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microeconomics

micro

brief edition

Microeconomics
B R I E F   E D I T I O N

Third Edition

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McGraw Hill Education

THE MCGRAW-HILL SERIES ECONOMICS

THE SEVEN VERSIONS OF MCCONNELL, BRUE, FLYNN

Chapter	Economics	Economics: Brief Edition	Microeconomics	Microeconomics: Brief Edition	Macroeconomics	Macroeconomics: Brief Edition	Essentials of Economics
1. Limits, Alternatives, and Choices	x	x	x	x	x	x	x
2. The Market System and the Circular Flow	x	x	x	x	x	x	x
3. Demand, Supply, and Market Equilibrium	x	x	x	x	x	x	x
4. Market Failures: Public Goods and Externalities	x	x	x	x	x	x	x
5. Government's Role and Government Failure	x	x	x	x	x	x	x
6. Elasticity	x	x	x	x			x
7. Utility Maximization	x	x	x	x			x
8. Behavioral Economics	x	x	x	x			
9. Businesses and the Costs of Production	x	x	x	x			x
10. Pure Competition in the Short Run	x	x	x	x			x
11. Pure Competition in the Long Run	x	x	x	x			x
12. Pure Monopoly	x	x	x	x			x
13. Monopolistic Competition	x	x	x	x			x
14. Oligopoly and Strategic Behavior	x	x	x	x			x
15. Technology, R&D, and Efficiency	x		x				
16. The Demand for Resources	x		x				
17. Wage Determination	x	x	x	x			
18. Rent, Interest, and Profit	x		x				
19. Natural Resource and Energy Economics	x		x				
20. Public Finance: Expenditures and Taxes	x	x	x	x			
21. Antitrust Policy and Regulation	x		x				x
22. Agriculture: Economics and Policy	x		x				
23. Income Inequality, Poverty, and Discrimination	x	x	x	x			
24. Health Care	x				x		
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30. Basic Macroeconomic Relationships	x				x		x
31. The Aggregate Expenditures Model	x				x		x
32. Aggregate Demand and Aggregate Supply	x	x			x	x	x
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36. Interest Rates and Monetary Policy	x	x			x	x	
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38. Extending the Analysis of Aggregate Supply	x	x	x		x	x	x
39. Current Issues in Macro Theory and Policy	x		x		x		
40. International Trade	x	x		x	x	x	x
41. The Balance of Payments, Exchange Rates, and Trade Deficits	x	x	x	x	x	x	x
42. The Economics of Developing Countries	x				x		

*Chapter numbers refer to *Economics: Principles, Problems, and Policies*.
*A Red "X" indicates chapters that combine or consolidate content from two or more *Economics* chapters.

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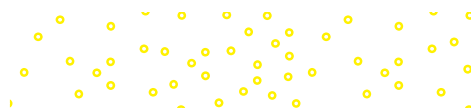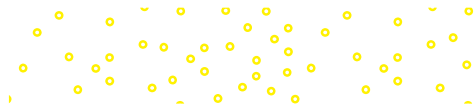
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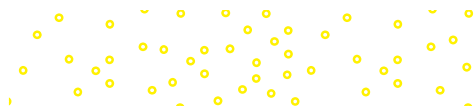
ABOUT THE AUTHORS

CAMPBELL R. MCCONNELL earned his PhD 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 also coauthor of *Contemporary Labor Economics,* eleventh edition, and *Essentials of Economics,* third edition, and has edited readers for the principles and labor economics courses. He is a recipient of both the University of Nebraska Distinguished Teaching Award and the James A. Lake Academic Freedom Award and is past president of the Midwest Economics Association. Professor McConnell was awarded an honorary Doctor of Laws degree from Cornell College in 1973 and received its Distinguished Achievement Award in 1994. His primary areas of interest are labor economics and economic education. He has an extensive collection of jazz recordings and enjoys reading jazz history.

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microeconomics

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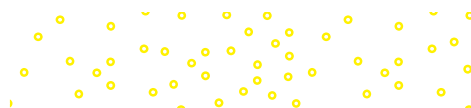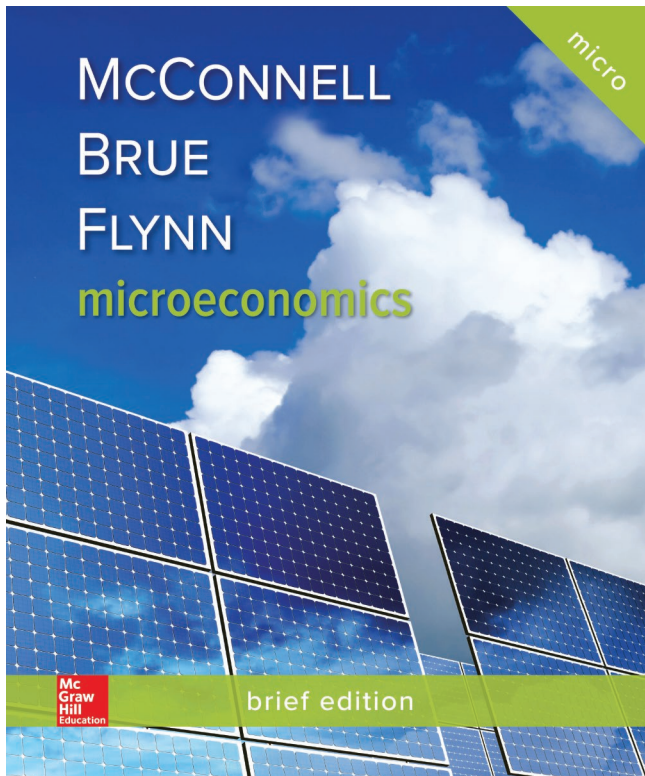
brief edition

Welcome to *Economics: Brief Edition,* third edition, the trimmed and edited version of *Economics,* twenty-first edition, the nation's best-selling economics textbook.

Fundamental Objectives

We have three main goals for *Economics: 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 *Economics: Brief Edition* is a spin-off of *Economics,* twenty-first edition, it is not a cut-and-paste book that simply eliminates several chapters of *Economics* 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 economics textbook that is distinct in purpose, style, and coverage from *Economics* and its Micro and Macro splits.

What's New and Improved?

One of the benefits of writing a successful text is the opportunity to revise—to delete the outdated and install the new, to rewrite misleading or ambiguous statements, to introduce more relevant illustrations, to improve the organizational structure, and to enhance the learning aids.

We trust that you will agree that we have used this opportunity wisely and fully. Some of the more significant changes include the following:

New Behavioral Economics Chapter

Placed at the end of the text for those instructors who want to supplement the primary material, this chapter on behavioral economics provides insights for those students wrestling with some of the standard assumptions and conclusions of traditional economics. Topics covered include time inconsistency, myopia, decision-making heuristics, framing effects, mental accounting, loss aversion, the endowment effect, and reciprocity. The discussion is couched in terms of consumer decision making and includes numerous concrete examples to bring the material home for students.

We have also striven to make clear to students the ways in which behavioral economics builds upon and augments the insights of traditional neoclassical economics. Thus the chapter opens with a section comparing and contrasting behavioral economics and neoclassical economics so that students will be able to see how both can be used in tandem to help understand and predict human choice behavior.

Updated End-of-Chapter Questions and Problems

We have updated the end-of-chapter questions, adding new problems to reflect revised and enhanced content. The questions are analytic and often ask for free responses, whereas the problems are mainly quantitative. We have aligned the questions and problems with the learning objectives presented at the beginning of the chapters. All of the questions and problems are assignable through McGraw Hill's *Connect,*

and many contain additional algorithmic variations and can be automatically graded within the system.

