain 1 ton of soybeans at a lower cost of $3\frac{1}{2}$ tons of avocados through trade with the United States, compared to the cost of 4 tons if Mexico produced the 1 ton of soybeans itself.

comparative advantage A lower relative or comparative opportunity cost than that of another person, producer, or country.

ORIGIN OF THE IDEA <u>O 12.1</u> Absolute and comparative advantage

terms of trade

The rate at which units of one product can be exchanged for units of another product.

Soybeans

Mexico: Must give up 4 tons of avocados to get 1 ton of soybeans United States: Must give up 3 tons of avocados to get 1 ton of soybeans Comparative advantage: United States

Avocados

Mexico: Must give up $\frac{1}{4}$ ton of soybeans to get I ton of avocados

United States: Must give up $\frac{1}{3}$ ton of soybeans to get 1 ton of avocados Comparative advantage: Mexico TABLE 12.3 Comparative-Advantage Example: A Summary **Gains from Specialization and Trade** Let's pinpoint the gains in total output from specialization and trade. Suppose that, before specialization and trade, production alternative C in Table 12.1 and alternative T in Table 12.2 were the optimal product mixes for the two countries. That is, Mexico preferred 24 tons of avocados and 9 tons of soybeans (Table 12.1) and the United States preferred 33 tons of avocados and 19 tons of soybeans (Table 12.2) to all other available domestic alternatives. These outputs are shown in column 1 in Table 12.4.

Now assume that both nations specialize according to their comparative advantages, with Mexico producing 60 tons of avocados and no soybeans (alternative E) and the United States producing no avocados and 30 tons of soybeans (alternative R). These outputs are shown in column 2 in Table 12.4. Using our $1S \equiv 3\frac{1}{2}$ A terms of trade, assume that Mexico exchanges 35 tons of avocados for 10 tons of U.S. soybeans. Column 3 in Table 12.4 shows the quantities exchanged in this trade, with a minus sign indicating exports and a plus sign indicating imports. As shown in column 4, after the trade Mexico has 25 tons of avocados and 10 tons of soybeans, while the United States has 35 tons of avocados and 20 tons of soybeans. Compared with their optimal product mixes before specialization and trade (column 1), *both* nations now enjoy more avocados and more soybeans! Specifically, Mexico has gained 1 ton of avocados and 1 ton of soybeans. The United States has gained 2 tons of avocados and 1 ton of soybeans. The united States has gained 2 tons of avocados and 1 ton of soybeans. These gains are shown in column 5.

Specialization based on comparative advantage improves global resource allocation. The same total inputs of world resources and technology result in a larger global output. If Mexico and the United States allocate all their resources to avocados and soybeans, respectively, the same total inputs of resources can produce more output between them, indicating that resources are being allocated more efficiently.

Through specialization and international trade a nation can overcome the production constraints imposed by its domestic production possibilities table and curve. Our discussion of Tables 12.1, 12.2, and 12.4 has shown just how this is done. The domestic production possibilities data (Tables 12.1 and 12.2) of the two countries have not changed, meaning that neither nation's production possibilities curve has shifted. But specialization and trade mean that citizens of both countries can enjoy increased consumption (column 5 of Table 12.4).

Trade with Increasing Costs

To explain the basic principles underlying international trade, we simplified our analysis in several ways. For example, we limited discussion to two products and two nations. But multiproduct and multinational analysis yields the same conclusions. We also

Country	(I) Outputs before Specialization	(2) Outputs after Specialization	(3) Amounts Traded	(4) Outputs Available after Trade	(5) Gains from Specialization and Trade (4) – (1)
Mexico	24 avocados	60 avocados	-35 avocados	25 avocados	l avocados
	9 soybeans	0 soybeans	+10 soybeans	10 soybeans	I soybeans
United States	33 avocados	0 avocados	+35 avocados	35 avocados	2 avocados
	19 soybeans	30 soybeans	-10 soybeans	20 soybeans	I soybeans

 TABLE 12.4
 Specialization According to Comparative Advantage and the Gains from Trade (in Tons)

WORKED PROBLEMS

Gains from specialization

assumed constant opportunity costs, which is a more substantive simplification. Let's consider the effect of allowing increasing opportunity costs to enter the picture.

As before, suppose that comparative advantage indicates that the United States should specialize in soybeans and Mexico in avocados. But now, as the United States begins to expand soybean production, its cost of soybeans will rise. It will eventually have to sacrifice more than 3 tons of avocados to get 1 additional ton of soybeans. Resources are no longer perfectly substitutable between alternative uses, as our constant-cost assumption implied. Resources less and less suitable to soybean output, and that means increasing costs—the sacrifice of larger and larger amounts of avocados for each additional ton of soybeans.



© Getty Images

Photo Op The Fruits of Free Trade*

Because of specialization and exchange, fruits from all over the world appear in our grocery stores. For example, apples may be from New Zealand; bananas, from Ecuador; coconuts, from the Philippines; pineapples, from Costa Rica; raspberries, from Mexico; plums, from Chile; and grapes, from Peru.

* This example is from "The Fruits of Free Trade," Federal Reserve Bank of Dallas, Annual Report 2002, p. 3.

Similarly, Mexico will find that its cost of producing an additional ton of avocados will rise beyond 4 tons of soybeans as it produces more avocados. Resources transferred from soybean to avocado production will eventually be less suitable to avocado production. At some point the differing domestic cost ratios that underlie comparative advantage will disappear, and further specialization will become uneconomical. And, most importantly, this point of equal cost ratios may be reached while the United States is still producing some avocados along with its soybeans and Mexico is producing some soybeans along with its avocados. The primary effect of increasing opportunity costs is less-than-complete specialization. For this reason we often find domestically produced products competing directly against identical or similar imported products within a particular economy.

The Foreign Exchange Market

Buyers and sellers (whether individuals, firms, or nations) use money to buy products or to pay for the use of resources. Within the domestic economy, prices are stated in terms of the domestic currency and buyers use that currency to purchase domestic products. In Mexico, for example, buyers have pesos, and that is what sellers want.

International markets are different. Sellers set their prices in terms of their domestic currencies, but buyers often possess entirely different currencies. How many dollars does it take to buy a truckload of Mexican avocados selling for 3000 pesos, a German automobile selling for 50,000 euros, or a Japanese motorcycle priced at 300,000 yen? Producers in Mexico, Germany, and Japan want payment in pesos, euros, and yen, respectively, so that they can pay their wages, rent, interest, dividends, and taxes.

A **foreign exchange market**, a market in which various national currencies are exchanged for one another, serves this need. The equilibrium prices in such currency markets are called **exchange rates**. An exchange rate is the rate at which the currency of one nation can be exchanged for the currency of another nation. (See Global Snapshot 12.3.)

foreign exchange market

A market in which foreign currencies are exchanged and relative currency prices are established.

exchange rates

The rates at which national currencies trade for one another.

GLOBAL SNAPSHOT 12.3

Exchange Rates: Foreign Currency per U.S. Dollar

The amount of foreign currency that a dollar will buy varies greatly from nation to nation and fluctuates in response to supply and demand changes in the foreign exchange market. The amounts shown here are for March 2008.





Photo Op Foreign Currencies

The world is awash with hundreds of national currencies. Currency markets determine the rates of exchange between them.

The market price or exchange rate of a nation's currency is an unusual price; it links all domestic prices with all foreign prices. Exchange rates enable consumers in one country to translate prices of foreign goods into units of their own currency: They need only multiply the foreign product price by the exchange rate. If the U.S. dollar–yen exchange rate is \$.01 (1 cent) per yen, a Sony television set priced at $\frac{1}{20,000} \times \frac{1}{20,000} \times \frac{1}{20$

Exchange Rates

Let's examine the rate, or price, at which U.S. dollars might be exchanged for British pounds. In Figure 12.1 we show the dollar price of 1 pound on the vertical axis and the quantity of pounds on the horizontal axis. The demand for pounds is D_1 and the supply of pounds is S_1 in this market for British pounds.

The *demand-for-pounds curve* is downward-sloping because all British goods and services will be cheaper to the United States if pounds become less expensive to the United States. That is, at lower dollar prices for pounds, the United States can obtain more pounds for each dollar and therefore buy more British goods and services per dollar. To buy those cheaper British goods, U.S. consumers will increase the quantity of pounds they demand.

INTERACTIVE GRAPHS G 12.1 Exchange rates **FIGURE 12.1 The market for foreign currency (pounds)** The intersection of the demand-for-pounds curve D_1 and the supply-of-pounds curve S_1 determines the equilibrium dollar price of pounds, here, \$2. That means that the exchange rate is $$2 = \pounds 1$. The upward blue arrow is a reminder that a higher dollar price of pounds (say, $$3 = \pounds 1$, caused by a shift in either the demand or the supply curve) means that the dollar has depreciated (the pound has appreciated). The downward blue arrow tells us that a lower dollar price of pounds (say, $\$1 = \pounds 1$, again caused by a shift in either the demand or the supply curve) means that the dollar has depreciated.



The *supply-of-pounds curve* slopes upward because the British will purchase more U.S. goods when the dollar price of pounds rises (that is, as the pound price of dollars falls). When the British buy more U.S. goods, they supply a greater quantity of pounds to the foreign exchange market. In other words, they must exchange pounds for dollars to purchase U.S. goods. So, when the dollar price of pounds rises, the quantity of pounds supplied goes up.

The intersection of the supply curve and the demand curve will determine the dollar price of pounds. In Figure 12.1, that price (exchange rate) is \$2 for £1.

Depreciation and Appreciation

An exchange rate determined by market forces can, and often does, change daily like stock and bond prices. These price changes result from changes in the supply of, or demand for, a particular currency. When the dollar price of pounds *rises*, for example, from \$2 = \$1 to \$3 = \$1, the dollar has *depreciated* relative to the pound (and the pound has appreciated relative to the dollar). A **depreciation** of a currency means that more units of it (dollars) are needed to buy a single unit of some other currency (a pound).

When the dollar price of pounds *falls*, for example, from \$2 = \$1 to \$1 = \$1, the dollar has *appreciated* relative to the pound. An **appreciation** of a currency means that it takes fewer units of it (dollars) to buy a single unit of some other currency (a pound). For example, the dollar price of pounds might decline from \$2 to \$1. Each British product becomes less expensive in terms of dollars, so people in the United States purchase more British goods. In general, U.S. imports from the United Kingdom rise. Meanwhile, because it takes more pounds to get a dollar, U.S. exports to the United Kingdom fall.

The central point is this: When the dollar depreciates (dollar price of foreign currencies rises), U.S. exports rise and U.S. imports fall; when the dollar appreciates (dollar price of foreign currencies falls), U.S. exports fall and U.S. imports rise.

depreciation (of a currency)

A decrease in the value of a currency relative to another currency.

appreciation (of a currency)

An increase in the value of a currency relative to another currency. In our U.S.-Britain illustrations, depreciation of the dollar means an appreciation of the pound, and vice versa. When the dollar price of a pound jumps from \$2 = \$1 to \$3 = \$1, the pound has appreciated relative to the dollar because it takes fewer pounds to buy \$1. At \$2 = \$1, it took \$1/2 to buy \$1; at \$3 = \$1, it takes only \$1/3 to buy \$1. Conversely, when the dollar appreciates relative to the pound, the pound depreciates relative to the dollar. More pounds are needed to buy a U.S. dollar.

Determinants of Exchange Rates

What factors would cause a nation's currency to appreciate or depreciate in the market for foreign exchange? Here are three generalizations (other things equal):

- If the demand for a nation's currency increases, that currency will appreciate; if the demand declines, that currency will depreciate.
- If the supply of a nation's currency increases, that currency will depreciate; if the supply decreases, that currency will appreciate.
- If a nation's currency appreciates, some foreign currency depreciates relative to it.

With these generalizations in mind, let's examine the determinants of exchange rates the factors that shift the demand or supply curve for a certain currency. As we do so, keep in mind that the other-things-equal assumption is always in force. Also note that we are discussing factors *that change the exchange rate*, not things that change *as a result of* a change in the exchange rate.

