Microeconomics for Today

Eleventh Edition

Irvin B. Tucker
University of North Carolina at Charlotte

Cengage

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***Microeconomics for Today,* 11e**
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Irvin B. Tucker

IRVIN B. TUCKER was a longtime leader in economic education with over 30 years of experience teaching introductory economics at the University of North Carolina in Charlotte. He earned his B.S. in economics at N.C. State University and his M.A. and Ph. D. in economics from the University of South Carolina. Dr. Tucker served as the executive director of the S.C. Council of Education and director of the Center for Economic Education at the University of North Carolina in Charlotte. Dr. Tucker is recognized for his ability to relate basic principles to economic issues and public policy. His work has received national recognition by being awarded the Meritorious Levy Award for Excellence in Private Enterprise Education, the Federation of Independent Business Award for Postsecondary Educator of the Year in Entrepreneurship and Economic Education, and the Freedom Foundation's George Washington Medal for Excellence in Economic Education. In addition, his research has been published in numerous professional economics journals on a wide range of topics, including industrial organization, entrepreneurship, and economics of education. Dr. Tucker is also the author of the highly successful *Survey of Economics*, eleventh edition, a text for the one-semester principles of economics courses, published by Cengage Learning.

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Note: Chapter numbers refer to the complete book, *Economics for Today*.

Preface

Text with a Mission

The purpose of *Economics for Today*, eleventh edition, is to teach, in an engaging style, the basic operations of the U.S. economy to students who will take a two-term economics course. Rather than taking an encyclopedic approach to economic concepts, *Economics for Today* focuses on the most important tools in economics and applies these concepts to clearly explain real-world economic issues and events.

Every effort has been made to make *Economics for Today* the most student-friendly text on the market. This text was written because so many others expose students to a confusing array of economic analyses that force students to simply memorize to pass the course. Instead, *Economics for Today* presents a straightforward and unbiased approach that effectively teaches the application of basic economic principles. After reading this text, the student should be able to say, "Now that economics stuff in the news makes sense."

How It Fits Together

This text presents the core principles of microeconomics, macroeconomics, and international economics. The first 14 chapters introduce the logic of economic analysis and develop the core of microeconomic analysis. Here, students learn the role of demand and supply in determining prices in competitive markets versus monopolistic markets. Within these chapters, the book explores issues such as minimum wage laws, rent control, and pollution. The next 13 chapters develop the macroeconomics part of the text. Using the modern yet simple aggregate demand and aggregate supply model, the text explains the measurement of and changes in the price level, national output, and employment in the economy. The study of macroeconomics also includes how the supply of and the demand for money influences the economy. Finally, this text concludes with three chapters devoted entirely to global issues. For example, students will learn how the supply of and demand for currencies determine exchange rates and what the implications are for a strong or a weak dollar on our nation's economy.

Text Flexibility

The full version of *Economics for Today* is easily adapted to an instructor's preference for the sequencing of microeconomic and macroeconomic topics. This text can be used in a macroeconomic–microeconomic sequence by teaching the first four chapters and then Parts 5 through 7. Next, microeconomics is covered in Parts 2 through 4. Finally, the course can be completed with Part 8, consisting of three chapters devoted to international economics.

An important design feature of this text is that it accommodates the two major approaches for teaching principles of macroeconomics: those who cover both the Keynesian Cross and AD–AS models and those who skip the Keynesian model and cover only the AD–AS model. For instructors who prefer the former, *Economics for Today* moves smoothly in Chapters 18–19 (*Macroeconomics for*

Today Chapters 8–9) from the Keynesian model (based on the Great Depression) to the AD–AS model in Chapter 20 (*Macroeconomics for Today* Chapter 10). For instructors using the latter approach, this text is written so instructors can skip the Keynesian model in Chapters 18–19 (*Macroeconomics for Today* Chapters 8–9) and proceed from Chapter 17 (*Macroeconomics for Today* Chapter 7) to Chapter 20 (*Macroeconomics for Today* Chapter 10) without losing anything. For example, the spending multiplier is completely covered both in the Keynesian and AD–AS model chapters.

For instructors who want to teach the self-correcting AD–AS model, emphasis can be placed on the appendices to Chapters 20 (*Macroeconomics for Today* Chapter 10) and 26 (*Macroeconomics for Today* Chapter 16). Instructors who choose not to cover this model can simply skip these appendices. In short, *Economics for Today* provides more comprehensive and flexible coverage of macroeconomics models than is available in other texts. Also, a customized text might meet your needs. If so, contact your Cengage learning consultant for information.

How Not to Study Economics

To some students, studying economics is a little frightening because many chapters are full of graphs. Students often make the mistake of preparing for tests by trying to memorize the lines of graphs. When their graded tests are returned, the students using this strategy will probably exclaim, "What happened?" The answer to this question is that the students should have learned the economic concepts *first*; then, they would understand the graphs as *illustrations* of these underlying concepts. Stated simply, superficial cramming for economics quizzes does not work.