Chapter-by-Chapter Changes

In addition to the changes and new features listed above, chapter-specific revisions include:

Chapter 1: Limits, Alternatives, and Choices features updated examples of opportunity cost, and the **Chapter One Appendix: Graphs and Their Meaning** has been converted from Web-Only content into the main product.

Chapter 2: The Market System and the Circular Flow includes several updates, including the example of consumer sovereignty, business and household sector data in the United States, and global data.

Chapter 3: Demand, Supply, and Market Equilibrium provides a new "Applying the Analysis" piece on Uber and dynamic pricing. The **Chapter Three Appendix: Additional Examples of Supply and Demand** has been converted from Web-Only content and relocated into the main product.

Chapter 5: Market Failures: Public Goods and Externalities features updated information on the U.S. tax structure. Taxes to correct negative externalities are now referred to as "Pigovian taxes" (versus "specific taxes" in previous editions).

Chapter 8: Pure Monopoly presents a new "Applying the Analysis" on monopoly power in the Internet age, replacing the De Beers diamond monopoly example.

Chapter 9: Monopolistic Competition and Oligopoly includes a new "Applying the Analysis" piece on Internet oligopolies, replacing the example of oligopoly in the beer industry.

Chapter 10: Wage Determination features revised discussion and updated data on occupational employment trends, wage differentials, and the minimum wage.

Chapter 11: Income Inequality and Poverty contains improved discussion and significant updates to the data on the distribution of income, poverty, and income-maintenance programs.

Chapter 12: Public Finance: Expenditures and Taxes contains significant data updates, including those resulting from the "Tax Cuts and Jobs Act" that went into effect in January 2018.

Chapter 13: International Trade and Exchange Rates includes updated material on recent U.S. trade deficits and a revised discussion related to Fed policy and changes in the relative value of the U.S. dollar.

Chapter 14: Behavioral Economics is a new chapter to this edition that incorporates a scientific understanding of decision making into the study of economics.

Distinguishing Features

Economics: Brief Edition includes several features that encourage students to read and retain the content.

Design and Pedagogy

The *Brief Edition* incorporates a single-column design with a host of pedagogical aids, including chapter learning objectives, definitions in the margins, combined tables and graphs, complete chapter summaries, lists of key terms, carefully constructed study questions, connections to our website, appendixes on graphs and additional examples of demand and supply, an extensive glossary, and historical statistics.

Focus on Core Models

Economics: 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 the one-semester course, but cutting explanations of the truly *essential* 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 Mark Zuckerberg, Taylor Swift, and Jennifer Lawrence illustrates the importance of opportunity costs in decision making. Art in the public square brings clarity to public goods and the free-rider problem. A pizza analogy walks students through the equity-efficiency trade-off, and a discussion of credit cards helps explain what money is and is not. 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. Differences in elasticity of supply are contrasted by the changing prices of antiques versus reproductions. The book describes the principal–agent problem via the problems of corporate accounting and financial fraud. 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. McDonald's sandwich "McHits" and "McMisses" over the years apply the concept of consumer sovereignty. The graphics of fiscal policy are followed by a discussion of recent fiscal policy, and the Federal Reserve's role in the economy is demonstrated through an application of its responses to the mortgage debt crisis and the recession. 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, Social Security checks and food stamps to highlight the differences between social insurance and public assistance, and photos of lumber and newly constructed homes to illustrate the difference between intermediate and final goods. Other photo sets illustrate normal versus inferior goods, complements versus substitutes in consumption, homogeneous versus differentiated products, substitute resources versus complementary resources, and more.

Global Snapshots

Global Snapshot pieces include 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.

Digital Solutions

Extensive Algorithmic and Graphing Assessment

Robust, auto-gradable question banks for each chapter now include even more questions that make use of the *Connect®* graphing tool. More questions featuring algorithmic variations have also been added.

Interactive Graphs

This new assignable resource within Connect® helps students see the relevance of subject matter by providing visual displays of real data for students to manipulate. All graphs are accompanied by assignable assessment questions and feedback to guide students through the experience of learning to read and interpret graphs and data.

Videos

New to this edition are videos that provide support for key economic topics. These short, engaging explanations are presented at the moment students may be struggling to help them connect the dots and grasp challenging concepts.

Math Preparedness Tutorials

Our math preparedness assignments have been reworked to help students refresh on important prerequisite topics necessary to be successful in economics.

McGraw-Hill *Connect®*

McGraw-Hill's Connect® is an online assessment solution that connects students with the tools and resources they'll need to achieve success.

McGraw-Hill's Connect *Features* *Connect* offers a number of powerful tools and features to make managing assignments easier, so faculty can spend more time teaching. With *Connect*, students can engage with their coursework anytime and anywhere, making the learning process more accessible and efficient. *Connect* offers the features as described here.

Simple Assignment Management With *Connect,* creating assignments is easier than ever, so you can spend more time teaching and less time managing. The assignment management function enables you to

- Create and deliver assignments easily with selectable end-of-chapter questions and test bank items.
- Streamline lesson planning, student progress reporting, and assignment grading to make classroom management more efficient than ever.
- Go paperless with the eBook and online submission and grading of student assignments.

Smart Grading   *Connect* helps students learn more efficiently by providing feedback and practice material when they need it, where they need it. The grading function enables you to

- Score assignments automatically, giving students immediate feedback on their work and side-by-side comparisons with correct answers.
- Access and review each response; manually change grades or leave comments for students to review.
- Reinforce classroom concepts with practice tests and instant quizzes.

Instructor Library   The *Connect* Instructor Library is your repository for additional resources to improve student engagement in and out of class. You can select and use any asset that enhances your lecture. The *Connect* Instructor Library includes all of the instructor supplements for this text.

Student Resources

Any supplemental resources that align with the text for student use will be available through Connect.

Student Progress Tracking   *Connect* keeps instructors informed about how each student, section, and class is performing, allowing for more productive use of lecture and office hours. The progress-tracking function enables you to

- View scored work immediately and track individual or group performance with assignment and grade reports.
- Access an instant view of student or class performance relative to learning objectives.
- Collect data and generate reports required by many accreditation organizations, such as AACSB and AICPA.

Connect Insight   The first and only analytics tool of its kind, Connect Insight™ is a series of visual data displays that are each framed by an intuitive question and provide at-a-glance information that allows instructors to leverage aggregated information about their courses and students to provide a more personalized teaching and learning experience.

Lecture Capture   Increase the attention paid to lecture discussion by decreasing the attention paid to note taking. Lecture Capture offers new ways for students to focus on the in-class discussion, knowing they can revisit important topics later. Lecture Capture enables you to

- Record and distribute your lecture with a click of a button.
- Record and index PowerPoint presentations and anything shown on your computer so they are easily searchable, frame by frame.

- Offer access to lectures anytime and anywhere by computer, iPod, or mobile device.
- Increase intent listening and class participation by easing students' concerns about note taking. Lecture Capture will make it more likely you will see students' faces, not the tops of their heads.

Test Bank   The Test Bank has been rigorously revised for this third edition of *Economics: Brief* by Randy Grant. All questions are coded according to chapter learning objectives, AACSB Assurance of Learning, and Bloom's Taxonomy guidelines. The computerized Test Bank is available in EZ Test, a flexible and easy-to-use electronic testing program that accommodates a wide range of question types, including user-created questions. You can access the test bank through McGraw-Hill *Connect*.

Computerized Test Bank Online   TestGen is a complete, state-of-the-art test generator and editing application software that allows instructors to quickly and easily select test items from McGraw Hill's test bank content. The instructors can then organize, edit, and customize questions and answers to rapidly generate tests for paper or online administration. Questions can include stylized text, symbols, graphics, and equations that are inserted directly into questions using built-in mathematical templates. TestGen's random generator provides the option to display different text or calculated number values each time questions are used. With both quick-and-simple test creation and flexible and robust editing tools, TestGen is a complete test generator system for today's educators.