Tastes Any change in consumer tastes or preferences for the products of a foreign country may alter the demand for that nation's currency and change its exchange rate. If technological advances in U.S. MP3 players make them more attractive to British consumers and businesses, then the British will supply more pounds in the exchange market in order to purchase more U.S. MP3 players. The supply-of-pounds curve will shift to the right, causing the pound to depreciate and the dollar to appreciate.

In contrast, the U.S. demand-for-pounds curve will shift to the right if British woolen apparel becomes more fashionable in the United States. So the pound will appreciate and the dollar will depreciate.

Relative Income A nation's currency is likely to depreciate if its growth of national income is more rapid than that of other countries. Here's why: A country's imports vary directly with its income level. As total income rises in the United States, people there buy both more domestic goods and more foreign goods. If the U.S. economy is expanding rapidly and the British economy is stagnant, U.S. imports of British goods, and therefore U.S. demands for pounds, will increase. The dollar price of pounds will rise, so the dollar will depreciate.

Relative Price Levels Changes in the relative price levels of two nations may change the demand for and supply of currencies and alter the exchange rate between the two nations' currencies. If, for example, the domestic price level rises rapidly in the United States and remains constant in Great Britain, U.S. consumers will seek out low-priced British goods, increasing the demand for pounds. The British will purchase fewer U.S. goods, reducing the supply of pounds. This combination of demand and supply changes will cause the pound to appreciate and the dollar to depreciate.

Relative Interest Rates Changes in relative interest rates between two countries may alter their exchange rate. Suppose that real interest rates rise in the United States but stay constant in Great Britain. British citizens will then find the United

States a more attractive place in which to loan money directly or loan money indirectly by buying bonds. To make these loans, they will have to supply pounds in the foreign exchange market to obtain dollars. The increase in the supply of pounds results in depreciation of the pound and appreciation of the dollar.

Changes in Relative Expected Returns on Stocks, Real Estate, and Production Facilities International investing extends beyond buying foreign bonds. It includes international investments in stocks and real estate as well as foreign purchases of factories and production facilities. Other things equal, the extent of this foreign investment depends on relative expected returns. To make the investments, investors in one country must sell their currencies to purchase the foreign currencies needed for the foreign investments.

For instance, suppose that investing in England suddenly becomes more popular due to a more positive outlook regarding expected returns on stocks, real estate, and production facilities there. U.S. investors therefore will sell U.S. assets to buy more assets in England. The U.S. assets will be sold for dollars, which will then be brought to the foreign exchange market and exchanged for pounds, which will in turn be used to purchase British assets. The increased demand for pounds in the foreign exchange market will cause the pound to appreciate and the dollar to depreciate.

Speculation Currency speculators are people who buy and sell currencies with an eye toward reselling or repurchasing them at a profit. Suppose that, as a group, speculators anticipate that the pound will appreciate and the dollar will depreciate. Speculators holding dollars will therefore try to convert them into pounds. This effort will increase the demand for pounds and cause the dollar price of pounds to rise (that is, cause the dollar to depreciate). A self-fulfilling prophecy occurs: The pound appreciates and the dollar depreciates because speculators act on the belief that these changes will in fact take place. In this way, speculation can cause changes in exchange rates.

Government and Trade

If people and nations benefit from specialization and international exchange, why do governments sometimes try to restrict the free flow of imports or encourage exports? What kinds of world trade barriers can governments erect, and why would they do so?

Trade Protections and Subsidies

Trade interventions by government take several forms. Excise taxes on imported goods are called **tariffs**. A *protective tariff* is designed to shield domestic producers from foreign competition. Such tariffs impede free trade by causing a rise in the prices of imported goods, thereby shifting demand toward domestic products. An excise tax on imported shoes, for example, would make domestically produced shoes more attractive to consumers. Although protective tariffs are usually not high enough to stop the importation of foreign goods, they put foreign producers at a competitive disadvantage in selling in domestic markets.

Import quotas are limits on the quantities or total value of specific items that may be imported. Once a quota is "filled," further imports of that product are choked off. Import quotas are more effective than tariffs in retarding international commerce. With a tariff, a product can go on being imported in large quantities; with an import quota, however, all imports are prohibited once the quota is filled.

tariffs

Taxes imposed by a nation on imported goods.

import quotas

Limits imposed by nations on the quantities (or total values) of goods that may be imported during some period of time. **Nontariff barriers (NTBs)** include onerous licensing requirements, unreasonable standards pertaining to product quality, or excessive bureaucratic hurdles and delays in customs procedures. Some nations require that importers of foreign goods obtain licenses. By restricting the issuance of licenses, imports can be restricted. Although many nations carefully inspect imported agricultural products to prevent the introduction of potentially harmful insects, some countries use lengthy inspections to impede imports.

A voluntary export restriction (VER) is a trade barrier by which foreign firms "voluntarily" limit the amount of their exports to a particular country. Exporters agree to a VER, which has the effect of an import quota, to avoid more stringent trade barriers. In the late 1990s, for example, Canadian producers of softwood lumber (fir, spruce, cedar, pine) agreed to a VER on exports to the United States under the threat of a permanently higher U.S. tariff.

Export subsidies consist of government payments to domestic producers of export goods. By reducing production costs, the subsidies enable producers to charge lower prices and thus to sell more exports in world markets. Example: The United States and other nations have subsidized domestic farmers to boost the domestic food supply. Such subsidies have lowered the market price of agricultural commodities and have artificially lowered their export prices.

Economic Impact of Tariffs

Tariffs, quotas, and other trade restrictions have a series of economic effects predicted by supply and demand analysis and observed in reality. These effects vary somewhat by type of trade protection. So to keep things simple, we will focus on the effects of tariffs.

Direct Effects Because tariffs raise the price of goods imported to the United States, U.S. consumption of those goods declines. Higher prices reduce quantity demanded, as indicated by the law of demand. A tariff prompts consumers to buy fewer of the imported goods and reallocate a portion of their expenditures to less desired substitute products. U.S. consumers are clearly injured by the tariff.

U.S. producers—who are not subject to the tariff—receive the higher price (pretariff foreign price + tariff) on the imported product. Because this new price is higher than before, the domestic producers respond by producing more. Higher prices increase quantity supplied, as indicated by the law of supply. So domestic producers increase their output. They therefore enjoy both a higher price and expanded sales; this explains why domestic producers lobby for protective tariffs. But from a social point of view, the greater domestic producers to bid resources away from other, more efficient, U.S. industries.

Foreign producers are hurt by tariffs. Although the sales price of the imported good is higher, that higher amount accrues to the U.S. government as tariff revenues, not to foreign producers. The after-tariff price, or the per-unit revenue to foreign producers, remains as before, but the volume of U.S. imports (foreign exports) falls.

Government gains revenue from tariffs. This revenue is a transfer of income from consumers to government and does not represent any net change in the nation's economic well-being. The result is that government gains a portion of what consumers lose by paying more for imported goods.

Indirect Effects Tariffs have a subtle effect beyond those just mentioned. They also hurt domestic firms that use the protected goods as inputs in their production

nontariff barriers (NTBs)

All impediments other than protective tariffs that nations establish to impede imports, including import quotas, licensing requirements, unreasonable productquality standards, and unnecessary bureaucratic detail in customs procedures.

voluntary export restriction (VER)

An agreement by countries or foreign firms to limit their exports to a certain foreign nation to avoid enactment of formal trade barriers by that nation.

export subsidies

Government payments to domestic producers to enable them to reduce the price of a product to foreign buyers.

ORIGIN OF THE IDEA

process. For example, a tariff on imported steel boosts the price of steel girders, thus hurting firms that build bridges and office towers. Also, tariffs reduce competition in the protected industries. With less competition from foreign producers, domestic firms may be slow to design and implement cost-saving production methods and introduce new products.

Because foreigners sell fewer imported goods in the United States, they earn fewer dollars and so must buy fewer U.S. exports. U.S. export industries must then cut production and release resources. These are highly efficient industries, as we know from their comparative advantage and their ability to sell goods in world markets.

Tariffs directly promote the expansion of inefficient industries that do not have a comparative advantage; they also indirectly cause the contraction of relatively efficient industries that do have a comparative advantage. Put bluntly, tariffs cause resources to be shifted in the wrong direction—and that is not surprising. We know that specialization and world trade lead to more efficient use of world resources and greater world output. But protective tariffs reduce world trade. Therefore, tariffs also reduce efficiency and the world's real output.

Net Costs of Tariffs

Tariffs impose costs on domestic consumers but provide gains to domestic producers and revenue to the Federal government. The consumer costs of trade restrictions are calculated by determining the effect the restrictions have on consumer prices. Protection raises the price of a product in three ways: (1) The price of the imported product goes up; (2) the higher price of imports causes some consumers to shift their purchases to higher-priced domestically produced goods; and (3) the prices of domestically produced goods rise because import competition has declined.

Study after study finds that the costs to consumers substantially exceed the gains to producers and government. A sizable net cost or efficiency loss to society arises from trade protection. Furthermore, industries employ large amounts of economic resources to influence Congress to pass and retain protectionist laws. Because these efforts divert resources away from more socially desirable purposes, trade restrictions also impose that cost on society.

Conclusion: The gains that U.S. trade barriers produce for protected industries and their workers come at the expense of much greater losses for the entire economy. The result is economic inefficiency, reduced consumption, and lower standards of living.

So Why Government Trade Protections?

In view of the benefits of free trade, what accounts for the impulse to impede imports and boost exports through government policy? There are several reasons—some legitimate, most not.

Misunderstanding the Gains from Trade It is a commonly accepted myth that the greatest benefit to be derived from international trade is greater domestic sales and employment in the export sector. This suggests that exports are "good" because they increase domestic sales and employment, whereas imports are "bad" because they reduce domestic sales and deprive people of jobs at home. Actually, the true benefit created by international trade is the extra output obtained from abroad—the imports obtained for a lower opportunity cost than if they were produced at home.

A recent study suggests that the elimination of trade barriers since the Second World War has increased the income of the average U.S. household by at least \$7000

and perhaps by as much as \$13,000. These income gains are recurring; they happen year after year.²

Political Considerations While a nation as a whole gains from trade, trade may harm particular domestic industries and particular groups of resource suppliers. In our earlier comparative-advantage example, specialization and trade adversely affected the U.S. avocado industry and the Mexican soybean industry. Understandably, those industries might seek to preserve their economic positions by persuading their respective governments to protect them from imports—perhaps through tariffs.

Those who directly benefit from import protection are relatively few in number but have much at stake. Thus, they have a strong incentive to pursue political activity to achieve their aims. Moreover, because the costs of import protection are buried in the price of goods and spread out over millions of citizens, the cost borne by each individual citizen is quite small. However, the full cost of tariffs and quotas typically greatly exceeds the benefits. It is not uncommon to find that it costs the public \$250,000 or more a year to protect a domestic job that pays less than onefourth that amount.

In the political arena, the voice of the relatively few producers and unions demanding *protectionism* is loud and constant, whereas the voice of those footing the bill is soft or nonexistent. When political deal making is added in—"You back tariffs for the apparel industry in my state, and I'll back tariffs for the steel industry in your state"—the outcome can be a network of protective tariffs.

Buy American?

Will "buying American" make Americans better off? No, says Dallas Federal Reserve economist W. Michael Cox:

A common myth is that it is better for Americans to spend their money at home than abroad. The best way to expose the fallacy of this argument is to take it to its logical extreme. If it is better for me to spend my money here than abroad, then it is even better yet to buy in Texas than in New York, better yet to buy in Dallas than in Houston . . . in my own neighborhood . . . within my own family . . . to consume only what I can produce. Alone and poor.*

* "The Fruits of Free Trade," Federal Reserve Bank of Dallas, Annual Report 2002, p. 16.

Three Arguments for Protection

Arguments for trade protection are many and diverse. Some—such as tariffs to protect "infant industries" or to create "military self-sufficiency"—have some legitimacy. But other arguments break down under close scrutiny. Three protectionist arguments, in particular, have persisted decade after decade in the United States.

ILLUSTRATING THE IDEA

² Scott C. Bradford, Paul L.E. Grieco, and Gary C. Hufbauer, "The Payoff to America from Globalization," *The World Economy*, July 2006, pp. 893–916.