For students who are anxious about using graphs, the Appendix to Chapter 1 provides a brief review of graphical analysis. In addition, Graph Builder in the Tucker MindTap product contains step-by-step features on how to construct and interpret graphs. Moreover, videos entitled "GuideMe Videos" (A Graphing Tutorial for Students) are found in the Tucker MindTap product that explain numerous key graphs throughout the textbook.

Changes to the Eleventh Edition

The basic layout of the eleventh edition remains the same. However, there have been many important changes. Each chapter now begins with clearly stated Chapter Objectives that outline the key learning goals students should achieve after having studied the chapter.

Throughout the narrative, the eleventh edition has replaced the "Conclusion Statements" of previous editions with "*Take Note Statements*." These *Take Note* statements have been carefully designed and updated to highlight key concepts and are strategically placed within the chapters to enhance pedagogy. Students will be able to use these to remember key points when reviewing the chapter and studying for quizzes and tests. A summary of these *Take Note* statements is provided at the end of each chapter.

The eleventh edition has also added a new feature entitled "*Am I on Track?*" which are multiple-choice questions testing students' understanding as they move through the chapter. They are designed to pique interest and to maximize mastery of the material presented in the chapters. They have been strategically placed

throughout each chapter to maximize learning. These questions spark student interest and enable them to check their progress by comparing their answers against the Key provided at the end of the chapter. Students who answer correctly earn the satisfaction of knowing they are on track and can feel more confident taking quizzes and tests because these questions are very similar to those they will face on their exams!

Finally, "Checkpoint" features of the previous editions have become, when appropriate, new "Study Questions and Problems" found at the end of the chapters.

The following are some additional specific changes.

- Chapter 1, Introducing the Economic Way of Thinking, has added a brief introduction to the efficiency versus equity trade-off and has an updated "A Closer Look" Feature on Unusual Economic Indicators to add interest for students. In addition, our discussion of the three fundamental economic questions that result from scarcity has been moved to Chapter 1, where scarcity is introduced. Three "Am I on Track?" multiple-choice questions and two "Study Questions and Problems" have been created.
- Chapter 2, Production Possibilities, Opportunity Cost, and Economic Growth, now introduces the concept of economic efficiency using the PPC. Three new "Am I on Track?" multiple-choice questions, two new "Study Questions and Problems," and three new "Sample Quiz" questions have been included.
- Chapter 3, Market Demand and Supply, now concludes with a discussion of how changes in demand and supply impact the market equilibrium price and quantity. Four "Am I on Track?" multiple-choice questions, two "Study Questions and Problems," and three "Sample Quiz" questions have been created.
- Chapter 4, Markets in Action, expands the efficiency discussion while maintaining many of the same examples from previous editions of the text. The Appendix to Chapter 4 now describes efficiency using consumer and producer surplus. Three "Am I on Track?" multiple-choice questions, two "Study Questions and Problems," and six "Sample Quiz" questions have been added.
- Chapter 5, Elasticity, maintains much of the narrative of the tenth edition while reducing the number of equations for simplicity. Three "Am I on Track?" multiple-choice questions, two "Study Questions and Problems," and two "Sample Quiz" questions have been created.
- Chapter 6, Consumer Choice Theory, has added one "Study Questions and Problems" and four new "Am I on Track?" questions.
- Chapter 7, Production Costs, has added three new "Am I on Track?" multiple-choice questions.
- Chapter 8, Perfect Competition, has streamlined the coverage of short-run supply derivation. Three "Am I on Track?" multiple-choice questions and one "Sample Quiz" question have been added.
- Chapter 9, Monopoly, has added four new "Am I on Track?" multiple-choice questions.
- Chapter 10, Monopolistic Competition and Oligopoly, has added one "Study Questions and Problems" and four new "Am I on Track?" multiple-choice questions.

- Chapter 11, Labor Markets, has condensed the discussion of labor unions and simplified the corresponding graphs. Three "Am I on Track?" multiple-choice questions, one "Study Questions and Problems," and two "Sample Quiz" questions have been created.
- Chapter 12, Income Distribution, Poverty, and Discrimination, has been updated with the latest figures on family income distribution and poverty rates. Three "Am I on Track?" multiple-choice questions and one "Study Questions and Problems" have been created.
- Chapter 13, Antitrust and Regulation, Three "Am I on Track?" multiple-choice questions and one "Study Questions and Problems" have been created.
- Chapter 14, Environmental Economics, has been condensed, and market inefficiency has been highlighted to tie in with concepts introduced in Chapter 4. Three "Am I on Track?" multiple-choice questions, one "Study Questions and Problems," and one "Sample Quiz" question have been added.
- Chapter 15, International Trade and Finance, has updated data for the international balance of payments and trade. Three new "Am I on Track?" multiple-choice questions and two new "Study Questions and Problems" have been created.
- Chapter 16, Economies in Transition, has greater clarification on the differences between capitalism and socialism and why all real-world economies are mixed economies. Three new "Am I on Track?" multiple-choice questions and one new "Study Questions and Problems" have been created.
- Chapter 17, Growth and the Less Developed Countries, presents updated data ranking countries by their GDP per capita. It also presents updated data comparing regions of the world by their average GDP per capita. Here, updated data is used to explain the link between economic freedom and quality-of-life indicators. Three new "Am I on Track?" multiple-choice questions" and two new "Study Questions and Problems" have been created.