You can use our test bank software, TestGen, or *Connect* to easily query for learning outcomes and objectives that directly relate to the learning objectives for your course. You can then use the reporting features to aggregate student results in a similar fashion, making the collection and presentation of assurance-of-learning data simple and easy.

Diagnostic and Adaptive Learning of Concepts: LearnSmart

Adaptive Reading Experience   SmartBook contains the same content as the print book, but actively tailors that content to the needs of the individual through adaptive probing. Instructors can assign SmartBook reading assignments for points to create incentives for students to come to class prepared.

▣LEARNSMART®   Students want to make the best use of their study time. The LearnSmart adaptive self-study technology within *Connect* provides students with a seamless combination of practice, assessment, and remediation for

every concept in the textbook. LearnSmart's intelligent software adapts to every student response and automatically delivers concepts that advance students' understanding while reducing time devoted to the concepts already mastered. The result for every student is the fastest path to mastery of the chapter concepts. LearnSmart

- Applies an intelligent concept engine to identify the relationships between concepts and to serve new concepts to each student only when he or she is ready.
- Adapts automatically to each student, so students spend less time on the topics they understand and practice more those they have yet to master.
- Provides continual reinforcement and remediation, but gives only as much guidance as students need.
- Integrates diagnostics as part of the learning experience.
- Enables you to assess which concepts students have efficiently learned on their own, thus freeing class time for more applications and discussion.

SMARTBOOK® Smartbook is an extension of LearnSmart—an adaptive eBook that helps students focus their study time more effectively. As students read, Smartbook assesses comprehension and dynamically highlights where they need to study more.

Digital Image Library Every graph and table in the text is available in the Instructor's Resource section in Connect.

McGraw-Hill's Customer Experience Group We understand that getting the most from your new technology can be challenging. That's why our services don't stop after you purchase our products. You can e-mail our Product Specialists 24 hours a day to get product-training online. Or you can search our knowledge bank of Frequently Asked Questions on our support website. For Customer Support, call **800-331-5094,** or visit **www.mhhe.com/support.**

Tegrity Campus: Lectures 24/7 Tegrity Campus is a fully automated lecture capture solution used in traditional, hybrid, "flipped classes," and online courses to record lessons, lectures, and skills. Its personalized learning features make study time incredibly efficient and its ability to affordably scale brings this benefit to every student on campus. Patented search technology and real-time LMS integrations make Tegrity the market-leading solution and service.

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Assurance-of-Learning Ready

Many educational institutions today are focused on the notion of *assurance of learning,* an important element of some accreditation standards. *Economics: Brief* is designed specifically to support your assurance-of-learning initiatives with a simple yet powerful solution.

Each test bank question for *Economics: Brief* maps to a specific chapter learning outcome/objective listed in the text. You can use our test bank software, EZ Test and EZ Test Online, or *Connect® Economics* to easily query for learning outcomes/objectives that directly relate to the learning objectives for your course. You can then use the reporting features of EZ Test to aggregate student results in similar fashion, making the collection and presentation of assurance-of-learning data simple and easy.

AACSB Statement

McGraw-Hill Education is a proud corporate member of AACSB International. Understanding the importance and value of AACSB accreditation, *Economics: Brief,* 3th edition, recognizes the curricula guidelines detailed in the AACSB standards for business accreditation by connecting selected questions in the text and the test bank to the six general knowledge and skill guidelines in the AACSB standards.

The statements contained in *Economics: Brief,* 3rd edition, are provided only as a guide for the users of this textbook. The AACSB leaves content coverage and assessment within the purview of individual schools, the mission of the school, and the faculty. While *Economics: Brief,* 3rd edition, and the teaching package make no claim of any specific AACSB qualification or evaluation, we have labeled within *Economics: Brief,* 3rd edition, selected questions according to the eight general knowledge and skills areas emphasized by AACSB.

Instructor Aids

PowerPoint Presentations Developed using Microsoft PowerPoint software, these slides are a step-by-step review of the key points in each of the book's 21 chapters. They are equally useful to the student in the classroom as lecture aids or for personal review at home or the computer lab. The slides use animation to show students how graphs build and shift.

Solutions Manual This manual provides detailed answers to the end-of-chapter questions.

Student Aids

Built-in Student Problem Set The built-in student problem set is found at the end of every chapter of *Economics: Brief.* Each chapter has 8 to 10 numerical and graphing problems tied to the content of the text.
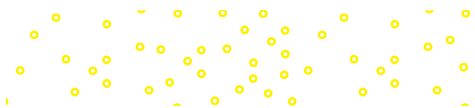
Acknowledgments

We give special thanks to Randy R. Grant of Linfield College, who served as the content coordinator for *Economics: Brief Edition*. Professor Grant modified and seamlessly incorporated appropriate new content and revisions that the authors made in the twenty-first edition of *Economics* into this third edition of the *Brief Edition.* He also updated the tables and other information in *Economics: Brief Edition* and made various improvements that he deemed helpful or were suggested to him by the authors, reviewers, and publisher.
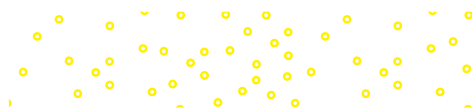
Finally, we wish to acknowledge William Walstad and Tom Barbiero (the coauthors of the Canadian edition of *Economics*) for their ongoing ideas and insights.

We are greatly indebted to an all-star group of professionals at McGraw-Hill—in particular Mark Christianson, Harvey Yep, Bruce Gin, Doug Ruby, Adam Huenecke, Anke Weekes, and Bobby Pearson for their publishing and marketing expertise. Matt Diamond provided the vibrant interior design and cover.

The third edition has benefited from a number of perceptive formal reviews. The reviewers, listed at the end of the preface, were a rich source of suggestions for this revision. To each of you, and others we may have inadvertently overlooked, thank you for your considerable help in improving *Economics: Brief Edition.*

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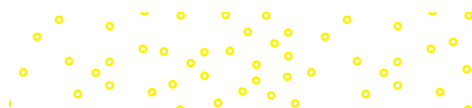**Sean M. Flynn**
Campbell R. McConnell

CONTRIBUTORS

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Microeconomics
B R I E F   E D I T I O N

Third Edition

Introduction

1

Limits, Alternatives, and Choices

Learning Objectives

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

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

LO1.3 Distinguish microeconomics from macroeconomics.

LO1.4 List the categories of scarce resources and delineate the nature of the economizing problem.

LO1.5 Apply production possibilities analysis, increasing opportunity costs, and economic growth.

LO1.6 (Chapter appendix) Understand graphs, curves, and slopes as they relate to economics.

(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's not the half of it." We also want flat-panel TVs, Internet service, education, homeland security, cell phones, and much more.

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

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

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 associated with their actions.

ILLUSTRATING THE IDEA

Did Zuckerberg, Swift, and Lawrence Make Bad Choices?

The importance of opportunity costs in decision making is illustrated by different choices people make with respect to college. Average salaries of college graduates are nearly twice as high as those earned by persons with just high school diplomas. For most capable students, "Go to college, stay in college, and earn a degree" is very sound advice.

Yet Facebook founder Mark Zuckerberg dropped out of college, pop singer Taylor Swift never started classes, and Jennifer Lawrence dropped out of high school. What were they thinking? Unlike most students, Zuckerberg faced enormous opportunity costs for staying in college. He had a vision for his company, and dropping out helped to ensure Facebook's success. Swift knew that staying on top in the world of pop takes unceasing work. So after her first album became a massive hit for her at the age of 16, it made sense for her to skip college in order to relentlessly pursue continuing success. And Lawrence was discovered by a talent scout at the age of 14, quit high school, and has become one of America's highest paid film stars. Finishing high school might have interrupted the string of successes that made her career possible.