Smoot-Hawley Tariff Act

Legislation passed in 1930 that established very high U.S. tariffs designed to reduce imports and stimulate the domestic economy. Instead, the law resulted only in retaliatory tariffs by other nations and a decline in trade worldwide.

Increased Domestic Employment Argument

Arguing for a tariff to "save U.S. jobs" becomes fashionable when the economy encounters a recession or experiences slow job growth during a recovery (as in the early 2000s in the United States). In an economy that engages in international trade, exports involve spending on domestic output and imports reflect spending to obtain part of another nation's output. So, in this argument, reducing imports will divert spending on another nation's output to spending on domestic output. Thus domestic output and employment will rise. But this argument has several shortcomings.

While imports may eliminate some U.S. jobs, they create others. Imports may have eliminated the jobs of some U.S. steel and textile workers in recent years, but other workers have gained jobs unloading ships, flying imported aircraft, and selling imported electronic equipment. Import restrictions alter the composition of employment, but they may have little or no effect on the volume of employment.

The *fallacy of composition*—the false idea that what is true for the part is necessarily true for the whole—is also present in this rationale for tariffs. All nations cannot simultaneously succeed in restricting imports while maintaining their exports; what is true for one nation is not true for all nations. The exports of one nation must be the imports of another nation. To the extent that one country is able to expand its economy through an excess of exports over imports, the resulting excess of imports over exports worsens another economy's unemployment problem. It is no wonder that tariffs and import quotas meant to achieve domestic full employment are called "beggar my neighbor" policies: They achieve short-run domestic goals by making trading partners poorer.

Moreover, nations adversely affected by tariffs and quotas are likely to retaliate, causing a "trade-barrier war" that will choke off trade and make all nations worse off. The **Smoot-Hawley Tariff Act** of 1930 is a classic example. Although that act was meant to reduce imports and stimulate U.S. production, the high tariffs it authorized prompted adversely affected nations to retaliate with tariffs equally high. International trade fell, lowering the output and income of all nations. Economic historians generally agree that the Smoot-Hawley Tariff Act was a contributing cause of the Great Depression.

Finally, forcing an excess of exports over imports cannot succeed in raising domestic employment over the long run. It is through U.S. imports that foreign nations earn dollars for buying U.S. exports. In the long run a nation must import in order to export. The long-run impact of tariffs is not an increase in domestic employment but, at best, a reallocation of workers away from export industries and to protected domestic industries. This shift implies a less efficient allocation of resources.

Cheap Foreign Labor Argument

The cheap foreign labor argument says that government must shield domestic firms and workers from the ruinous competition of countries where wages are low. If protection is not provided, cheap imports will flood U.S. markets and the prices of U.S. goods—along with the wages of U.S. workers—will be pulled down. That is, the domestic living standards in the United States will be reduced.

This argument can be rebutted at several levels. The logic of the argument suggests that it is not mutually beneficial for rich and poor persons to trade with one another. However, that is not the case. A relatively low-income mechanic may fix the Mercedes owned by a wealthy lawyer, and both may benefit from the transaction. And both U.S. consumers and Chinese workers gain when they "trade" a pair of athletic shoes priced at \$30 as opposed to U.S. consumers being restricted to a similar shoe made in the U.S. for \$60.

Also, recall that gains from trade are based on comparative advantage, not on absolute advantage. Again, think back to our U.S.-Mexico (soybean-avocado) example in which the United States had greater labor productivity than Mexico in producing both soybeans and avocados. Because of that greater productivity, wages and living standards will be higher for U.S. labor. Mexico's less productive labor will receive lower wages.

The cheap foreign labor argument suggests that, to maintain American living standards, the United States should not trade with low-wage Mexico. Suppose it forgoes trade with Mexico. Will wages and living standards rise in the United States as a result? Absolutely not! To obtain avocados, the United States will have to reallocate a portion of its labor from its relatively efficient soybean industry to its relatively inefficient avocado industry. As a result, the average productivity of U.S. labor will fall, as will real wages and living standards for American workers. The labor forces of both countries will have diminished standards of living because without specialization and trade they will have less output available to them. Compare column 4 with column 1 in Table 12.4 to confirm this point.

Protection-against-Dumping Argument

The protection-against dumping argument contends that tariffs are needed to protect domestic firms from "dumping" by foreign producers. **Dumping** is the sale of a product in a foreign country at prices either below cost or below the prices commonly charged at home.

Economists cite two plausible reasons for this behavior. First, with regard to belowcost dumping, firms in country A may dump goods at below cost into country B in an attempt to drive their competitors in country B out of business. If the firms in country A succeed in driving their competitors in country B out of business, they will enjoy monopoly power and monopoly prices and profits on the goods they subsequently sell in country B. Their hope is that the longer-term monopoly profits will more than offset the losses from below-cost sales that must take place while they are attempting to drive their competitors in country B out of business.

Second, dumping that involves selling abroad at a price that is below the price commonly charged in the home country (but which is still at or above production costs) may be a form of price discrimination, which is charging different prices to different customers. As an example, a foreign seller that has a monopoly in its home market may find that it can maximize its overall profit by charging a high price in its monopolized domestic market while charging a lower price in the United States, where it must compete with U.S. producers. Curiously, it may pursue this strategy even if it makes no profit at all from its sales in the United States, where it must charge the competitive price. So why bother selling in the United States? Because the increase in overall production that comes about by exporting to the United States may allow the firm to obtain the per unit cost savings often associated with large-scale production. These cost savings imply even higher profits in the monopolized domestic market.

Because dumping is an "unfair trade practice," most nations prohibit it. For example, where dumping is shown to injure U.S. firms, the Federal government imposes tariffs called *antidumping duties* on the goods in question. But relatively few documented cases of dumping occur each year, and specific instances of unfair trade do not justify widespread, permanent tariffs. Moreover, antidumping duties can be abused. Often, what appears to be dumping is simply comparative advantage at work.

Trade Adjustment Assistance

A nation's comparative advantage in the production of a certain product is not forever fixed. As national economies evolve, the size and quality of their labor forces may change, the volume and composition of their capital stocks may shift, new technologies may develop, and even the quality of land and the quantity of natural resources may be

dumping

The sale of products in a foreign country at prices either below costs or below the prices charged at home.

Trade Adjustment Assistance Act

A U.S. law passed in 2002 that provides cash assistance, education and training benefits, health care subsidies, and wage subsidies (for persons age 50 or more) to workers displaced by imports or plant relocations abroad. altered. As these changes take place, the relative efficiency with which a nation can produce specific goods will also change. Also, new trade agreements can suddenly leave formerly protected industries highly vulnerable to major disruption or even collapse.

Shifts in patterns of comparative advantage and removal of trade protection can hurt specific groups of workers. For example, the erosion of the United States' once strong comparative advantage in steel has caused production plant shutdowns and layoffs in the U.S. steel industry. The textile and apparel industries in the United States face similar difficulties. Clearly, not everyone wins from free trade (or freer trade). Some workers lose.

The **Trade Adjustment Assistance Act** of 2002 introduced some new, novel elements to help those hurt by shifts in international trade patterns. The law provides cash assistance (beyond unemployment insurance) for up to 78 weeks for workers displaced by imports or plant relocations abroad. To obtain the assistance, workers must participate in job searches, training programs, or remedial education. There also are relocation allowances to help displaced workers move geographically to new jobs within the United States. Refundable tax credits for health insurance serve as payments to help workers maintain their insurance coverage during the retraining and job search period. Also, workers who are 50 years of age or older are eligible for "wage insurance," which replaces some of the difference in pay (if any) between their old and new jobs.

Many economists support trade adjustment assistance because it not only helps workers hurt by international trade but also helps create the political support necessary to reduce trade barriers and export subsidies.

But not all economists are keen on trade adjustment assistance. Loss of jobs from imports or plant relocations abroad is only a small fraction (about 4 percent in recent years) of total job loss in the economy each year. Many workers also lose their jobs because of changing patterns of demand, changing technology, bad management, and other dynamic aspects of a market economy. Some critics ask, "What makes losing one's job to international trade worthy of such special treatment, compared to losing one's job to, say, technological change or domestic competition?" There is no totally satisfying answer.

APPLYING THE ANALYSIS

offshoring

The practice of shifting work previously done by American workers to workers located in other nations.

Is Offshoring of Jobs Bad?

In recent years U.S. firms have found it increasingly profitable to outsource work abroad. Economists call this business activity **offshoring:** shifting work previously done by American workers to workers located in other nations. Offshoring is not a new practice but traditionally has involved components for U.S. manufacturing goods. For example, Boeing has long offshored the production of major airplane parts for its "American" aircraft.

Recent advances in computer and communications technology have enabled U.S. firms to offshore service jobs such as data entry, book composition, software coding, call-center operations, medical transcription, and claims processing to countries such as India. Where offshoring occurs, some of the value added in the production process occurs in foreign countries rather than the United States. So part of the income generated from the production of U.S. goods is paid to foreigners, not to American workers.

Offshoring is obviously costly to Americans who lose their jobs, but it is not generally bad for the economy. Offshoring simply reflects a growing international

trade in services, or, more descriptively, "tasks." That trade has been made possible by recent trade agreements and new information and communication technologies. As with trade in goods, trade in services reflects comparative advantage and is beneficial to both trading parties. Moreover, the United States has a sizable trade surplus with other nations in services. The United States gains by specializing in high-valued services such as transportation services, accounting services, legal services, and advertising services, where it still has a comparative advantage. It then "trades" to obtain lower-valued services such as call-center and data entry work, for which comparative advantage has gone abroad.

Offshoring also increases the demand for complementary jobs in the United States. Jobs that are close substitutes for existing U.S. jobs are lost, but complementary jobs in the United States are expanded. For example, the lower price of offshore maintenance of aircraft and reservation centers reduces the price of airline tickets. That means more domestic and international flights by American carriers, which in turn means more jobs for U.S.-based pilots, flight attendants, baggage handlers, and check-in personnel. Moreover, offshoring encourages domestic investment and expansion of firms in the United States by reducing their costs and keeping them competitive worldwide. Some observers equate "offshoring jobs" to "importing competitiveness."

Question:

What has enabled white-collar labor services to become the world's newest export and import commodity even though such labor itself remains in place?

Multilateral Trade Agreements and Free-Trade Zones

Being aware of the overall benefits of free trade, nations have worked to lower tariffs worldwide. Their pursuit of free trade has been aided by the growing power of free-trade interest groups: Exporters of goods and services, importers of foreign components used in "domestic" products, and domestic sellers of imported products all strongly support lower tariffs. And, in fact, tariffs have generally declined during the past half-century.

General Agreement on Tariffs and Trade

Following the Second World War, the major nations of the world set upon a general course of liberalizing trade. In 1947 some 23 nations, including the United States, signed the **General Agreement on Tariffs and Trade (GATT).** GATT was based on the principles of equal, nondiscriminatory trade treatment for all member nations and the reduction of tariffs and quotas by multilateral negotiation. Basically, GATT provided a continuing forum for the negotiation of reduced trade barriers on a multilateral basis among nations.

Since 1947, member nations have completed eight "rounds" of GATT negotiations to reduce trade barriers. The *Uruguay Round* agreement of 1993 phased in trade liberalizations between 1995 and 2005.

World Trade Organization

The Uruguay Round of 1993 established the **World Trade Organization (WTO)** as GATT's successor. In 2008, 153 nations belonged to the WTO, which oversees trade

General Agreement on Tariffs and Trade (GATT)

An international accord reached in 1947 in which 23 nations agreed to give equal and nondiscriminatory treatment to one another, to reduce tariffs through multinational negotiations, and to eliminate import quotas.

World Trade Organization (WTO)

An organization of 153 nations (as of 2008) that oversees the provisions of the current world trade agreement, resolves disputes stemming from it, and holds forums for further rounds of trade negotiations.

Doha Round

The latest, uncompleted (as of 2008) sequence of trade negotiations by members of the World Trade Organization; named after Doha, Qatar, where the set of negotiations began.