Alternative Versions of the Book

For instructors who want to spend various amounts of time for their courses and offer different topics of this text:

- *Economics for Today*. This complete version of the book contains all 30 chapters. It is designed for two-semester introductory courses that cover both microeconomics and macroeconomics.
- *Microeconomics for Today*. This version contains 17 chapters and is designed for one-semester courses in introductory microeconomics.
- *Macroeconomics for Today*. This version contains 20 chapters and is designed for one-semester courses in introductory macroeconomics.
- *Survey of Economics*. This version of the book contains 24 chapters. It is designed for one-semester courses that cover the basics of both microeconomics and macroeconomics.

The Available Versions accompanying table on page xi shows precisely which chapters are included in each book. Instructors who want more information about these alternative versions should contact their local Cengage learning consultant.

Motivational Pedagogical Features

Economics for Today strives to motivate and advance the boundaries of pedagogy with the following features:

Part Openers

Each part begins with a statement of the overall mission of the chapters in the part. In addition, there is a nutshell introduction for each chapter in relation to the part's learning objective.

Chapter Objectives

Each chapter begins with Chapter Objectives that outline the key learning goals students should achieve after having studied the chapter. This is followed by a brief introduction to the chapter that is designed to pique the student's interest and help place the chapter material into the broader context of the book.

Margin Definitions and Flashcards

Key concepts introduced in the chapter are highlighted in bold type and then defined with the definitions again in the margins. This feature, therefore, serves as a quick reference. Key terms are also defined on the Tucker MindTap product with a flashcard feature that is great for learning terms.

A Closer Look

Each chapter includes boxed inserts that provide the acid test of "relevance to everyday life." These were formerly known as the "You're the Economist" boxed sections. This feature gives the student an opportunity to encounter timely, real-world extensions of economic theory by taking a closer look at important concepts introduced in the chapter. For example, students read about Fred Smith as he writes an economics term paper explaining his plan to create FedEx. To ensure that the student wastes no time figuring out which chapter concepts apply to these boxed features, applicable concepts are listed after each title. Several of these boxed features include quotes from newspaper articles over a period of years, demonstrating that economic concepts remain relevant over time. Many of these boxed features have been updated or changed in the eleventh edition to reflect the latest issues, developments, and relevant applications of economics for students today.

The accompanying "Analyze the Issue" questions found in previous editions have now been moved to the Instructor's Manual, where suggested answers are also provided for these thought-provoking questions that require students to test their knowledge of how the material in the boxed insert is relevant to the applicable concept introduced in the chapter.

Take Note Statements

Throughout the chapters, highlighted *Take Note* statements of key concepts strategically appear where most pedagogically advantageous. These *Take Note* statements have been carefully designed and updated to replace the "Conclusion Statements" of the previous edition. Students will be able to use these to remember key points when reviewing the chapter and studying for tests. A summary of these *Take Note* statements is provided at the end of each chapter.

Am I on Track? Multiple-Choice Questions

Watch for these! Who said learning economics can't be fun? This new feature is a unique approach to generating interest and critical thinking. These questions spark students to check their progress by asking challenging economics questions. Students enjoy thinking through and answering these *Am I on Track?* multiple-choice questions and then checking the answers at the end of the chapter. Students who answer correctly earn the satisfaction of knowing they are on track and ready to continue progressing through the material and can feel more confident taking tests because these questions are very similar to those they will face on their exams! All of these are new for the updated eleventh edition to pique interest and to maximize mastery of the material presented in the chapters.

Exhibits

Attractive, large graphical presentations with grid lines and real-world numbers are essential for any successful economics textbook. Each exhibit has been carefully analyzed to ensure that the key concepts being represented stand out clearly. Brief descriptions are included with graphs to provide guidance for students as they study the graph. The MindTap course brings these exhibits to life:

- Students can interact with selected exhibits via Graph Builder.
- Students can watch detailed explanations of selected exhibits via the GuideMe Videos (a graphing tutorial for students.)

Key Terms

Key terms introduced in the chapter are listed at the end of each chapter and defined in the margins. Visit the Tucker MindTap to access interactive flashcards.

Visual Summaries

Each chapter ends with a brief point-by-point summary of the key concepts. Many of these summarized points include miniaturized versions of the important graphs and causation chains that illustrate many of the key concepts. These are intended to serve as visual reminders for students as they finish the chapters and are also useful in reviewing and studying for quizzes and exams.