So Zuckerberg, Swift, and Lawrence understood opportunity costs and made their choices accordingly. The size of opportunity costs matters greatly 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?

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

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.

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."

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).

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. People sometimes are impulsive or emulative. "Purposeful behavior" simply means that people make decisions with some desired outcome in mind. (In Chapter 21 on behavioral economics, we examine the sources and impacts of certain systematic errors in economic decision making that people regularly commit.)

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: Comparing Benefits and Costs

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

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 amounts. Example: You and your fiancée are shopping for an engagement ring. Should you buy a $\frac{1}{2}$-carat diamond, a $\frac{5}{8}$-carat diamond, a $\frac{3}{4}$-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, you should 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 every-day 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.
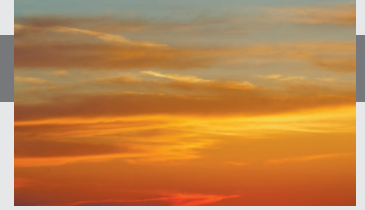
Theories, Principles, and Models

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.

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.

- 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 and purchases 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.

Microeconomics

Microeconomics is the part of economics concerned with decision making by individual consumers, households, and business firms. At this level of analysis, we observe the details of their behavior under a figurative microscope. 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.

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 are held constant; *ceteris paribus* assumption.

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.

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.

Source: NPS Photo

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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. Very little attention is given to specific units making up the various aggregates.

macroeconomics The part of economics concerned with the economy as a whole; with such major aggregates as the household, business, and government sectors; and with measures of the total economy.

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.

Individual's Economic Problem

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.

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).

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 2016 was $56,810. In the poorest nations, it was less than $500.

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, 2016*
Norway	$82,240
United States	56,810
Sweden	54,590
Singapore	51,880
France	38,720
South Korea	27,600
Mexico	9,040
China	8,250
Iraq	5,420
India	1,670
Madagascar	400
Malawi	320

*U.S. dollars, based on exchange rates.
Source: World Bank, **www.worldbank.org.**

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 ex- ample, 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 satisfac- tion 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.

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

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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.

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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, given the limitations we face.

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 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 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. As elsewhere in this book, we represent discrete (separate element) numbers in tables as points on continuous-data smooth curves. Therefore, note that the line (curve) in the graph is not restricted to whole units of DVDs and books as is the table. Every point on the line 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 $P_b/P_{dvd} = \$-10/\$+20 = -\frac{1}{2}$ 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 $-\frac{1}{2}$ or $-.5$.

The budget line illustrates several ideas.

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.

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.

The Budget Line: Whole-Unit Combinations of DVDs and Paperback Books Attainable with an Income of $120		
Units of DVDs (Price = $20)	Units of Books (Price = $10)	Total Expenditure
6	0	$120 = ($120 + $0)
5	2	$120 = ($100 + $20)
4	4	$120 = ($80 + $40)
3	6	$120 = ($60 + $60)
2	8	$120 = ($40 + $80)
1	10	$120 = ($20 + $100)
0	12	$120 = ($0 + $120)
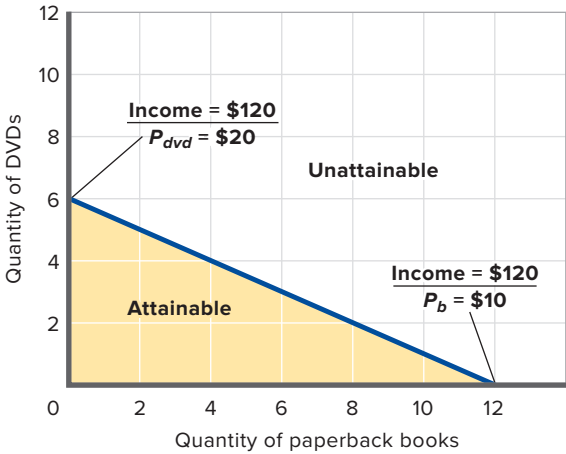
Attainable and Unattainable Combinations All the combinations of DVDs and books on or inside the budget line are *attainable* from the $120 of money income. You can afford to buy, for example, 3 DVDs at $20 each and 6 books at $10 each. You also can obviously afford to buy 2 DVDs and 5 books, thereby using up only $90 of the $120 available on your gift card. But to achieve maximum utility, you will want to spend the full $120. The budget line shows all combinations that cost exactly 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 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 (= $\frac{1}{2}$ DVD) as more books are bought.

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).

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.

economic resources The land, labor, capital, and entrepreneurial ability that are used in the production of goods and services; productive agents; factors of production.

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. These include mineral and oil deposits, arable land, forests, and water resources.

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

Labor The resource **labor** consists of the physical actions and mental activities that people contribute to the production of goods and services. The work-related activities of a logger, retail clerk, machinist, teacher, professional football player, and nuclear physicist all fall under the general heading "labor."

labor People's physical and mental talents and efforts that are used to help produce goods and services.

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 use the term **investment** to describe spending that pays for the production and accumulation of capital goods.

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. For example, large commercial baking ovens (capital goods) help make loaves of bread (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 goods and services, including capital goods.

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*.

investment Spending for the production and accumulation of capital and additions to inventories.

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

entrepreneurial ability The human resource that combines the other resources to produce a product, makes nonroutine decisions, innovates, and bears risks.

Economic Resources

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

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- The entrepreneur makes the strategic business decisions that set the course of an enterprise.
- The entrepreneur innovates. He or she commercializes new products, new production techniques, or even new forms of business organization.
- The entrepreneur bears risk. Innovation is risky, as nearly all new products and ideas are subject to the possibility of failure as well as success. Progress would cease without entrepreneurs who are willing to take on risk by devoting their time, effort, and ability—as well as their own money and the money of others—to commercializing new products and ideas that may enhance society's standard of living.

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

factors of production Economic resources: land, capital, labor, and entrepreneurial ability.

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 of 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.

consumer goods Products and services that satisfy human wants directly.

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

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 pizza and industrial robots; the data

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 industrial robots means fewer pizzas, and vice versa. Limited resources and a fixed technology make any combination of industrial robots and pizza 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.

Type of Product	Production Alternatives				
	A	**B**	**C**	**D**	**E**
Pizzas (in hundred thousands)	0	1	2	3	4
Industrial robots (in thousands)	10	9	7	4	0
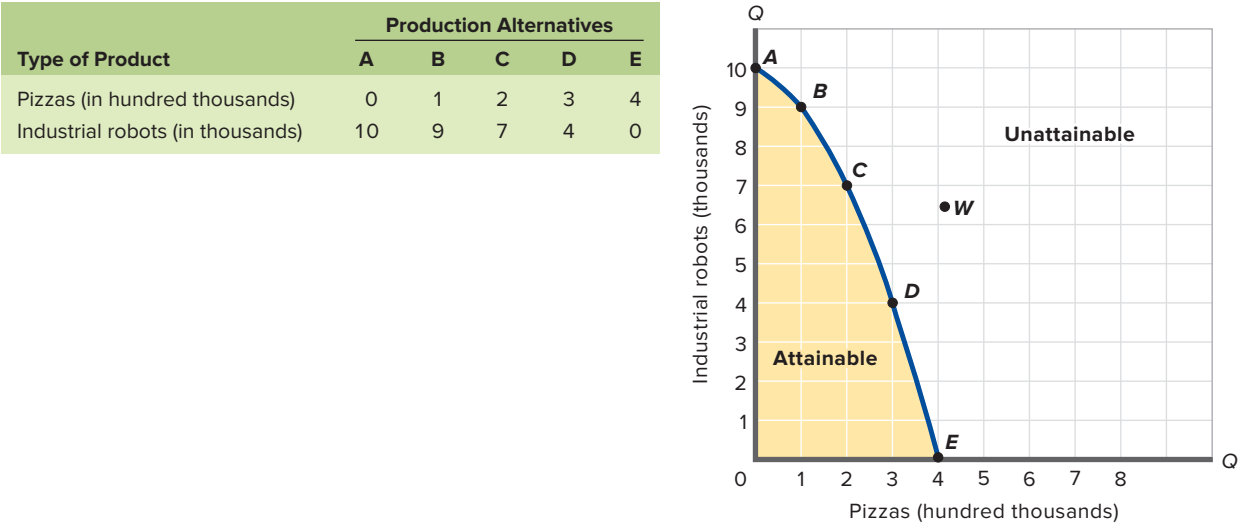
are, of course, hypothetical. At alternative A, this economy would be devoting all its available resources to the production of industrial robots (capital goods); at alternative E, all resources would go to pizza production (consumer goods). Those alternatives are un- realistic extremes; an economy typically 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 pizza at the expense of the production of industrial robots.