European Union (EU)

An association of 27 European nations that has eliminated tariffs and quotas among them, established common tariffs for imported goods from outside the member nations, reduced barriers to the free movement of capital, and created other common economic policies.

trade bloc

A group of nations that lower or abolish trade barriers among themselves.

euro

The common currency unit used by 15 (as of 2008) European nations in the European Union.

North American Free Trade Agreement (NAFTA)

A 1993 agreement establishing, over a 15-year period, a freetrade zone composed of Canada, Mexico, and the United States. agreements and rules on disputes relating to them. It also provides forums for further rounds of trade negotiations. The ninth and latest round of negotiations—the **Doha Round**—was launched in Doha, Qatar, in late 2001. (The trade rounds occur over several years in several geographic venues but are named after the city or country of origination.) The negotiations are aimed at further reducing tariffs and quotas, as well as agricultural subsidies that distort trade. One of this chapter's questions asks you to update the progress of the Doha Round via an Internet search.

GATT and the WTO have been positive forces in the trend toward liberalized world trade. The trade rules agreed upon by the member nations provide a strong and necessary bulwark against the protectionism called for by the special-interest groups in the various nations. For that reason and because current WTO agreements lack strong labor standards and environmental protections, the WTO is controversial.

European Union

Countries have also sought to reduce tariffs by creating regional *free-trade zones*—also called *trade blocs*. The most dramatic example is the **European Union (EU)**. In 2007, the addition of Bulgaria and Romania expanded the EU to 27 nations.³

The EU has abolished tariffs and import quotas on nearly all products traded among the participating nations and established a common system of tariffs applicable to all goods received from nations outside the EU. It has also liberalized the movement of capital and labor within the EU and has created common policies in other economic matters of joint concern, such as agriculture, transportation, and business practices. The EU is now a strong **trade bloc:** a group of countries having common identity, economic interests, and trade rules. Of the 27 EU countries, 15 used the **euro** as a common currency in 2008.

EU integration has achieved for Europe what the U.S. constitutional prohibition on tariffs by individual states has achieved for the United States: increased regional specialization, greater productivity, greater output, and faster economic growth. The free flow of goods and services has created large markets for EU industries. The resulting economies of large-scale production have enabled those industries to achieve much lower costs than they could have achieved in their small, single-nation markets.

North American Free Trade Agreement

In 1993 Canada, Mexico, and the United States formed a major trade bloc. The **North American Free Trade Agreement (NAFTA)** established a free-trade zone that has about the same combined output as the EU but encompasses a much larger geographic area. NAFTA has eliminated tariffs and other trade barriers between Canada, Mexico, and the United States for most goods and services.

Critics of NAFTA feared that it would cause a massive loss of U.S. jobs as firms moved to Mexico to take advantage of lower wages and weaker regulations on pollution and workplace safety. Also, there was concern that Japan and South Korea would build plants in Mexico and transport goods tariff-free to the United States, further hurting U.S. firms and workers.

In retrospect, critics were much too pessimistic. Since the passage of NAFTA in 1993, employment in the United States rose by more than 22 million workers and the unemployment rate fell from 6.9 percent to 4.7 percent. Increased trade between Canada, Mexico, and the United States has enhanced the standard of living in all three countries.

³ The other 25 are France, Germany, United Kingdom, Italy, Belgium, the Netherlands, Luxembourg, Denmark, Ireland, Greece, Spain, Portugal, Austria, Finland, Sweden, Poland, Hungary, Czech Republic, Slovakia, Lithuania, Latvia, Estonia, Slovenia, Malta, and Cyprus.

Not all aspects of trade blocs are positive. By giving preferences to countries within their free-trade zones, trade blocs such as the EU and NAFTA tend to reduce their members' trade with non-bloc members. Thus, the world loses some of the benefits of a completely open global trading system. Eliminating that disadvantage has been one of the motivations for liberalizing global trade through the World Trade Organization. Its liberalizations apply equally to all 153 nations that belong to the WTO.

U.S. Trade Deficits

As indicated in Figure 12.2, the United States has experienced large and persistent trade deficits over the past several years. These deficits climbed steeply between 1994 and 2000, fell slightly in the recessionary year 2001, and rose again between 2002 and 2007. In 2007 the trade deficit on goods was \$816 billion and the trade deficit on goods and services was \$709 billion. Large trade deficits are expected to continue for many years.

Causes of the Trade Deficits

There are several reasons for these large trade deficits. First, over recent years the U.S. economy has grown more rapidly than the economies of several of its major trading partners. The strong growth of U.S. income that accompanies economic growth has enabled Americans to buy more imported goods. In contrast, Japan and some European nations have either suffered recession or experienced slow income growth. So their purchases of U.S. exports have not kept pace with the growing U.S. imports. Large trade deficits with Japan and Germany have been particularly note-worthy in this regard.

Second, large trade deficits with China have emerged, reaching \$257 billion in 2007. This is even greater than the U.S. trade imbalance with Japan (\$85 billion in 2007) or OPEC countries (\$125 billion in 2007). The United States is China's largest export market, and although China has increased its imports from the United States, its standard of living has not yet increased enough for its citizens to afford large quantities of U.S. goods and services.



FIGURE 12.2 U.S. trade deficits, 1999–2007. The United States experienced large deficits in goods and in goods and services between 1999 and 2007. These deficits have steadily increased, dipping only slightly in 2001 and 2007. They are expected to continue at least throughout the current decade. Source: U.S. Census Bureau, Foreign Trade Division, www.census.gov/foreign-trade/ statistics.

Finally, a declining U.S. saving rate (=saving/total income) undoubtedly has also contributed to U.S. trade deficits. Over the last 10 years, the saving rate has diminished while the investment rate (=investment/total income) has remained stable or increased. The gap between saving and investment has been met through foreign purchases of U.S. real and financial assets. Because foreign savers are willingly financing a larger part of U.S. investment, Americans are able to save less than otherwise and consume more. Part of that added consumption spending is on imported goods. That is, the inflow of funds from abroad may be one cause of the trade deficits, not just a result of those deficits.

The U.S. recession of 2001 temporarily lowered income and reduced U.S. imports and trade deficits. But the general trend toward higher trade deficits quickly reemerged in 2002 and ballooned until 2007, when they dipped slightly (though still remaining high).

Implications of U.S. Trade Deficits

There is disagreement on whether the large trade deficits should be of major policy concern for the United States. Most economists see both benefits and costs to trade deficits but are increasingly anxious about the size of these deficits.

Increased Current Consumption At the time a trade deficit is occurring, American consumers benefit. A trade deficit means that the United States is receiving more goods and services as imports from abroad than it is sending out as exports. Taken alone, a trade deficit augments the domestic standard of living. But there is a catch: The gain in present consumption may come at the expense of reduced future consumption.

Increased U.S. Indebtedness A trade deficit is considered "unfavorable" because it must be financed by borrowing from the rest of the world, selling off assets, or dipping into foreign currency reserves. Trade deficits are financed primarily by net inpayments of foreign currencies to the United States. When U.S. exports are insufficient to finance U.S. imports, the United States increases both its debt to people abroad and the value of foreign claims against assets in the United States. Financing of the U.S. trade deficit has resulted in a larger foreign accumulation of claims against U.S. financial and real assets than the U.S. claim against foreign assets. In 2006, foreigners owned about \$2.5 trillion more of U.S. assets (corporations, land, stocks, bonds, loan notes) than U.S. citizens and institutions owned of foreign assets.

If the United States wants to regain ownership of these domestic assets, at some future time it will have to export more than it imports. At that time, domestic consumption will be lower because the United States will need to send more of its output abroad than it receives as imports. Therefore, the current consumption gains delivered by U.S. current account deficits may mean permanent debt, permanent foreign ownership, or large sacrifices of future consumption.

We say "may mean" above because the foreign lending to U.S. firms and foreign investment in the United States increase the stock of American capital. U.S. production capacity might increase more rapidly than otherwise because of a large inflow of funds to offset the trade deficits. We know that faster increases in production capacity and real GDP enhance the economy's ability to service foreign debt and buy back real capital, if that is desired.

Downward Pressure on the Dollar Finally, the large U.S. trade deficits place downward pressure on the exchange value of the U.S. dollar. The surge of

imports requires the United States to supply dollars in the currency market in order to obtain the foreign currencies required for purchasing the imported goods. That flood of dollars into the currency market causes the dollar to depreciate relative to other currencies. Between 2002 and 2008, the dollar depreciated against most other currencies, including 43 percent against the European euro, 27 percent against the British pound, 37 percent against the Canadian dollar, 15 percent against the Chinese yuan, and 25 percent against the Japanese yen. Some of this depreciation was fueled by the expansionary monetary policy (reduced real interest rates) undertaken by the Fed beginning in 2007 and carrying into 2008 (discussed in Chapter 10). Economists feared that the decline in the dollar would contribute to inflation as imports became more expensive to Americans in dollar terms. Traditionally the Fed would need to react to that inflation with a tight monetary policy that raises real interest rates in the United States. In 2008, however, the U.S. economy severely receded, largely as a result of spillover damage from the mortgage debt crisis and the decline in housing demand. The Fed chose to aggressively reduce interest rates, hoping to halt the downturn in the economy. In effect, it gambled that its actions would not ignite inflation because of the dampening effect of the severe economic recession on rising prices.

Summary

- 1. The United States leads the world in the volume of international trade, but trade is much larger as a percentage of GDP in many other nations.
- 2. Mutually advantageous specialization and trade are possible between any two nations if they have different domestic opportunity-cost ratios for any two products. By specializing on the basis of comparative advantage, nations can obtain larger real incomes with fixed amounts of resources. The terms of trade determine how this increase in world output is shared by the trading nations. Increasing costs lead to less-than-complete specialization for many tradable goods.
- 3. The foreign exchange market establishes exchange rates between currencies. Each nation's purchases from abroad create a supply of its own currency and a demand for foreign currencies. The resulting supply-demand equilibrium sets the exchange rate that links the currencies of all nations. Depreciation of a nation's currency reduces its imports and increases its exports; appreciation increases its imports and reduces its exports.
- 4. Currencies will depreciate or appreciate as a result of changes in their supply or demand, which in turn depend on changes in tastes for foreign goods, relative changes in national incomes, changes in relative price levels, changes in

interest rates, and the extent and direction of currency speculation.

- 5. Trade barriers and subsidies take the form of protective tariffs, quotas, nontariff barriers, voluntary export restrictions, and export subsidies. Protective tariffs increase the prices and reduce the quantities demanded of the affected goods. Sales by foreign exporters diminish; domestic producers, however, gain higher prices and enlarged sales. Consumer losses from trade restrictions greatly exceed producer and government gains, creating an efficiency loss to society.
- 6. Three recurring arguments for free trade—increased domestic employment, cheap foreign labor, and protection against dumping—are either fallacies or overstatements that do not hold up under careful economic analysis.
- 7. Not everyone benefits from free (or freer) trade. The Trade Adjustment Assistance Act of 2002 provides cash assistance, education and training benefits, health care subsidies, and wage subsidies (for persons 50 years old or more) to workers who are displaced by imports or plant relocations abroad. But less than 4 percent of all job losses in the United States each year result from imports, plant relocations, or the offshoring of service jobs.

- 8. In 2008 the World Trade Organization (WTO) consisted of 153 member nations. The WTO oversees trade agreements among the members, resolves disputes over the rules, and periodically meets to discuss and negotiate further trade liberalization. In 2001 the WTO initiated a new round of trade negotiations in Doha, Qatar. The Doha Round (named after its place of initiation) will continue over the next several years.
- Free-trade zones (trade blocs) liberalize trade within regions but may at the same time impede trade with non-bloc members. Two examples of free-trade arrangements are the 27member European Union (EU) and the North American

Free Trade Agreement (NAFTA), comprising Canada, Mexico, and the United States. Fifteen of the EU nations (as of 2008) have abandoned their national currencies for a common currency called the euro.

10. U.S. trade deficits have produced current increases in the livings standards of U.S. consumers. But the deficits have also increased U.S. debt to the rest of the world and increased foreign ownership of assets in the United States. This greater foreign investment in the United States, however, has undoubtedly increased U.S. production possibilities. The trade deficits also place extreme downward pressure on the international value of the U.S. dollar.