Study Questions and Problems

These end-of-chapter questions and problems offer a variety of levels ranging from straightforward recall to deeply thought-provoking applications. The answers to odd-numbered questions and problems are found in Appendix A in the back of the text. This feature gives students immediate feedback without requiring the instructor to check their work. The even-numbered answers are found in the Instructor's Manual. Most of the previous edition's "Checkpoints" have been added as new Study Questions and Problems in this eleventh edition.

End-of-Chapter Sample Quizzes

These particular assessments are a great help before quizzes and tests. Many instructors test students using multiple-choice questions. For this reason, the final section of each chapter provides the type of multiple-choice questions given in the test bank. The answers are readily available to students to help them learn the material

and are found in Appendix B at the end of the textbook. In addition to the end-of-chapter sample quizzes, each section quiz appears in the Tucker MindTap product. Each quiz contains multiple questions like those found on a typical exam. Feedback is included for each answer so the student will know instantly why they have answered correctly or incorrectly. Between this feature and the end-of-chapter sample quizzes, students are well prepared for tests. Finally, the Instructor's Manual also contains four to five multiple-choice questions per chapter that can also be used to engage students with the material.

Road Maps

This feature concludes each sectioned part with review questions listed by chapter from the particular part. These help to reinforce learning and prepare students for tests. Answers to the questions are also found in Appendix C in the back of the text.

A Supplements Package Designed for Success

Tucker is known for its unequaled resources for instructors and students. To access additional course material for *Economics for Today*, visit www.cengagebrain.com. At the CengageBrain.com home page, search for "Tucker" using the search box on the page. This will take you to the product page where these resources can be found. For additional information, contact your Cengage learning consultant.

Instructors' Resources

Tucker Companion Site

The Tucker website at www.cengagebrain.com provides open access to PowerPoint chapter review slides; an instructor's manual prepared by Douglas Copeland of Johnson County Community College, available in various formats; updates to the text, describing key concepts relevant to the current states of economics and the world today; PowerPoint lecture tools elaborating on key concepts and exhibits, which can be used as supplies or can be customized for instructor intentions; and test banks in various downloadable formats.

Student Resources

MindTap for Tucker

MindTap engages students and aids them in consistently producing their best work. By seamlessly integrating course material with interactive media, step-by-step graphing, activities, apps, and much more, MindTap creates a unique learning path for courses that fosters increased comprehension and efficiency of the material.

- MindTap delivers real-world relevance with activities, assignments, homework, media, and study tools that help students build critical thinking and analytic skills that will carry over to their professional lives.
- MindTap helps students stay organized and efficient with a single destination that reflects what's important to the instructor and the tools to master

that content. MindTap empowers students to get their "game face on" by motivating them with competitive benchmarks in performance.

- Relevant readings, multimedia, and activities are designed to take students up the levels of learning from basic knowledge to analysis and application.
- Analytics and reports provide a snapshot of class progress, time in course, engagement, and completion rates.
- News Analysis and Concept Clips help students by bringing real world economic applications to life. A+ Test Prep provides practice tests that help students identify topics that need further study.
- Homework and the Math & Graphing Tutorial, both powered by Aplia, and videos that explain key graphs round out the student learning experience within MindTap that enable students to master course content.
- New features to this edition are Video Problem Walk-Throughs which walk a student through a challenging homework problem.
- Interactive Graphing Lessons break down graphing concepts into digestible assignments with corresponding video support.

Acknowledgments

A deep debt of gratitude is owed to the reviewers of all 11 editions for their expert assistance. All comments and suggestions were carefully evaluated and served to improve the final product.

Special Thanks

Much appreciation goes to Chris Rader, Product Manager, for allowing us contributing authors, Douglas W. Copeland (Johnson Country Community College) and Inge O'Connor (Syracuse University), to have the opportunity to revise Irvin Tucker's *Economics for Today* for this eleventh edition. Many thanks also goes to Anita Verma and Colleen Farmer, senior Content Managers; Brian Rodriguez and Eugenia Belova as senior In-House Subject Matter Experts and Andrew DeJong as In-House Subject Matter Expert. We also want to express our sincere thanks for a job well done to the entire team at Cengage.

A Tribute to Irvin B. Tucker

The contributing authors, Douglas W. Copeland, and Inge O'Connor, and the entire Cengage team want to express our heartfelt gratitude for the opportunity and the privilege to have been able to work on this textbook. Many of us had the pleasure of working with Irvin Tucker and this textbook over all these many years. Some of us, including Doug Copeland, have had the honor of working with Irvin from the beginning, when this book was just a manuscript. We know of few, if any, other authors who have consistently demonstrated such a firm commitment and tireless dedication to teaching and learning. Irvin always believed that knowledge of economics can enhance people's lives and should, therefore, be made accessible to everyone. And Irvin displayed the rare ability to translate complex concepts into easily understood principles that have enriched the lives of countless numbers of students across the globe. He has made economics not only accessible but fun to learn.