Because consumer goods satisfy our wants directly, any movement toward E looks tempting. In producing more pizza, society increases the satisfaction of its current wants. But there is a cost: More pizzas mean fewer industrial robots. This shift of resources to consumer goods catches up with society over time because the stock of capital goods expands more slowly, thereby reducing potential future production. 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 pizza or a free industrial robot. 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, industrial robots) on the vertical axis and the output of consumer goods (here, pizza) on the horizontal axis, as shown in Figure 1.2.

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.

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 industrial robots and pizzas 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 pizzas mean fewer industrial robots. The number of units of industrial robots that must be given up to obtain another unit of pizzas, of course, is the opportunity cost of that unit of pizzas.

In moving from alternative A to alternative B in the table in Figure 1.2, the cost of 1 additional unit of pizza is 1 less unit of industrial robots. 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 pizzas is greater than the opportunity cost of the preceding one. When we move from A to B, just 1 unit of industrial robots is sacrificed for 1 more unit of pizzas; but in going from B to C, we sacrifice 2 additional units of industrial robots for 1 more unit of pizzas; then 3 more of industrial robots for 1 more of pizzas; and finally 4 for 1. Conversely, confirm that as we move from E to A, the cost of an additional unit of industrial robots (on average) is $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, and 1 unit of pizzas, 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.

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

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 industrial robots (1, 2, 3, and 4) to acquire equal increments of pizzas (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 law of increasing opportunity costs is driven by the fact that economic resources are not completely adaptable to alternative uses. Many resources are better at producing one type of good than at producing others. Consider land. 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 industrial robots. That land will be the first land devoted to the production of industrial robots. But as society steps up the production of industrial robots, it must use resources that are less and less suited to making their components.

If we start at *A* and move to *B* in Figure 1.2, we can shift resources whose productivity is relatively high in pizza production and low in industrial robots. But as we move from *B* to *C*, *C* to *D*, and so on, resources highly productive of pizzas become increasingly scarce. To get more pizzas, resources whose productivity in industrial robots is relatively great will be needed. It will take increasingly more of such resources, and hence greater sacrifices of industrial robots, to achieve each 1-unit increase in pizzas. 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 pizzas and industrial robots on the curve in Figure 1.2, which is optimal (best)? That is, what specific quantities of resources should be allocated to pizzas and what specific quantities to industrial robots 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 pizzas. We already know from the law of increasing opportunity costs that the marginal cost of additional units of pizzas 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 pizzas decline with each successive unit of pizzas. Consequently, each successive unit of pizzas brings with it both increasing marginal costs and decreasing marginal benefits.

The optimal quantity of pizzas 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 pizzas 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 pizza production has been increased to 200,000.

In contrast, the production of 300,000 units of pizzas is excessive. There the MC of an added unit is $15 and its MB is only $5. This means that 1 unit of pizzas 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 industrial robots, we find its optimal (MB = MC) quantity is 7,000. This would mean that alternative *C* (200,000 units of pizzas and 7,000 units of industrial robots) on the production possibilities curve in Figure 1.2 would be optimal for this economy.
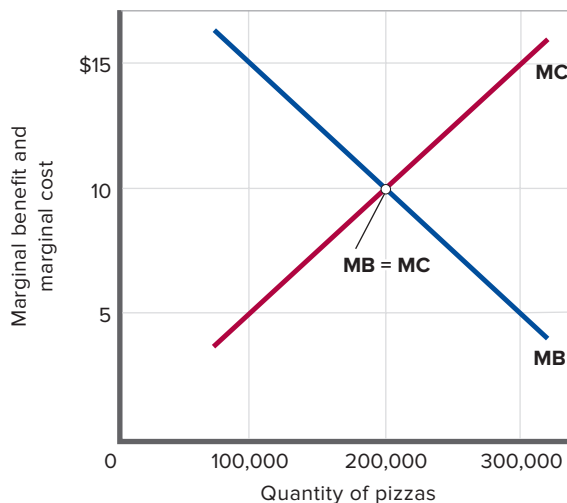
FIGURE 1.3   Optimal output: MB = MC. Achieving the optimal output requires the expansion of a good's output until its marginal benefit (MB) and marginal cost (MC) are equal. No resources beyond that point should be allocated to the product. Here, optimal output occurs when 200,000 units of pizzas are produced.
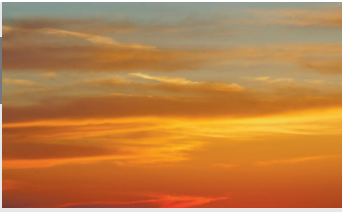
The Economics of War

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 2015, the estimated cost of these efforts exceeded $1.7 trillion, with some projecting the total cost to reach $6 trillion, including interest costs, over the next 40 years.

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 framework is a useful way of approaching choices. Efficient allocation 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. Subsequent downturns have been much less severe. During the deep 2007–2009 recession, for instance, production fell by a comparably smaller 5.1 percent, and 1 in 10 workers was without a job.

Almost all nations have experienced widespread unemployment and unused production capacity from business downturns at one time or another. Since 2000, for example, several nations—including Argentina, Italy, Russia, Japan, and France—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;
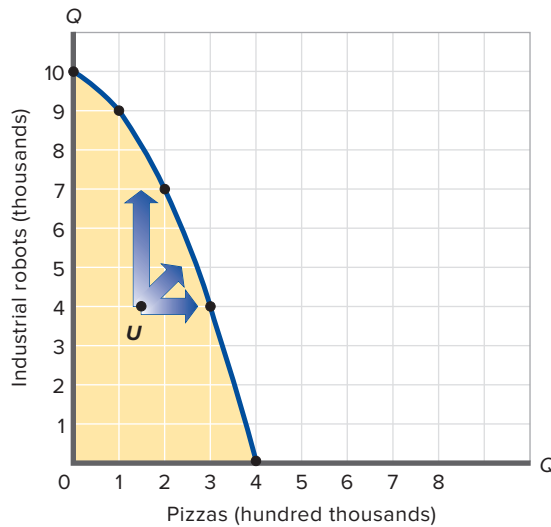
they illustrate the combinations of pizzas and industrial robots that can be produced when the economy is operating at full employment. With unemployment, this economy would produce less than each alternative shown in the table.

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 pizzas and industrial robots 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 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 systems, 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 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.

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.

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.