Terms and Concepts

- comparative advantage terms of trade foreign exchange market exchange rates depreciation appreciation tariffs import quotas nontariff barriers (NTBs)
- voluntary export restriction (VER) export subsidies Smoot-Hawley Tariff Act dumping Trade Adjustment Assistance Act offshoring General Agreement on Tariffs and Trade (GATT)
- World Trade Organization (WTO) Doha Round European Union (EU) trade bloc euro North American Free Trade Agreement (NAFTA)

Study Questions Connect

- 1. Quantitatively, how important is international trade to the United States relative to its importance to other nations? What country is the United States' most important trading partner, quantitatively? With what country does the United States have the largest current trade deficit? LOI
- **2.** Below are hypothetical production possibilities tables for New Zealand and Spain. Each country can produce apples and plums. **LO2**

New Zealand's Production Possibilities Table (Millions of Bushels)

	F	Production Alternatives				
Product	Α	В	С	D		
Apples	0	20	40	60		
Plums	15	10	5	0		

Spain's Production Possibilities Table (Millions of Bushels)

		Production Alternatives				
Product	R	S	т	U		
Apples	0	20	40	60		
Plums	60	40	20	0		

Referring to the tables, answer the following:

- a. What is each country's cost ratio of producing plums and apples?
- b. Which nation should specialize in which product?
- **c.** Suppose the optimal product mixes before specialization and trade are alternative B in New Zealand and alternative S in Spain and the actual terms of trade are 1 plum for 2 apples. What will be the gains from specialization and trade?

3. The following are production possibilities tables for South Korea and the United States. Assume that before specialization and trade the optimal product mix for South Korea is alternative B and for the United States is alternative U. **LO2**

	Sout	South Korea Production Possibilities				
Product	Α	в	С	D	Е	F
LCD displays (in thousands)	30	24	18	12	6	0
Chemicals (in tons)	0	6	12	18	24	30

	I	U.S. Production Possibilities				
Product	R	S	т	U	V	W
LCD displays (in thousands)	10	8	6	4	2	0
Chemicals (in tons)	0	4	8	12	16	20

- **a.** Are comparative-cost conditions such that the two areas should specialize? If so, which product should each produce?
- **b.** What is the total gain in LCD displays and chemical output that would result from such specialization?
- c. What are the limits of the terms of trade? Suppose actual terms of trade are $1\frac{1}{2}$ unit of LCD displays for units of chemicals and that 4 units of LCD displays are exchanged for 6 units of chemicals. What are the gains from specialization and trade for each nation?
- **d.** Explain why this illustration allows you to conclude that specialization according to comparative advantage results in a more efficient use of world resources.
- **4.** What effect do rising costs (rather than constant costs) have on the extent of specialization and trade? Explain. **LO2**
- 5. What is offshoring of white-collar service jobs, and how does it relate to international trade? Why has it recently increased? Why do you think more than half of all offshored jobs have gone to India? Give an example (other than that in the textbook) of how offshoring can eliminate some U.S. jobs while creating other U.S. jobs. LO2
- **6.** Explain why the U.S. demand for Mexican pesos is downward-sloping and the supply of pesos to Americans is upward-sloping. Indicate whether each of the following would cause the Mexican peso to appreciate or depreciate: **LO3**
 - **a.** The United States unilaterally reduces tariffs on Mexican products.
 - **b.** Mexico encounters severe inflation.

Web-Based Questions

At the text's Online Learning Center, **www.mcconnellbriefmicro 1e.com**, you will find a multiple-choice quiz on this chapter's content. We encourage you to take the quiz to see how you do.

- **c.** Deteriorating political relations reduce American tourism in Mexico.
- d. The U.S. economy moves into a severe recession.
- e. The United States engages in a high-interest-rate monetary policy.
- **f.** Mexican products become more fashionable to U.S. consumers.
- **g.** The Mexican government encourages U.S. firms to invest in Mexican oil fields.
- 7. Explain why you agree or disagree with the following statements: LO3
 - **a.** A country that grows faster than its major trading partners can expect the international value of its currency to depreciate.
 - **b.** A nation whose interest rate is rising more rapidly than interest rates in other nations can expect the international value of its currency to appreciate.
 - **c.** A country's currency will appreciate if its inflation rate is less than that of the rest of the world.
- 8. If the European euro were to depreciate relative to the U.S. dollar in the foreign exchange market, would it be easier or harder for the French to sell their wine in the United States? Suppose you were planning a trip to Paris. How would depreciation of the euro change the dollar cost of your trip? LO3
- 9. What measures do governments take to promote exports and restrict imports? Who benefits and who loses from protectionist policies? What is the net outcome for society? LO4
- Speculate as to why some U.S. firms strongly support trade liberalization while other U.S. firms favor protectionism. Speculate as to why some U.S. labor unions strongly support trade liberalization while other U.S. labor unions strongly oppose it. LO4
- 11. Explain: "Free-trade zones such as the EU and NAFTA lead a double life: They can promote free trade among members, but they pose serious trade obstacles for nonmembers." Do you think the net effects of trade blocs are good or bad for world trade? Why? How do the efforts of the WTO relate to these trade blocs? **LOS**
- 12. What is the WTO, and how does it affect international trade? How many nations belong to the WTO? (Update the number given in this book at www.wto.org.) Is the Doha Round (or Doha Agenda) still in progress, or has it been concluded with an agreement (again, use the WTO Website)? If the former, when and where was the latest ministerial meeting? If the latter, what are the main features of the agreement? LOS

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnellbriefmicrole.com

Also, you will find one or more Web-based questions that require information from the Internet to answer.

Glossary

ability-to-pay principle The idea that those who have greater income (or wealth) should pay a greater proportion of it as taxes than those who have less income (or wealth).

advertising A seller's activities in communicating its message about its product to potential buyers.

aggregate A collection of specific economic units treated as if they were one. For example, all prices of individual goods and services are combined into a price level, or all the units of output are aggregated into gross domestic product.

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.

antitrust laws Legislation (including the Sherman Act) that prohibits anticompetitive business activities such as price fixing, bid rigging, monopolization, and tying contracts.

appreciation (of the dollar) An increase in the value of the dollar relative to the currency of another nation, so a dollar buys a larger amount of the foreign currency and thus of foreign goods.

asset Anything of monetary value owned by a firm or individual.

average fixed cost A firm's total fixed cost divided by output (the quantity of product produced).

average product The total output produced per unit of a resource employed (total product divided by the quantity of that employed resource).

average revenue Total revenue from the sale of a product divided by the quantity of the product sold (demanded); equal to the price at which the product is sold when all units of the product are sold at the same price.

average tax rate Total tax paid divided by total (taxable) income, as a percentage.

average total cost A firm's total cost divided by output (the quantity of product produced); equal to average fixed cost plus average variable cost.

average variable cost A firm's total variable cost divided by output (the quantity of product produced).

barrier to entry Anything that artificially prevents the entry of firms into an industry.

barter The exchange of one good or service for another good or service.

benefits-received principle The idea that those who receive the benefits of goods and services provided by government should pay the taxes required to finance them. **bond** A financial device through which a borrower (a firm or government) is obligated to pay the principal and interest on a loan at a specific date in the future.

budget constraint The limit that the size of a consumer's income (and the prices that must be paid for goods and services) imposes on the ability of that consumer to obtain goods and services.

budget line A line that shows the different combinations of two products a consumer can purchase with a specific money income, given the products' prices.

business firm (See firm.)

capital Human-made resources (buildings, machinery, and equipment) used to produce goods and services; goods that do not directly satisfy human wants; also called *capital goods* and *investment goods*.

capital gain The gain realized when securities or properties are sold for a price greater than the price paid for them.

capital goods (See capital.)

capitalism An economic system in which property resources are privately owned and markets and prices are used to direct and coordinate economic activities.

capital stock The total available capital in a nation.

cartel A formal agreement among firms (or countries) in an industry to set the price of a product and establish the outputs of the individual firms (or countries) or to divide the market for the product geographically.

ceiling price (See price ceiling.)

central economic planning Government determination of the objectives of the economy and how resources will be directed to attain those goals.

ceteris paribus assumption (See other-things-equal assumption.)

change in demand A change in the quantity demanded of a good or service at every price; a shift of the demand curve to the left or right.

change in quantity demanded A change in the amount of a product that consumers are willing and able to purchase because of a change in the product's price; a movement from one point to another on a fixed demand curve.

change in quantity supplied A change in the amount of a product that producers offer for sale because of a change in the product's price.

change in supply A change in the quantity supplied of a good or service at every price; a shift of the supply curve to the left or right.

circular flow diagram The flow of resources from households to firms and of products from firms to households. These flows

are accompanied by reverse flows of money from firms to households and from households to firms.

Coase theorem The idea, first stated by economist Ronald Coase, that externality problems may be resolved through private negotiations of the affected parties.

coincidence of wants A situation in which the good or service that one trader desires to obtain is the same as that which another trader desires to give up and an item that the second trader wishes to acquire is the same as that which the first trader desires to surrender.

collusion A situation in which firms act together and in agreement (collude) to fix prices, divide a market, or otherwise restrict competition.

command system A method of organizing an economy in which property resources are publicly owned and government uses central economic planning to direct and coordinate economic activities; command economy; communism.

communism (See command system.)

comparative advantage A situation in which a person or country can produce a specific product at a lower opportunity cost than some other person or country; the basis for specialization and trade.

compensating differences Differences in the wages received by workers in different jobs to compensate for nonmonetary differences in the jobs.

competition The presence in a market of independent buyers and sellers competing with one another along with the freedom of buyers and sellers to enter and leave the market.

competitive industry's short-run supply curve The horizontal summation of the short-run supply curves of the firms in a purely competitive industry (see **pure competition**); a curve that shows the total quantities offered for sale at various prices by the firms in an industry in the short run.

competitive labor market (See purely competitive labor market.)

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

constant-cost industry An industry in which expansion by the entry of new firms has no effect on the prices firms in the industry must pay for resources and thus no effect on production costs.

constant opportunity cost An opportunity cost that remains the same for each additional unit as a consumer (or society) shifts purchases (production) from one product to another along a straight-line budget line (production possibilities curve).

constant returns to scale Unchanging average total cost of producing a product as the firm expands the size of its plan (its output) in the long run.

consumer goods Products and services that satisfy human wants directly.

consumer sovereignty Determination by consumers of the types and quantities of goods and services that will be produced

with the scarce resources of the economy; consumers' direction of production through their dollar votes.

corporate income tax A tax levied on the net income (accounting profit) of corporations.

corporation A legal entity ("person") chartered by a state or the Federal government that is distinct and separate from the individuals who own it.

cost-benefit analysis A comparison of the marginal costs of a government project or program with the marginal benefits to decide whether or not to employ resources in that project or program and to what extent.

craft union A labor union that limits its membership to workers with a particular skill (craft).

creative destruction The hypothesis that the creation of new products and production methods simultaneously destroys the market power of existing monopolies.

cross-elasticity of demand The ratio of the percentage change in *quantity demanded* of one good to the percentage change in the price of some other good. A positive coefficient indicates the two products are *substitute goods*; a negative coefficient indicates they are *complementary goods*.

decreasing-cost industry An industry in which expansion through the entry of firms lowers the prices that firms in the industry must pay for resources and therefore decreases their production costs.

demand A schedule showing the amounts of a good or service that buyers (or a buyer) wish to purchase at various prices during some time period.

demand curve A curve illustrating demand.

dependent variable A variable that changes as a consequence of a change in some other (independent) variable; the "effect" or outcome.

depreciation (of a currency) A decrease in the value of the dollar relative to another currency, so a dollar buys a smaller amount of the foreign currency and therefore of foreign goods.

derived demand The demand for a resource that depends on the demand for the products it helps to produce.

determinants of demand Factors other than price that locate the position of the demand curve.

determinants of supply Factors other than price that locate the position of the suppy curve.

differentiated oligopoly An oligopoly in which the firms produce a differentiated product.

differentiated product A product that differs physically or in some other way from the similar products produced by other firms; a product such that buyers are not indifferent to the seller when the price charged by all sellers is the same.

diminishing marginal returns (See law of diminishing returns.)

direct relationship The relationship between two variables that change in the same direction, for example, product price and quantity supplied.

discrimination The practice of according individuals or groups inferior treatment in hiring, occupational access, education and training, promotion, wage rates, or working conditions even though they have the same abilities, education, skills, and work experience as other workers.

diseconomies of scale Increases in the average total cost of producing a product as the firm expands the size of its plant (its output) in the long run.

dividends Payments by a corporation of all or part of its profit to its stockholders (the corporate owners).

division of labor The separation of the work required to produce a product into a number of different tasks that are performed by different workers; specialization of workers.