For this, he has distinguished himself among the very best economists of our time! His life has complemented the profession of economics and promoted the noble cause of education. Beyond having earned our respect as a superb economist and author, Irvin was also always a joy to work with. He was always kind to everyone, willing to listen to any new ideas or suggestions, and consistently made everyone feel needed and appreciated.

We would be remiss if we did not also make a tribute to Irvin's wife, Nonie. Nonie has also demonstrated the traits of those you feel blessed to work with. She has also made countless meaningful contributions to this title from the very beginning. Irvin and Nonie have always been known to be "quite the team!" Thank you, Irvin, and thank you, Nonie! You have made the world a better place!

This edition is dedicated to the memory of Irvin B. Tucker.

Chapter 1

Introducing the Economic Way of Thinking

Chapter Objectives

1. Describe economics as a field of study.
2. Describe the three fundamental economic questions that arise from scarcity.
3. Discuss the steps and common pitfalls in the economic model-building process.
4. Describe common sources of disagreement among economists.

Have you ever wondered why colleges and universities charge students different tuition rates for the same education or why some countries grow rich while others remain poor and less developed? In this text, you will learn what it means to think economically, and you will come to see how the economic way of thinking is a powerful tool that can be used to explain a broad array of issues, from small choices we make in our daily lives to larger issues faced by countries worldwide. So, let's get started and begin exploring the economic way of thinking.

1-1 Economics: The Study of Scarcity and Choice

Economics is sometimes referred to as the "science of choice." We all make choices every day. Should you get up early to study for a test or sleep in? Should you stop at a fast food restaurant on the way home or wait to cook dinner when you get home? The need to make choices is unavoidable. Robert Frost described this in his poem "The Road Less Traveled" and the Rolling Stones sang "You Can't Always

Get What You Want." Let's look a bit more closely now at why we must make choices and how the economic way of thinking helps us understand the choices people make.

1-1a The Problem of Scarcity

Scarcity
The condition in which human wants are forever greater than the available supply of time, goods, and resources.

At the heart of the economic way of thinking is the fact that we live in a world of scarcity. **Scarcity** is the condition in which human wants are forever greater than the available supply of time, goods, and resources. Because of scarcity, we are unable to have as much as we would like. Pause for a moment to consider some of your own unsatisfied wants. Perhaps you would like a new winter coat, a car, clean air, better health care, shelter for the homeless, more leisure time, and so on. Unfortunately, there is not enough time nor are there enough resources to satisfy every want. Instead, there are always limits on the economy's ability to satisfy these unlimited wants and as a result, choices must be made.

The problem of scarcity impacts individuals, governments, and societies throughout the world. You may think the scarcity problem would disappear if you were rich, but even the "rich and famous" desire finer homes, faster planes, and more yachts. What is true for individuals also applies to society. The federal government never has enough money to spend for education, highways, police, national defense, Social Security, and all the other programs it wants to fund. Finally, scarcity is a fact of life throughout the world.

In much of South America, Africa, and Asia, the problem of scarcity is often life-threatening. On the other hand, even in more developed countries where life is much less "grueling" such as in North America, Western Europe, and some parts of Asia, the problem of scarcity still exists because individuals and countries never have as much of all the goods and services as they would like to have.

As a result of scarcity, every nation must decide what combination of goods and services to produce, how to produce them, and who is going to get those goods and services. These economic choices have profound social and political implications.

Take Note

Scarcity forces all societies to make choices regarding what combination of goods and services to produce, how to produce them and who will get the limited supply of those goods and services.

1-1b Scarcity and Economics

Economics
The study of how society chooses to allocate its scarce resources to the production of goods and services to satisfy unlimited wants.

The perpetual problem of scarcity forcing people and nations to make choices is the basis for the definition of economics. **Economics** is the study of how society chooses to allocate its scarce resources to satisfy unlimited wants. You may be surprised by this definition. People often think economics means studying supply and demand, the stock market, money, and banking. Well, those are certainly parts, but economics is more all-encompassing. It is the study of the choices we make because we are faced with scarcity—because we are unable to have as much as we would like.

Society makes two broad levels of choices: economy-wide, or macro choices, and individual, or micro choices. The prefixes *macro* and *micro* come from the Greek words meaning "large" and "small," respectively. Reflecting the macro and micro perspectives, economics consists of two main branches: *macroeconomics* and *microeconomics*.

The old saying "look at the forest rather than the trees" describes **macroeconomics**, which is the branch of economics that studies decision making for the economy as a whole. This "big picture" view is concerned with what causes the broader economy to sometimes expand and grow and provide for more jobs, while at other times it experiences a recession and higher rates of unemployment. In our discussions of the macroeconomy, we often focus on this "business cycle" and what government can do to try to smooth out these fluctuations to promote full employment and economic growth, and to minimize inflation.

Macroeconomics
The branch of economics that studies decision making for the economy as a whole.