Type of Product	Production Alternatives				
	A′	B′	C′	D′	E′
Pizzas (in hundred thousands)	0	2	4	6	8
Industrial robots (in thousands)	14	12	9	5	0
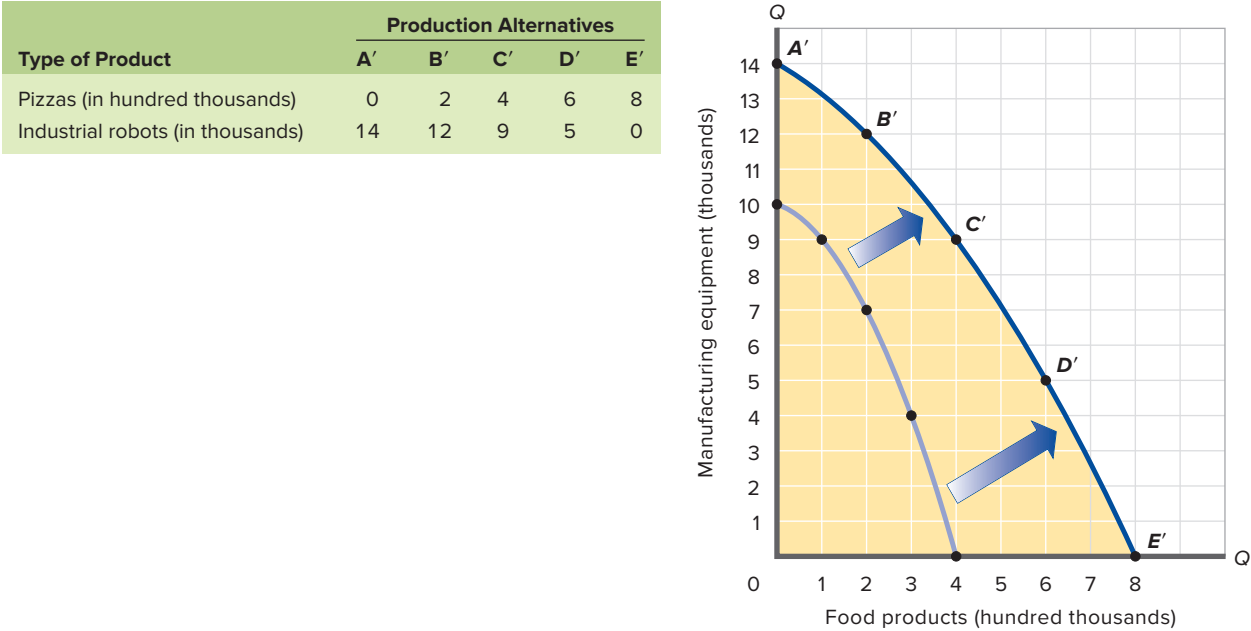
Advances in Technology An advancing technology brings both new and better goods and improved ways of producing them. For now, let's think of technological advance as being only improvements in the methods of production, for example, the introduction of computerized systems to manage inventories and schedule 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.

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 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.

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?

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 less 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.

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.
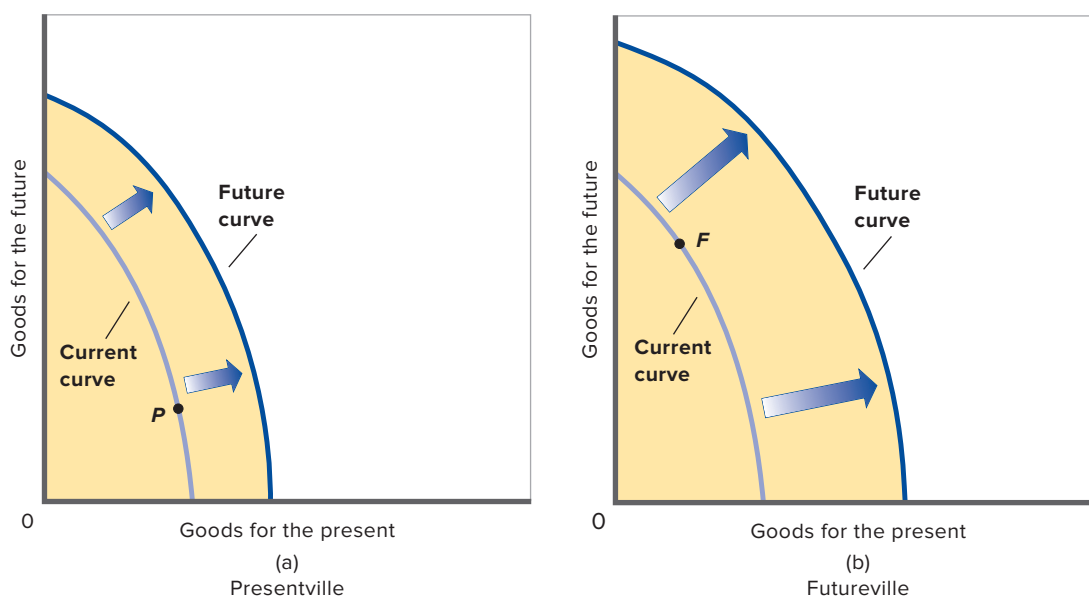
Now, other things equal, we can expect Futureville's future production possibilities curve to be farther to the right than Presentville's future production possibilities curve. By currently choosing an output more favorable to technological advances and to increases in the quantity and quality of resources, 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.

SUMMARY

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

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.

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

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.

LO1.3 Distinguish microeconomics from macroeconomics.

Microeconomics examines the decision making of specific economic units or institutions. Macroeconomics looks at the economy as a whole or its major aggregates.

LO1.4 List the categories of scarce resources and delineate the nature of the economic problem.

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.

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.

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.

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.

LO1.5 Apply production possibilities analysis, increasing opportunity costs, and economic growth.

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.

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.

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).

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	macroeconomics	investment
economic perspective	aggregate	entrepreneurial ability
opportunity cost	economic problem	factors of production
utility	budget line	consumer goods
marginal analysis	constant opportunity cost	capital goods
scientific method	economic resources	production possibilities curve
principles	land	law of increasing opportunity costs
other-things-equal assumption	labor	economic growth
microeconomics	capital	

QUESTIONS

The following and additional problems can be found in 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? **LO1.1**

2. "Buy 2, get 1 free." Explain why the "1 free" is free to the buyer but not to society. **LO1.1**

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. **LO1.1**

4. What is meant by the term "utility," and how does it relate to purposeful behavior? **LO1.1**

5. Cite three examples of recent decisions that you made in which you, at least implicitly, weighed marginal cost and marginal benefit. **LO1.1**

6. What are the key elements of the scientific method, and how does this method relate to economic principles and laws? **LO1.2**

7. Indicate whether each of the following statements applies to microeconomics or macroeconomics: **LO1.3**
   a. The unemployment rate in the United States was 5.1% in September 2015.
   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, increased by 2.4% in 2014.
   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 0.2% from August 2014 to August 2015.

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? **LO1.4**

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? **LO1.4**

10. 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. **LO1.5**

11. Explain how (if at all) each of the following events affects the location of a country's production possibilities curve: **LO1.5**
    a. 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.

12. Suppose that, on the basis of a nation's production possibilities curve, an economy must sacrifice 10,000 pizzas domestically to get the 1 additional industrial robot it desires but that it can get the robot from another country in exchange for 9,000 pizzas. Relate this information to the following statement: "Through international specialization and trade, a nation can reduce its opportunity cost of obtaining goods and thus 'move outside its production possibilities curve.'" **LO1.5**

PROBLEMS

1. Potatoes cost Janice $1 per pound, and she has $5.00 that she could possibly spend on potatoes or other items. If she feels that the first pound of potatoes is worth $1.50, the second pound is worth $1.14, the third pound is worth $1.05, and all subsequent pounds are worth $0.30, how many pounds of potatoes will she purchase? What if she only had $2 to spend? **LO1.1**

2. Pham can work as many or as few hours as she wants at the college bookstore for $9 per hour. But due to her hectic schedule, she has just 15 hours per week that she can spend working at either the bookstore or at other potential jobs. One potential job, at a café, will pay her $12 per hour for up to 6 hours per week. She has another job offer at a garage that will pay her $10 an hour for up to 5 hours per week. And she has a potential job at a day care center that will pay her $8.50 per hour for as many hours as she can work. If her goal is to maximize the amount of money she can make each week, how many hours will she work at the bookstore? **LO1.1**

3. 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. **LO1.4**
   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 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?