Doha Round The latest, uncompleted (as of 2008) sequence of trade negotiations by members of the World Trade Organization; named after Doha, Qatar, where the set of negotiations began.

dollar votes The "votes" that consumers and entrepreneurs cast for the production of consumer and capital goods, respectively, when they purchase those goods in product and resource markets.

dumping The sale of products in a foreign country at prices either below costs or below the prices charged at home.

durable good A consumer good with an expected life (use) of 3 or more years.

earned-income tax credit A refundable Federal tax credit for low-income working people designed to reduce poverty and encourage labor-force participation.

earnings The money income received by a worker; equal to the wage (rate) multiplied by the amount of time worked.

economic cost A payment that must be made to obtain and retain the services of a resource; the income a firm must provide to a resource supplier to attract the resource away from an alternative use; equal to the quantity of other products that cannot be produced when resources are instead used to make a particular product.

economic efficiency The use of the minimum necessary resources to obtain the socially optimal amounts of goods and services; entails both productive efficiency and allocative efficiency.

economic growth (1) An outward shift in the production possibilities curve that results from an increase in resource supplies or quality or an improvement in technology; (2) an increase of real output (gross domestic product) or real output per capita.

economic law An economic principle that has been tested and retested and has stood the test of time.

economic model A simplified picture of economic reality; an abstract generalization.

economic perspective A viewpoint that envisions individuals and institutions making rational decisions by comparing the marginal benefits and marginal costs associated with their actions.

economic policy A course of action intended to correct or avoid a problem.

economic principle A widely accepted generalization about the economic behavior of individuals or institutions.

economic problem The choices necessitated because society's economic wants for goods and services are unlimited but the resources available to satisfy these wants are limited (scarce).

economic profit The total revenue of a firm less its economic costs (which include both explicit costs and implicit costs); also called *pure profit* and *above-normal profit*.

economic resources The land, labor, capital, and entrepreneurial ability that are used in the production of goods and services; productive agents; factors of production.

economics The study of how people, institutions, and society make economic choices under conditions of scarcity.

economic system A particular set of institutional arrangements and a coordinating mechanism for solving the economizing problem; a method of organizing an economy, of which the market system and the command system are the two general types.

economic theory A statement of a cause-effect relationship; when accepted by nearly all economists, an economic principle.

economies of scale Reductions in the average total cost of producing a product as the firm expands the size of plant (its output) in the long run; the economies of mass production.

efficient allocation of resources That allocation of an economy's resources among the production of different products that leads to the maximum satisfaction of consumers' wants, thus producing the socially optimal mix of output with society's scarce resources.

elastic demand Product or resource demand whose price elasticity is greater than 1. This means the resulting change in quantity demanded is greater than the percentage change in price.

elasticity coefficient The number obtained when the percentage change in quantity demanded (or supplied) is divided by the percentage change in the price of the commodity.

elasticity formula (See price elasticity of demand.)

elasticity of labor demand A measure of the responsiveness of labor quantity to a change in the wage rate; the percentage change in labor quantity divided by the percentage change in the wage rate.

elastic supply Product or resource supply whose price elasticity is greater than 1. This means the resulting change in quantity supplied is greater than the percentage change in price.

entitlement programs Government programs such as social insurance, food stamps, Medicare, and Medicaid that guarantee particular levels of transfer payments or noncash benefits to all who fit the programs' criteria.

entrepreneurial ability The human resource that combines the other resources to produce a product, makes nonroutine decisions, innovates, and bears risks.

equality-efficiency tradeoff The decrease in economic efficiency that may accompany a decrease in income inequality; the presumption that some income inequality is required to achieve economic efficiency.

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.

equilibrium quantity (1) The quantity demanded and supplied at the equilibrium price in a competitive market; (2) the profit-maximizing output of a firm.

euro The common currency unit used by 15 European nations as of 2008 (Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovenia, and Spain).

European Union (EU) An association of 27 European nations (as of 2008) that has eliminated tariffs and quotas among them, established common tariffs for imported goods from outside the member nations, eliminated barriers to the free movement of capital, and created other common economic policies.

excess capacity Plant resources that are underused when imperfectly competitive firms produce less output than that associated with achieving minimum average total cost.

exchange rate The rate of exchange of one nation's currency for another nation's currency.

exchange-rate appreciation An increase in the value of a nation's currency in foreign exchange markets; an increase in the rate of exchange for foreign currencies.

exchange-rate depreciation A decrease in the value of a nation's currency in foreign exchange markets; a decrease in the rate of exchange for foreign currencies.

excise tax A tax levied on the production of a specific product or on the quantity of the product purchased.

exclusive unionism The practice of a labor union of restricting the supply of skilled union labor to increase the wages received by union members; the policies typically employed by a craft union.

expectations The anticipations of consumers, firms, and others about future economic conditions.

explicit cost The monetary payment a firm must make to an outsider to obtain a resource.

exports Goods and services produced in a nation and sold to buyers in other nations.

export subsidies Government payments to domestic producers to enable them to reduce the price of a good or service to foreign buyers.

external benefit A benefit obtained without compensation by third parties from the production or consumption of sellers or

buyers. Example: A beekeeper benefits when a neighboring farmer plants clover.

external cost A cost imposed without compensation on third parties by the production or consumption of sellers or buyers. Example: A manufacturer dumps toxic chemicals into a river, killing the fish sought by sport fishers.

externality A benefit or cost from production or consumption, accruing without compensation to nonbuyers and nonsellers of the product (see **external benefit** and **external cost**).

factors of production Economic resources: land, capital, labor, and entrepreneurial ability.

fallacy of composition The false idea that what is true for the individual (or part) is necessarily true for the group (or whole).

Federal government The government of the United States, as distinct from the state and local governments.

financial capital Money available to purchase capital; simply money, as defined by economists.

firm An organization that employs resources to produce a good or service for profit and owns and operates one or more plants.

fixed cost Any cost that in total does not change when the firm changes its output; the cost of fixed resources.

fixed resource Any resource whose quantity cannot be changed by a firm in the short run.

flexible prices Product prices that freely move upward or downward when product demand or supply changes.

food-stamp program A program permitting low-income persons to purchase for less than their retail value, or to obtain without cost, coupons that can be exchanged for food items at retail stores.

foreign exchange market A market in which the money (currency) of one nation can be used to purchase (can be exchanged for) the money of another nation.

foreign exchange rate (See exchange rate.)

freedom of choice The freedom of owners of property resources to employ or dispose of them as they see fit, of workers to enter any line of work for which they are qualified, and of consumers to spend their incomes in a manner that they think is appropriate.

freedom of enterprise The freedom of firms to obtain economic resources, to use those resources to produce products of the firm's own choosing, and to sell their products in markets of their choice.

free-rider problem The inability of a firm to profitably provide a good because everyone, including nonpayers, can obtain the benefit.

free trade The absence of artificial (government-imposed) barriers to trade among individuals and firms in different nations.

full employment The use of all available resources to produce want-satisfying goods and services.

gains from trade The extra output that trading partners obtain through specialization of production and exchange of goods and services.

game theory A means of analyzing the business behavior of oligopolists that uses the theory of strategy associated with games such as chess and bridge.

GDP (See gross domestic product.)

General Agreement on Tariffs and Trade (GATT) The international agreement reached in 1947 in which 23 nations agreed to give equal and nondiscriminatory treatment to one another, to reduce tariff rates by multinational negotiations, and to eliminate import quotas. It now includes most nations and has become the World Trade Organization.

Gini ratio A numerical measure of the overall dispersion of income among households, families, or individuals; found graphically by dividing the area between the diagonal line and the Lorenz curve by the entire area below the diagonal line.

government purchases Expenditures by government for goods and services that government consumes in providing public goods and for public (or social) capital that has a long lifetime; the expenditures of all governments in the economy for those final goods and services.

government transfer payment The disbursement of money (or goods and services) by government for which government receives no currently produced good or service in return.

gross domestic product (GDP) The total market value of all final goods and services produced annually within the boundaries of the United States, whether by U.S.- or foreign-supplied resources.

homogeneous oligopoly An oligopoly in which the firms produce a standardized product.

household An economic unit (of one or more persons) that provides the economy with resources and uses the income received to purchase goods and services that satisfy economic wants.

human capital The accumulation of knowledge and skills that make a worker productive.

human capital investment Any expenditure undertaken to improve the education, skills, health, or mobility of workers, with an expectation of greater productivity and thus a positive return on the investment.

hypothesis A tentative explanation of cause and effect that requires testing.

immobility The inability or unwillingness of a worker to move from one geographic area or occupation to another or from a lower-paying job to a higher-paying job.

imperfect competition Any market structure except pure competition; includes monopoly, monopolistic competition, and oligopoly.

implicit cost The monetary income a firm sacrifices when it uses a resource it owns rather than supplying the resource in the

market; equal to what the resource could have earned in the bestpaying alternative employment; includes a normal profit.

import quota A limit imposed by a nation on the quantity (or total value) of a good that may be imported during some period of time.

imports Spending by individuals, firms, and governments for goods and services produced in foreign nations.

inclusive unionism The practice of a labor union of including as members all workers employed in an industry.

income A flow of dollars (or purchasing power) per unit of time derived from the use of human or property resources.

income elasticity of demand The ratio of the percentage change in the quantity demanded of a good to a percentage change in consumer income; measures the responsiveness of consumer purchases to income changes.

income inequality The unequal distribution of an economy's total income among households or families.

income-maintenance system A group of government programs designed to eliminate poverty and reduce inequality in the distribution of income.

income mobility The extent to which income receivers move from one part of the income distribution to another over some period of time.

increase in demand An increase in the quantity demanded of a good or service at every price; a shift of the demand curve to the right.

increasing-cost industry An industry in which expansion through the entry of new firms raises the prices firms in the industry must pay for resources and therefore increases their production costs.

increasing marginal returns An increase in the marginal product of a resource as successive units of the resource are employed.

increasing returns An increase in a firm's output by a larger percentage than the percentage increase in its inputs.

increase in supply An increase in the quantity supplied of a good or service at every price; a shift of the supply curve to the right.

independent goods Products or services for which there is little or no relationship between the price of one and the demand for the other. When the price of one rises or falls, the demand for the other tends to remain constant.

independent variable The variable causing a change in some other (dependent) variable.

industrial union A labor union that accepts as members all workers employed in a particular industry (or by a particular firm).

industry A group of (one or more) firms that produce identical or similar products.

inelastic demand Product or resource demand for which the elasticity coefficient for price is less than 1. This means the result-ing percentage change in quantity demanded is less than the percentage change in price.

inelastic supply Product or resource supply for which the price elasticity coefficient is less than 1. The percentage change in quantity supplied is less than the percentage change in price.

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

information technology New and more efficient methods of delivering and receiving information through use of computers, fax machines, wireless phones, and the Internet.

infrastructure The capital goods usually provided by the public sector for the use of its citizens and firms (for example, highways, bridges, transit systems, wastewater treatment facilities, municipal water systems, and airports).

in-kind transfer The distribution by government of goods and services to individuals for which the government receives no currently produced good or service in return; a government transfer payment made in goods or services rather than in money; also called *noncash transfer*.

interest The payment made for the use of money (of borrowed funds).

interest rate The annual rate at which interest is paid; a percentage of the borrowed amount.

inventories Goods that have been produced but remain unsold.

inverse relationship The relationship between two variables that change in opposite directions, for example, product price and quantity demanded.

investment Spending for the production and accumulation of capital and additions to inventories.

investment goods (See capital.)

investment in human capital (See human capital investment.)