Examining individual trees, leaves, and pieces of bark, rather than surveying the forest, illustrates microeconomics. **Microeconomics** is the branch of economics that studies decision making by a single individual, household, firm, industry, or level of government. It applies a microscope to study specific parts of an economy, as one would examine cells in the body. Microeconomics typically focuses on a specific market or industry, or even a specific firm within an industry.

Microeconomics
The branch of economics that studies decision making by a single individual, household, firm, industry, or level of government.

We have described macroeconomics and microeconomics as two separate branches, but they are related. Because the overall economy is the sum, or aggregation, of its parts, micro changes affect the macro economy, and macro changes produce micro changes.

Take Note

Economics is the study of how society chooses to allocate its scarce resources to the production of goods and services to satisfy unlimited wants; microeconomics studies how decisions are made by individuals and firms, while macroeconomics is concerned with broader issues that impact the economy as a whole.

1-2 Three Fundamental Economic Questions

Because of the problem of scarcity, whether rich or poor, every nation must answer the same three fundamental economic questions:

1. *What* products will be produced?
2. *How* will they be produced? and
3. *For Whom* will they be produced?

Let's take a closer look at each fundamental question.

1-2a What to Produce?

The *What* question requires that an economy decide the mix and quantity of goods and services it will produce. Should society devote more of its limited resources to producing health care and less to military goods? Should society produce more electric cars and fewer SUVs? The problem of scarcity restricts our ability to produce everything we want during a given period, so the choice to produce "more" of one good requires producing "less" of another good. The answer to the *What* question is determined differently across economic systems, with some relying more heavily on the decisions of self-interested individual buyers and sellers operating through markets and others relying more on government decision-making to determine what gets produced.

1-2b How to Produce?

After deciding *what* products to make, the second question for society to decide is *how* to mix existing technology and resources to produce these goods. Because of the economic problem of scarcity, no society has enough resources to produce all the goods and services necessary to satisfy all human wants. **Resources** are the basic categories of inputs used to produce goods and services. Resources are also called *factors of production* (or *"inputs"*). Economists divide resources into three categories:

1. *Land*
2. *Labor*
3. *Capital*

Resources
The basic categories of inputs used to produce goods and services. Resources are also called *factors of production*. Economists divide resources into three categories: *land, labor*, and *capital*.

Land is a shorthand expression for any natural resource provided by nature that is used to produce a good or service. *Land* includes those resources or raw materials that are gifts of nature available for use in the production process. Farming, building factories, and constructing oil refineries would be impossible without land. Land includes anything natural above or below the ground, such as forests, gold, diamonds, oil, coal, wind, and the ocean.

Land
Any natural resource provided by nature that is used to produce a good or service.

Labor is the mental and physical capacity of workers to produce goods and services. The services of farmers, assembly-line workers, lawyers, professional football players, and economists are all *labor*. The labor resource is measured both by the number of people available for work and by the skills or quality of workers. One reason that nations differ in their ability to produce is that human characteristics, such as the educational opportunities, experience, and health, of workers, differ among nations. For this reason, education and training, which improve the ability of workers to perform their work, play an important role in answering the *How* question.

Labor
The mental and physical capacity of workers to produce goods and services.

Capital can be defined as a human-made good used to produce other goods and services; it includes physical plants, machinery, equipment, roads, and bridges. The term *capital*, as it is used in the study of economics, should not be confused with the term *financial capital*, which when used in everyday conversations refers to money or stocks and bonds. However, *capital* as used by economists means a factor of production such as a factory or machinery.

Capital
A human-made good used to produce other goods and services.

The three factors of production are organized, managed, and directed by entrepreneurs. **Entrepreneurship** is the creative ability of individuals to seek profits by taking risks and combining resources to produce innovative products. Entrepreneurs, because they are another human resource, could be thought of as a special type of labor. Entrepreneurs are often successful when they embrace new or existing technologies (using their "know-how") in creative ways. For example, consider all of the amazing apps created for use with Androids and the iPhone. An important benefit of entrepreneurship is that it creates a growing economy.

Entrepreneurship
The creative ability of individuals to seek profits by taking risks and combining resources to produce innovative products.

1-2c For Whom to Produce?

After the *What* and *How* questions are resolved, the third question is *For Whom* are these products produced? This question concerns how the economic pie is divided. Who is fed well? Who drives a Mercedes? Who receives organ transplants? In some economic systems, the *For Whom* question is largely decided by the government, while in others, it is decided by the owners of the factors of production.

Am I on Track?

1. Because of scarcity, no society has enough resources (land, labor, and capital) to produce the goods and services necessary to satisfy all human wants. As a result, every nation must:
   a. Work to eliminate scarcity
   b. Make choices about what, how, and for whom to produce
   c. Establish a minimum wage
   d. All of the above

Answers at the end of chapter.

1-3 The Methodology of Economics

As used by other disciplines, such as criminology, biology, chemistry, and physics, economists employ a step-by-step procedure for solving problems.