4. Suppose that you are on a desert island and possess exactly 20 coconuts. Your neighbor, Friday, is a fisherman, and he is willing to trade 2 fish for every 1 coconut that you are willing to give him. Another neighbor, Kwame, is also a fisherman, and he is willing to trade 3 fish for every 1 coconut. **LO1.4**
   a. On a single figure, draw budget lines for trading with Friday and for trading with Kwame. (Put coconuts on the vertical axis.)
   b. What is the slope of the budget line from trading with Friday?

c. What is the slope of the budget line from trading with Kwame?
d. Which budget line features a larger set of attainable combinations of coconuts and fish?
e. If you are going to trade coconuts for fish, would you rather trade with Friday or Kwame?

5. Below is a production possibilities table for consumer goods (automobiles) and capital goods (forklifts): **LO1.5**

Type of Production	Production Alternatives				
	A	B	C	D	E
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 two more automobiles? Of six more forklifts? 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?

6. Referring to the table in problem 5, 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. **LO1.5**

7. On average, households in China save 40 percent of their annual income each year, whereas households in the United States save less than 5 percent. Production possibilities are growing at roughly 9 percent annually in China and 3.5 percent in the United States. Use graphical analysis of "present goods" versus "future goods" to explain the differences in growth rates. **LO1.5**

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 1A.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 1A.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 1A.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 1A.1, the relationship is said to be *linear*.

Direct and Inverse Relationships

The line in Figure 1A.1 slopes upward to the right, so it depicts a **direct relationship** between income and consumption. A direct relationship, or positive relationship, means that two variables (here, consumption and income) change in the same direction. An increase in consumption is associated with an increase in income; a decrease in consumption accompanies a decrease in income. When two sets

> **direct relationship** The relationship between two variables that change in the same direction, for example, product price and quantity supplied.

FIGURE 1A.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	a
100	100	b
200	150	c
300	200	d
400	250	e
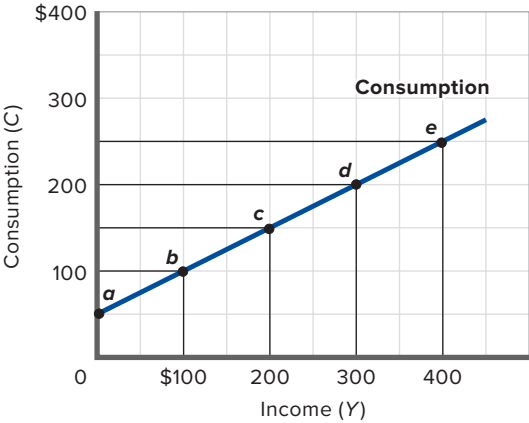
of data are positively or directly related, they always graph as an upsloping line, as in Figure 1A.1.

In contrast, two sets of data may be inversely related. Consider the table in Figure 1A.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 1A.2. This inverse relationship graphs as a downsloping line.

> **inverse relationship** The relationship between two variables that change in opposite directions, for example, product price and quantity demanded.

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 or outcome; it is the variable that changes because of the change in the independent variable. As in our income–consumption example, income generally is the independent variable and consumption the dependent variable. Income causes consumption

> **independent variable** The variable causing a change in some other (dependent) variable.

> **dependent variable** A variable that changes as a consequence of a change in some other (independent) variable; the "effect" or outcome.

to be what it is rather than the other way around. Similarly, ticket prices (set in advance of the season and 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 convention, 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 any possible confusion.

Other Things Equal

Our simple two-variable graphs purposely ignore many other factors that might affect the amount of consumption 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-things-equal) assumption. Thus, in Figure 1A.1 all factors other than income that might affect the amount of consumption are presumed to be

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FIGURE 1A.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	a
40	4	b
30	8	c
20	12	d
10	16	e
0	20	f
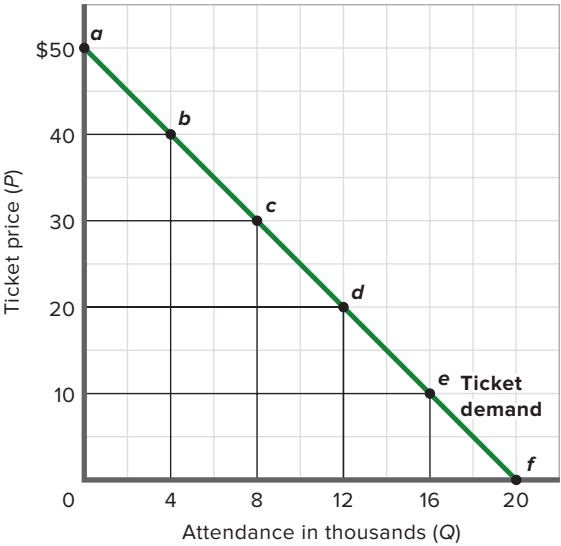
constant or unchanged. Similarly, in Figure 1A.2 all factors other than ticket price that might influence attendance at BTU basketball games are assumed constant. In reality, "other things" are not equal; they often change, and when they do, the relationship represented in our two tables and graphs will 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 1A.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 1A.2, assuming that 2,000 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. 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.

Positive Slope Between point b and point c in the graph in Figure 1A.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:

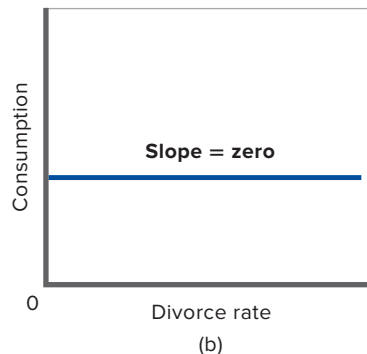$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{+50}{+100} = \frac{1}{2} = .5$$
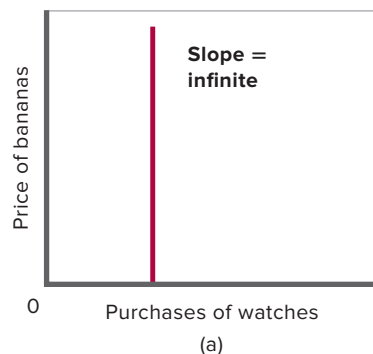
Note that our slope of $\frac{1}{2}$ or .5 is positive because consumption and income change in the same direction; that is, consumption and income are directly or positively related.

Negative Slope Between any two of the identified points in the graph of Figure 1A.2, say, point c and point d, the vertical change is −10 (the drop) and the horizontal change is +4 (the run). Therefore

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

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 fewer unit). For example, in Figure 1A.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 1A.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 1A.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 1A.3b we put

FIGURE 1A.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.

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 1A.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.

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 1A.4 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.