"invisible hand" The tendency of firms and resource suppliers that seek to further their own self-interests in competitive markets to also promote the interest of society.

kinked-demand curve The demand curve for a noncollusive oligopolist, which is based on the assumption that rivals will match a price decrease and will ignore a price increase.

labor People's physical and mental talents and efforts that are used to help produce goods and services.

labor productivity Total output divided by the quantity of labor employed to produce it; the average product of labor or output per hour of work.

labor union A group of workers organized to advance the interests of the group (to increase wages, shorten the hours worked, improve working conditions, and so on).

land Natural resources ("free gifts of nature") used to produce goods and services.

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.

law of 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.

law of diminishing returns The principle that as successive increments of a variable resource are added to a fixed resource, the marginal product of the variable resource will eventually decrease.

law of increasing opportunity costs The principle that as the production of a good increases, the opportunity cost of producing an additional unit rises.

law of supply The principle that, other things equal, as price rises, the quantity supplied rises, and as price falls, the quantity supplied falls.

learning by doing Achieving greater productivity and lower average total cost through gains in knowledge and skill that accompany repetition of a task; a source of economies of scale.

liability A debt with a monetary value; an amount owed by a firm or an individual.

limited liability Restriction of the maximum loss to a predetermined amount for the owners (stockholders) of a corporation. The maximum loss is the amount they paid for their shares of stock.

long run In microeconomics, a period of time long enough to enable producers of a product to change the quantities of all the resources they employ; period in which all resources and costs are variable and no resources or costs are fixed.

long-run competitive equilibrium The price at which firms in pure competition neither obtain economic profit nor suffer losses in the long run and the total quantity demanded and supplied are equal; a price equal to the minimum long-run average total cost of producing the product.

long-run supply A schedule or curve showing the prices at which a purely competitive industry will make various quantities of the product available in the long run.

long-run supply curve A curve showing the prices at which a purely competitive industry will make various quantities of the product available in the long run.

Lorenz curve A curve showing the distribution of income in an economy. The cumulated percentage of families (income receivers) is measured along the horizontal axis, and cumulated percentage of income is measured along the vertical axis.

macroeconomics The part of economics concerned with the economy as a whole; with such major aggregates as the house-hold, business, and government sectors; and with measures of the total economy.

marginal analysis The comparison of marginal ("extra" or "additional") benefits and marginal costs, usually for decision making.

marginal benefit The extra (additional) benefit of consuming 1 more unit of some good or service; the change in total benefit when 1 more unit is consumed.

marginal cost The extra (additional) cost of producing 1 more unit of output; equal to the change in total cost divided by the change in output (and, in the short run, to the change in total variable cost divided by the change in output).

marginal product The additional output produced when 1 additional unit of a resource is employed (the quantity of all other resources employed remaining constant); equal to the change in total product divided by the change in the quantity of a resource employed.

marginal resource cost The amount the total cost of employing a resource increases when a firm employs 1 additional unit of the resource (the quantity of all other resources employed remaining constant); equal to the change in the total cost of the resource divided by the change in the quantity of the resource employed.

marginal revenue The change in total revenue that results from the sale of 1 additional unit of a firm's product; equal to the change in total revenue divided by the change in the quantity of the product sold.

marginal revenue product The change in a firm's total revenue when it employs 1 additional unit of a resource (the quantity of all other resources employed remaining constant); equal to the change in total revenue divided by the change in the quantity of the resource employed.

marginal tax rate The tax rate paid on an additional dollar of income.

marginal utility The extra utility a consumer obtains from the consumption of 1 additional unit of a good or service; equal to the change in total utility divided by the change in the quantity consumed.

market Any institution or mechanism that brings together buyers (demanders) and sellers (suppliers) of a particular good or service.

market economy An economy in which only the private decisions of consumers, resource suppliers, and firms determine how resources are allocated; the market system.

market failure The inability of a market to bring about the allocation of resources that best satisfies the wants of society; in particular, the overallocation or underallocation of resources to the production of a particular good or service because of spillovers or informational problems or because markets do not provide desired public goods.

market for externality rights A market in which firms can buy rights to discharge pollutants. The price of such rights is determined by the demand for the right to discharge pollutants and a perfectly inelastic supply of such rights (the latter determined by the quantity of discharges that the environment can assimilate).

market period A period in which producers of a product are unable to change the quantity produced in response to a change in its price and in which there is a perfectly inelastic supply.

market system All the product and resource markets of a market economy and the relationships among them; a method that allows the prices determined in those markets to allocate the economy's scarce resources and to communicate and coordinate the decisions made by consumers, firms, and resource suppliers.

Medicaid A Federal program that helps finance the medical expenses of individuals covered by the Supplemental Security Income (SSI) and Temporary Assistance for Needy Families (TANF) programs.

Medicare A Federal program that is financed by payroll taxes and provides for (1) compulsory hospital insurance for senior citizens, (2) low-cost voluntary insurance to help older Americans pay physicians' fees, and (3) subsidized insurance to buy prescription drugs.

microeconomics The part of economics concerned with such individual units as a household, a firm, or an industry and with individual markets, specific goods and services, and product and resource prices.

minimum efficient scale The lowest level of output at which a firm can minimize long-run average total cost.

minimum wage The lowest wage employers may legally pay for an hour of work.

money Any item that is generally acceptable to sellers in exchange for goods and services.

monopolistic competition A market structure in which many firms sell a differentiated product, into which entry is relatively easy, in which the firm has some control over its product price, and in which there is considerable nonprice competition.

monopoly A market structure in which the number of sellers is so small that each seller is able to influence the total supply and the price of the good or service. (Also see **pure monopoly.**)

monopsony A market structure in which only a single buyer of a good, service, or resource is present.

MR = MC rule The principle that a firm will maximize its profit (or minimize its losses) by producing the output at which marginal revenue and marginal cost are equal, provided product price is equal to or greater than average variable cost.

MRP = MRC rule The principle that to maximize profit (or minimize losses), a firm should employ the quantity of a resource at which its marginal revenue product (MRP) is equal to its marginal resource cost (MRC), the latter being the wage rate in pure competition.

mutual interdependence A situation in which a change in price strategy (or in some other strategy) by one firm will affect the sales and profits of another firm (or other firms). Any firm that makes such a change can expect the other rivals to react to the change.

natural monopoly An industry in which economies of scale are so great that a single firm can produce the product at a lower average total cost than would be possible if more than one firm produced the product.

negative externalities A cost imposed without compensation on third parties by the production or consumption of sellers or buyers. Example: A manufacturer dumps toxic chemicals into a river, killing the fish sought by sports fishers; an external cost or a spillover cost.

negative relationship (See inverse relationship.)

net exports Exports minus imports.

net taxes The taxes collected by government less government transfer payments.

network effects Increases in the value of a product to each user, including existing users, as the total number of users rises.

net worth The total assets less the total liabilities of a firm or an individual; for a firm, the claims of the owners against the firm's total assets; for an individual, his or her wealth.

noncash transfer A government transfer payment in the form of goods and services rather than money, for example, food stamps, housing assistance, and job training; also called *in-kind transfer*.

noncollusive oligopoly An oligopoly in which the firms do not act together and in agreement to determine the price of the product and the output that each firm will produce.

noncompeting groups Collections of workers in the economy who do not compete with each other for employment because the skill and training of the workers in one group are substantially different from those of the workers in other groups.

nondurable good A consumer good with an expected life (use) of less than 3 years.

nonexcludability The inability to keep nonpayers (free riders) from obtaining benefits from a certain good; a public goods characteristic.

nonprice competition Competition based on distinguishing one's product by means of product differentiation and then advertising the distinguished product to consumers.

nonrivalry The idea that one person's benefit from a certain good does not reduce the benefit available to others; a public goods characteristic.

nontariff barriers All barriers other than protective tariffs that nations erect to impede international trade, including import quotas, licensing requirements, unreasonable product-quality standards, and unnecessary bureaucratic detail in customs procedures.

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

normal profit The payment made by a firm to obtain and retain entrepreneurial ability; the minimum income entrepreneurial ability must receive to induce it to perform entrepreneurial functions for a firm.

North American Free Trade Agreement (NAFTA) A 1993 agreement establishing, over a 15-year period, a free-trade zone composed of Canada, Mexico, and the United States.

occupational licensing State and local laws that require a worker to satisfy certain specific requirements and obtain a license from a licensing board before engaging in a particular occupation.

offshoring The practice of shifting work previously done by American workers to workers located abroad.

oligopoly A market structure in which a few firms sell either a standardized or a differentiated product, into which entry is difficult, in which the firm has limited control over product price because of mutual interdependence (except when there is collusion among firms), and in which there is typically nonprice competition.

OPEC (See Organization of Petroleum Exporting Countries.)

opportunity cost The value of the good, service, or time forgone to obtain something else.

Organization of Petroleum Exporting Countries (OPEC) A cartel of oil-producing countries (Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, Venezuela, and the UAE) that attempts to control the quantity and price of crude oil exported by its members and that accounts for 60 percent of the world's export of oil.

other-things-equal assumption The assumption that factors other than those being considered are held constant; *ceteris paribus* assumption.

output effect An increase in the use of labor that occurs when a decline in the price of capital reduces a firm's production costs and therefore enables it to sell more output.

partnership An unincorporated firm owned and operated by two or more persons.

patent An exclusive right given to inventors to produce and sell a new product or machine for 20 years from the time of patent application.

payroll tax A tax levied on employers of labor equal to a percentage of all or part of the wages and salaries paid by them and on employees equal to a percentage of all or part of the wages and salaries received by them.

P = MC rule The principle that a purely competitive firm will maximize its profit or minimize its loss by producing that output at which the price of the product is equal to marginal cost, provided that price is equal to or greater than average variable cost in the short run and equal-to or greater than average total cost in the long run.

per capita GDP Gross domestic product (GDP) per person; the average GDP of a population.

per capita income A nation's total income per person; the average income of a population.

perfectly elastic demand Product or resource demand in which quantity demanded can be of any amount at a particular product price; graphs as a horizontal demand curve.

perfectly elastic supply Product or resource supply in which quantity supplied can be of any amount at a particular product or resource price; graphs as a horizontal supply curve.

perfectly inelastic demand Product or resource demand in which price can be of any amount at a particular quantity of the product or resource demanded; quantity demanded does not respond to a change in price; graphs as a vertical demand curve.

perfectly inelastic supply Product or resource supply in which price can be of any amount at a particular quantity of the product or resource demanded; quantity supplied does not respond to a change in price; graphs as a vertical supply curve.

per se violations Collusive actions, such as attempts to fix prices or divide markets, that are violations of the antitrust laws, even if the actions are unsuccessful.

personal income tax A tax levied on the taxable income of individuals, households, and unincorporated firms.

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

positive relationship A direct relationship between two variables.

poverty A situation in which the basic needs of an individual or family exceed the means to satisfy them.

poverty rate The percentage of the population with incomes below the official poverty income levels that are established by the Federal government.

price The amount of money needed to buy a particular good, service, or resource.

price ceiling A legally established maximum price for a good or service.

price discrimination The selling of a product to different buyers at different prices when the price differences are not justified by differences in cost.