Step 1: Identify the problem
Step 2: Develop a model
Step 3: Gather data and test whether the theory can be supported by the data
Step 4: Formulate a conclusion

Step 1: Identify the Problem

The first step in applying the economic method is to define the issue. Suppose as an example, an economist wishes to investigate the microeconomic problem of why U.S. motorists cut back on gasoline consumption in a given year from, say, 400 million gallons per day in May to 300 million gallons per day in December. So, the issue we will investigate is, "Why did the consumption of gasoline decrease during this time?"

Step 2: Develop a Model

The second step in applying the economic method is for the economist to build a model. A **model** is a simplified description of reality used to understand and predict the relationship between variables. A model emphasizes only those variables that are most important to explaining an event. The purpose of a model is to construct an abstraction from real-world complexities and make events understandable. Consider a model airplane that is placed in a wind tunnel to test the aerodynamics of a new design. For this purpose, the model must represent only the shapes of the wings and fuselage, but it does not need to include tiny seats, electrical wiring, or other interior design details.

Model
A simplified description of reality used to understand and predict the relationship between variables.

To be useful, a model requires simplified assumptions. In our gasoline consumption example, several variables might be related to the quantity of gasoline consumed, including the price of gasoline, consumer incomes, the fuel economy of cars, and weather conditions. Using their expertise, economists must select the variables that are related to gasoline consumption and reject variables that have only a slight or no relationship to gasoline consumption. In this simple case, the economist removes the cloud of complexity by formulating a *theory*, which states that increases in the price of gasoline *cause* the quantity of gasoline consumed to decrease during the time period.

Step 3: Gather Data and Test the Theory

The purpose of an economic model is to *forecast* or *predict* the results of various changes in variables. An economic theory can be expressed in the form "If *X*, then *Y*, all other things held constant." An economic model is useful only if it yields accurate predictions. In this third step, the economist gathers data to test the theory that if the price of gasoline *rises*, then gasoline purchases *fall*—all other relevant factors held constant.

Step 4: Formulate a Conclusion

When the evidence is consistent with the theory that *X* causes outcome *Y*, there is confidence in the theory's validity. When the evidence is inconsistent with the theory that *X* causes outcome *Y*, the researcher rejects this theory. Suppose the investigation reveals that the price of gasoline rose sharply between May and December. The data, therefore, appear to support the theory that the quantity of gasoline consumed falls when its price rises, assuming no other factors which could have caused people to buy less gasoline have changed.

1-4 Hazards of the Economic Way of Thinking

As we just saw, models help us understand and predict the impact of changes in economic variables. As such, a model is an important tool in the economist's toolkit, but it must be handled with care. The economic way of thinking seeks to avoid reasoning mistakes. Two of the most common pitfalls to clear thinking are:

1. failing to understand the *ceteris paribus assumption*.
2. confusing *correlation* and *causation*.

1-4a The Ceteris Paribus Assumption

Ceteris paribus
A Latin phrase that means while certain variables change, "all other things remain unchanged."

Ceteris paribus is a Latin phrase that means while certain variables change, "all other things remain unchanged." In short, the ceteris paribus assumption allows us to isolate or focus attention on selected variables. In our gasoline example, a key simplifying assumption of the model is that changes in consumer incomes and certain other variables do not occur and complicate the analysis. The ceteris paribus assumption holds everything else constant and therefore allows us to concentrate on the relationship between two key variables: changes in the price of gasoline and the quantity of gasoline purchased per month.

Now suppose an economist examines a model explaining the relationship between the price and quantity purchased of Coca-Cola. The theory is "If the price increases, then the quantity of Coca-Cola purchased decreases, ceteris paribus." Now assume you observe that the price of Coca-Cola increased in one summer, and some people actually bought more, not less. Based on this real-world observation, you might declare that the theory is incorrect. Think again! Perhaps the reason the model appeared flawed is because another factor—for example a sharp rise in the temperature—*caused* people to buy more Coca-Cola in spite of its higher price. However, if the temperature and all other factors were held constant, and the ceteris paribus assumption is satisfied, we would find that as the price of Coca-Cola rises, people will indeed buy less Coca-Cola, as the model predicts.

Take Note It is important to make sure the ceteris paribus assumption, that all other things remain unchanged, is satisfied if we wish to correctly conclude there is a relationship between two variables.

1-4b Correlation versus Causation

Another common error in reasoning is confusing *correlation* (or association) and *causation* between variables. Stated differently, you err when you read more into a relationship between variables than is actually there. A model is valid only when a cause- and-effect relationship is stable or dependable over time, rather than being an association that occurs by chance and eventually disappears. Suppose Jai baked cookies during three different months and stock market prices rose during each of those months. Jai's cookie baking is *correlated* with the increase in stock prices, but this does not mean the baking *caused* the event. Even though there is a statistical relationship between these two variables in a number of observations, eventually the cookie baking will occur and stock prices will fall or remain unchanged. The reason is that there is no true systematic economic relationship between cookie baking and stock prices.