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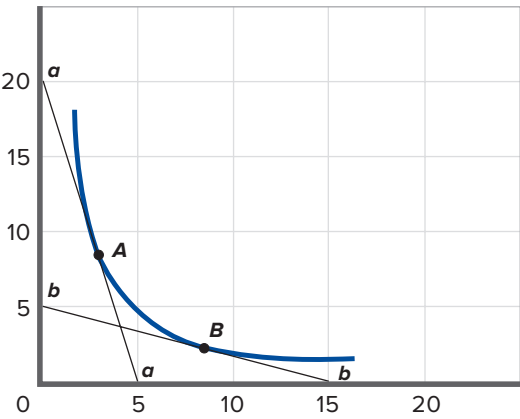
Line *bb* in Figure 1A.4 is tangent to the curve at point *B*. Using the same procedure, we find the slope at *B* to be −5/+15, or −$\frac{1}{3}$. Thus, in this flatter part of the curve, the slope is less negative.

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

LO1.6 Understand graphs, curves, and slopes as they relate to economics.

Graphs are a convenient and revealing way to represent economic relationships.

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. Two variables are negatively or inversely related when their values change in opposite directions. The curve representing two inversely related variables slopes downward.

The value of the dependent variable (the "effect") is determined by the value of the independent variable (the "cause"). 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.

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

APPENDIX TERMS AND CONCEPTS

direct relationship

inverse relationship

independent variable

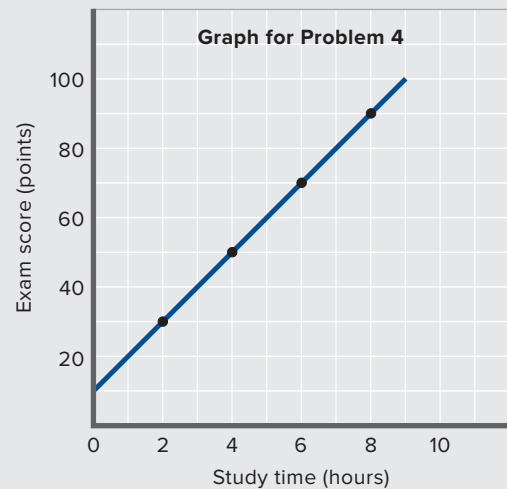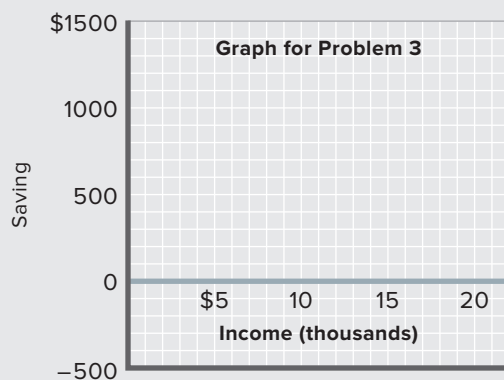dependent variable

slope of a straight line

APPENDIX QUESTIONS

The following and additional problems can be found in connect

1. 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? **LO1.6**

2. Describe the graphical relationship between ticket prices and the number of people choosing to visit amusement parks. Is that relationship consistent with the fact that, historically, park attendance and ticket prices have both risen? Explain. **LO1.6**

3. Look back at Figure 1A.2, which shows the inverse relationship between ticket prices and game attendance at Big Time University. (a) Interpret the meaning of the slope. (b) If the slope of the line were steeper, what would that say about the amount by which ticket sales respond to increases in ticket prices? **LO1.6**

APPENDIX PROBLEMS

1. Graph and label as either direct or indirect the relationships you would expect to find between (a) the number of inches of rainfall per month and the sale of umbrellas, (b) the amount of tuition and the level of enrollment at a university, and (c) the popularity of an entertainer and the price of her concert tickets. **LO1.6**

2. Indicate how each of the following might affect the data shown in the table and graph in Figure 1A.2 of this appendix: **LO1.6**
   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? What would you predict saving to be at the $12,500 level of income? **LO1.6**

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

Graph for Problem 3

4. Construct a table from the data shown on the graph below. Which is the dependent variable and which the independent variable? **LO1.6**

Graph for Problem 4

5. 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, 5,000 ounces of output (production) is profitable. At $300, a total of 10,000 ounces of output is profitable. Similarly, total production increases by 5,000 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 a table and on a graph. Put the price of gold on the vertical axis and the output of gold on the horizontal axis. **LO1.6**

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. **LO1.6**
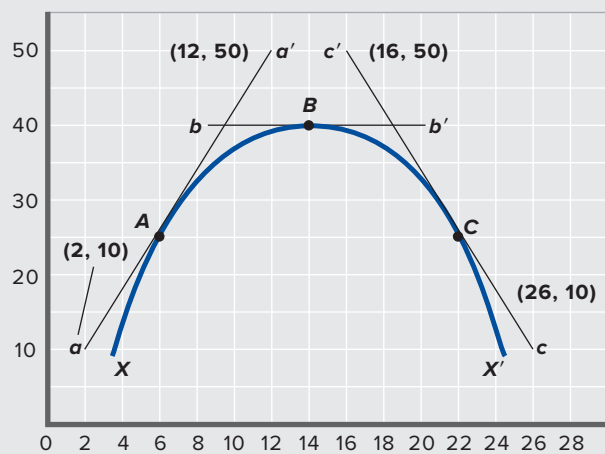
7. In the accompanying graph, is the slope of curve *AA'* positive or negative? Does the slope increase or decrease as we move along the curve from *A* to *A'*? Answer the same two questions for curve *BB'*. **LO1.6**
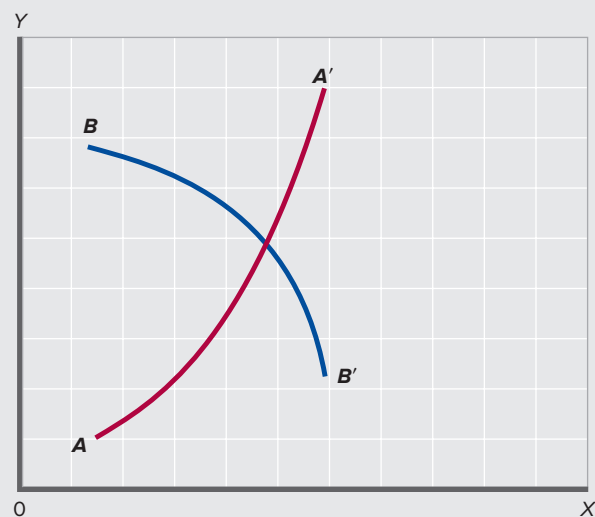
The Market System and the Circular Flow

Learning Objectives

LO2.1 Differentiate between a command system and a market system.

LO2.2 List the main characteristics of the market system.

LO2.3 Explain how the market system answers the four fundamental questions.

LO2.4 Discuss how the market system adjusts to change and promotes progress.

LO2.5 Describe the mechanics of the circular flow model.

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 a command 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 to buy and sell goods, services, and resources. 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 operation of the market system. The term "laissez-faire" means "let it be," that is, keep government

Margin definitions

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.

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.

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.

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*	$1.6 trillion*
GDP per capita	$1,800*	$35,700*
Exports	$4.4 billion	$638 billion
Imports	$5.6 billion	$524.1 billion
Agriculture as % of GDP	37 percent	2.3 percent

*Based on purchasing power equivalencies to the U.S. dollar.

Source: CIA World Fact Book, 2013–2014, **www.cia.gov.**

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.

The most important consequence of property rights is that they encourage people to cooperate by helping to ensure that only *mutually agreeable* economic transactions take place. In a world without legally enforceable property rights, the strong could simply take whatever they wanted from the weak without giving them any compensation. But in a world of legally enforceable property rights, any person wanting something from you has to get you to agree to give it to them. And you can say no. The result is that if that person really wants what you have, she must offer you something that you value more highly in return. That is, she must offer you a mutually agreeable economic transaction—one that benefits you as well as her.

private property The right of private persons and firms to obtain, own, control, employ, dispose of, and bequeath land, capital, and other property.

Property rights also 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 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.

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** 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

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

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

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.

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.