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.

price elasticity of supply The ratio of the percentage change in quantity supplied of a product or resource to the percentage change in its price; a measure of the responsiveness of producers to a change in the price of a product or resource.

price fixing The conspiring by two or more firms to set the price of their products; an illegal practice under the Sherman Act.

price floor A legally determined price above the equilibrium price.

price leadership An informal method that firms in an oligopoly may employ to set the price of their product: One firm (the leader) is the first to announce a change in price, and the other firms (the followers) soon announce identical or similar changes.

price maker A seller (or buyer) that is able to affect the product or resource price by changing the amount it sells (or buys). **price support** A minimum price that government allows sellers to receive for a good or service; a legally established or maintained minimum price.

price taker A seller (or buyer) that is unable to affect the price at which a product or resource sells by changing the amount it sells (or buys).

price war Successive and continued decreases in the prices charged by firms in an oligopolistic industry. Each firm lowers its price below rivals' prices, hoping to increase its sales and revenues at its rivals' expense.

principal-agent problem A conflict of interest that occurs when agents (workers or managers) pursue their own objectives to the detriment of the principals' (stockholders') goals.

principles Statements about economic behavior that enable predictions of the probably effects of certain actions.

private good A good or service that is individually consumed and that can be profitably provided by privately owned firms because they can exclude nonpayers from receiving the benefits.

private property The right of private persons and firms to obtain, own, control, employ, dispose of, and bequeath land, capital, and other property.

private sector The households and business firms of the economy.

product differentiation A strategy in which one firm's product is distinguished from competing products by means of its design, related services, quality, location, or other attributes (except price).

production possibilities curve A curve showing the different combinations of two goods or services that can be produced in a full-employment, full-production economy where the available supplies of resources and technology are fixed.

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.

productivity A measure of average output or real output per unit of input. For example, the productivity of labor is determined by dividing real output by hours of work.

product market A market in which products are sold by firms and bought by households.

profit The return to the resource entrepreneurial ability (see **normal profit**); total revenue minus total cost (see **economic profit**).

progressive tax A tax whose average tax rate increases as the taxpayer's income increases and decreases as the taxpayer's income decreases.

property tax A tax on the value of property (capital, land, stocks and bonds, and other assets) owned by firms and households.

proportional tax A tax whose average tax rate remains constant as the taxpayer's income increases or decreases.

proprietor's income The net income of the owners of unincorporated firms (proprietorships and partnerships).

protective tariff A tariff designed to shield domestic producers of a good or service from the competition of foreign producers.

public assistance programs Government programs that pay benefits to those who are unable to earn income (because of permanent disabilities or because they have very low income and dependent children); financed by general tax revenues and viewed as public charity (rather than earned rights).

public good A good or service that is characterized by nonrivalry and nonexcludability; a good or service with these characteristics provided by government.

public investments Government expenditures on public capital (such as roads, highways, bridges, mass-transit systems, and electric power facilities) and on human capital (such as education, training, and health).

public sector The part of the economy that contains all government entities; government.

pure competition A market structure in which a very large number of firms sell a standardized product, into which entry is very easy, in which the individual seller has no control over the product price, and in which there is no nonprice competition; a market characterized by a very large number of buyers and sellers.

purely competitive labor market A labor market in which a large number of similarly qualified workers independently offer their labor services to a large number of employers, none of whom can set the wage rate.

pure monopoly A market structure in which one firm sells a unique product, into which entry is blocked, in which the single firm has considerable control over product price, and in which nonprice competition may or may not be found.

quantity demanded The amount of a good or service that buyers (or a buyer) desire to purchase at a particular price during some period.

quantity supplied The amount of a good or service that producers (or a producer) offer to sell at a particular price during some period.

quasi-public good A good or service to which excludability could apply but that has such a large spillover benefit that government sponsors its production to prevent an underallocation of resources.

rational behavior Human behavior based on comparison of marginal costs and marginal benefits; behavior designed to maximize total utility.

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

regressive tax A tax whose average tax rate decreases as the taxpayer's income increases and increases as the taxpayer's income decreases.

rent-seeking behavior The actions by persons, firms, or unions to gain special benefits from government at the taxpayers' or someone else's expense.

resource A natural, human, or manufactured item that helps produce goods and services; a productive agent or factor of production.

resource market A market in which households sell and firms buy resources or the services of resources.

rule of reason The rule stated and applied in the U.S. Steel case that only combinations and contracts unreasonably restraining trade are subject to actions under the antitrust laws and that size and possession of monopoly power are not illegal.

sales tax A tax levied on the cost (at retail) of a broad group of products.

scarce resources The limited quantities of land, capital, labor, and entrepreneurial ability that are never sufficient to satisfy people's virtually unlimited economic wants.

scientific method The procedure for the systematic pursuit of knowledge involving the observation of facts and the formulation and testing of hypotheses to obtain theories, principles, and laws.

self-interest The most-advantageous outcome as viewed by each firm, property owner, worker, or consumer.

service An (intangible) act or use for which a consumer, firm, or government is willing to pay.

Sherman Act The Federal antitrust act of 1890 that makes monopoly and conspiracies to restrain trade criminal offenses.

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

short run In microeconomics, a period of time in which producers are able to change the quantities of some but not all of the resources they employ; a period in which some resources (usually plant) are fixed and some are variable.

short-run competitive equilibrium The price at which the total quantity of a product supplied in the short run in a purely competitive industry equals the total quantity of the product demanded and that is equal to or greater than average variable cost.

short-run supply curve A supply curve that shows the quantity of a product a firm in a purely competitive industry will offer to sell at various prices in the short run; the portion of the firm's short-run marginal cost curve that lies above its average-variable-cost curve.

shutdown case The circumstance in which a firm would experience a loss greater than its total fixed cost if it were to produce any output greater than zero; alternatively, a situation in which a firm would cease to operate when the price at which it can sell its product is less than its average variable cost.

simultaneous consumption A product's ability to satisfy a large number of consumers at the same time.

slope of a line The ratio of the vertical change (the rise or fall) to the horizontal change (the run) between any two points on a line. The slope of an upward-sloping line is positive, reflecting a direct relationship between two variables; the slope of a downward-sloping line is negative, reflecting an inverse relationship between two variables.

Smoot-Hawley Tariff Act Legislation passed in 1930 that established very high tariffs. Its objective was to reduce imports and stimulate the domestic economy, but it resulted only in retaliatory tariffs by other nations.

social insurance programs Programs that replace a portion of the earnings lost when people retire or are temporarily unemployed, that are financed by payroll taxes, and that are viewed as earned rights (rather than charity).

Social Security The Federal program, financed by compulsory payroll taxes, that partially replaces earnings lost when workers retire, become disabled, or die.

Social Security trust fund A Federal fund that saves excessive Social Security tax revenues received in one year to meet Social Security benefit obligations that exceed Social Security tax revenues in some subsequent year.

sole proprietorship An unincorporated firm owned and operated by one person.

special-interest effect Any result of government promotion of the interests (goals) of a small group at the expense of a much larger group.

specialization The use of the resources of an individual, a firm, a region, or a nation to concentrate production on one or a small number of goods and services.

speculation The activity of buying or selling with the motive of later reselling or rebuying for profit.

SSI (See Supplemental Security Income.)

standardized product A product whose buyers are indifferent to the seller from whom they purchase it as long as the price charged by all sellers is the same; a product all units of which are identical and thus are perfect substitutes for each other.

Standard Oil case A 1911 antitrust case in which Standard Oil was found guilty of violating the Sherman Act by illegally monopolizing the petroleum industry. As a remedy the company was divided into several competing firms.

start-up (firm) A new firm focused on creating and introducing a particular new product or employing a specific new production or distribution method.

stock (corporate) An ownership share in a corporation.

strategic behavior Self-interested economic actions that take into account the expected reactions of others.

strike The withholding of labor services by an organized group of workers (a labor union).

subsidy A payment of funds (or goods and services) by a government, firm, or household for which it receives no good or service in return. When made by a government, it is a government transfer payment. **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.

substitution effect The effect of a change in the price of a resource on the quantity of the resource employed by a firm, assuming no change in its output.

sunk cost A cost that has been incurred and cannot be recovered.

Supplemental Security Income (SSI) A federally financed and administered program that provides a uniform nationwide minimum income for the aged, blind, and disabled who do not qualify for benefits under Social Security in the United States.

supply A schedule showing the amounts of a good or service that sellers (or a seller) will offer at various prices during some period.

supply curve A curve illustrating the direct relationship between the price of a product and the quantity of it supplied, other things equal.

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

tacit collusion Any method used by an oligopolist to set prices and outputs that does not involve outright (or overt) collusion. Price leadership is a frequent example.

TANF (See Temporary Assistance for Needy Families.)

tariff A tax imposed by a nation on an imported good.

tax An involuntary payment of money (or goods and services) to a government by a household or firm for which the household or firm receives no good or service directly in return.

tax incidence The person or group that ends up paying a tax.

technological advance New and better goods and services and new and better ways of producing or distributing them.

technology The body of knowledge and techniques that can be used to combine economic resources to produce goods and services.

Temporary Assistance for Needy Families (TANF) A stateadministered and partly federally funded program in the United States that provides financial aid to poor families; the basic welfare program for low-income families in the United States; contains time limits and work requirements.

terms of trade The rate at which units of one product can be exchanged for units of another product; the price of a good or service; the amount of one good or service that must be given up to obtain 1-unit of another good or service.

total cost The sum of fixed cost and variable cost.

total product The total output of a particular good or service produced by a firm (or a group of firms or the entire economy).

total revenue The total number of dollars received by a firm (or firms) from the sale of a product; equal to the total expenditures

for the product produced by the firm (or firms); equal to the quantity sold (demanded) multiplied by the price at which it is sold.

total-revenue test A test to determine elasticity of demand between any two prices: Demand is elastic if total revenue moves in the opposite direction from price; it is inelastic when it moves in the same direction as price; and it is of unitary elasticity when it does not change when price changes.

total utility The total amount of satisfaction derived from the consumption of a single product or a combination of products.

Trade Adjustment Assistance Act A U.S. law passed in 2002 that provides cash assistance, education and training benefits, health care subsidies, and wage subsidies (for persons age 50 or more) to workers displaced by imports or plant relocations.

trade balance The export of goods (or goods and services) of a nation less its imports of goods (or goods and services).

trade bloc A group of nations that lower or abolish trade barriers among members. Examples include the European Union and the nations of the North American Free Trade Agreement.

trade deficit The amount by which a nation's imports of goods (or goods and services) exceed its exports of goods (or goods and services).

trademark A legal protection that gives the originators of a product an exclusive right to use the brand name.

trade-off The sacrifice of some or all of one economic goal, good, or service to achieve some other goal, good, or service.

trade surplus The amount by which a nation's exports of goods (or goods and services) exceed its imports of goods (or goods and services).

transfer payment A payment of money (or goods and services) by a government to a household or firm for which the payer receives no good or service directly in return.

unemployment The failure to use all available economic resources to produce desired goods and services; the failure of the economy to fully employ its labor force.

unemployment compensation (See unemployment insurance.)

unemployment insurance The social insurance program that in the United States is financed by state payroll taxes on employers and makes income available to workers who become unemployed and are unable to find jobs.

unit elasticity Demand or supply for which the elasticity coefficient is equal to 1; means that the percentage change in the quantity demanded or supplied is equal to the percentage change in price.

unlimited wants The insatiable desire of consumers for goods and services that will give them satisfaction or utility.

U.S. Steel case The antitrust action brought by the Federal government against the U.S. Steel Corporation in which the courts ruled (in 1920) that only unreasonable restraints of trade were illegal and that size and the possession of monopoly power were not violations of the antitrust laws.

usury laws State laws that specify the maximum legal interest rate at which loans can be made.

utility The want-satisfying power of a good or service; the satisfaction or pleasure a consumer obtains from the consumption of a good or service (or from the consumption of a collection of goods and services).

utility-maximizing rule The principle that to obtain the greatest utility, the consumer should allocate money income so that the last dollar spent on each good or service yields the same marginal utility.

variable cost A cost that in total increases when the firm increases its output and decreases when the firm reduces its output.

vertical integration A group of plants engaged in different stages of the production of a final product and owned by a single firm.

voluntary export restrictions Voluntary limitations by countries or firms of their exports to a particular foreign nation to avoid enactment of formal trade barriers by that nation.

wage (or wage rate) The price paid for the use or services of labor per unit of time (per hour, per day, and so on).

wage differential The difference between the wage received by one worker or group of workers and that received by another worker or group of workers.

wealth Anything that has value because it produces income or could produce income. Wealth is a stock; income is a flow. Assets less liabilities; net worth.

World Trade Organization (WTO) An organization of 153 nations (as of 2008) that oversees the provisions of the current world trade agreement, resolves trade disputes stemming from it, and holds forums for further rounds of trade negotiations.

X-inefficiency The production of output, whatever its level, at higher than the lowest average (and total) cost.

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