Take Note The fact that one event follows another does not necessarily mean that the first event caused the second event.

Am I on Track?

2. Ajay received an A on the math exam he took last week while wearing his blue sweater. He plans to wear the same sweater to his sociology exam this week hoping to receive an A on that exam as well. Ajay's behavior is an example of:

a. The steps in the model-building process
b. The ceteris paribus assumption
c. An error in reasoning by confusing correlation with causation
d. Macroeconomics

Answers at the end of chapter.

1-5 Why Do Economists Disagree?

Why might one economist say a clean environment should be our most important priority and another economist say economic growth should be our most important goal? If economists share the economic way of thinking and carefully avoid reasoning pitfalls, then why do they disagree? Why are economists known for giving advice by saying, "On the one hand, if you do this, then *A* results, and, on the other hand, doing this causes result *B*?" George Bernard Shaw once said, "If you took all the economists in the world and laid them end to end, they would never reach a conclusion." It might appear that economists disagree more than other professionals, but physicists,

doctors, business executives, lawyers, and others often disagree as well. Actually, economists agree on a wide range of issues. Many economists, for example, agree that the benefits from free trade outweigh the costs, that a market-driven healthcare delivery system has many flaws, and that government deficit spending (which adds to the national debt) can be a good thing if we want to recover more quickly from a recession. When disagreements do exist, the reason can often be explained by either the tradeoff between efficiency and equity or the difference between positive economics and normative economics.

A Closer Look

Applicable Concept: Correlation versus Causation

Unusual Economic Indicators

While we now understand that correlation does not necessarily mean causation, many economic indicators have been created that show interesting and sometimes unusual correlations which may or may not reflect causation. Here are just a few.

Super Bowl Indicator

Our first example is the Super Bowl Indicator, which shows that a Super Bowl win by a National Football Conference (NFC) team predicts that in the following December the stock market will be higher than the year before. A win by an old American Football League (AFL) team predicts a dip in the stock market. Seem unlikely? The Super Bowl Indicator has been correct nearly 80 percent of the time over the past 50 years![1] What do you think? Does correlation mean causation in this case?

The Boston Snow Index

The Boston Snow Index (BSI) is the brainchild of a vice president of a New York securities firm. It predicts a rising economy for the next year if there is snow on the ground in Boston on Christmas Day. The BSI predicted correctly about 73 percent of the time over a 30-year period. However, its creator, David L. Upshaw, did not take it too seriously and views it as a spoof of other forecasters' methods.[2]

Marriage Indicator

Anthony Chan, chief economist for Bank One Investment Advisors, studied marriage trends over a 34-year period. He discovered that when the number of marriages increases, the economy rises significantly, and a slowdown in marriages is followed by a decline in the economy. Chan explains that there is usually about a 1-year lag between a change in the marriage rate and the economy.[3]

The Diaper Rash Indicator

Could an increase in the sale of diaper rash creams indicate a recession? It's possible. During a recession, families cut back on all kinds of spending, including spending on diapers. An unintended consequence of this may be an increase in diaper rash. SymphonyIRI data indicate that between August 2010 and August 2011, although the number of babies under the age of two fell by 3 percent, sales of disposable diapers fell by 9 percent. During that same time period, sales of diaper rash creams and ointments rose 2.8 percent.[4]

The Champagne Index

Sales of champagne have been used as a barometer of the economy's strength. Champagne is often used as part of a celebration, and people may have less to celebrate during an economic downturn. Mark Reeth reported that "shipments of champagne to the U.S. reached 23.1 million bottles in 2006. Then the recession hit, and shipments plummeted to 12.5 million bottles by 2009."[5]

1. Mike Murphy, "Patriots' Super Bowl Win Bodes Ill for the Stock Market," *Market Watch,* February 6, 2017.
2. "Economic Indicators, Turtles, Butterflies, Monks, and Waiters," *The Wall Street Journal,* August 27, 1979, pp. 1, 16.
3. Sandra Block, "Worried? Look at Wedding Bell Indicator," *The Charlotte Observer,* April 15, 1995, p. 8A.
4. Guss Lubin, "The Diaper Rash Economic Indicator" *Business Insider,* Sept. 6, 2011.
5. Mark Reeth, "9 Unusual Economic Indicators to Watch" *UsNews & World Report,* April 13, 2020.

1-5a Efficiency versus Equity

Economists generally use the term **efficiency** to describe a situation where society is "doing the best it can" with its existing resources and technology. This implies society is producing the best combination of goods and services as well as maximizing production. **Equity**, on the other hand, focuses on fairness in the way production is distributed among members of society. Simply stated, and shown in Exhibit 1, efficiency is concerned with maximizing the size of the economic pie while equity is concerned with how the pie is divided. Often society faces a trade-off between efficiency and equity.

Efficiency
A situation where society is "doing the best it can" with existing resources and technology.

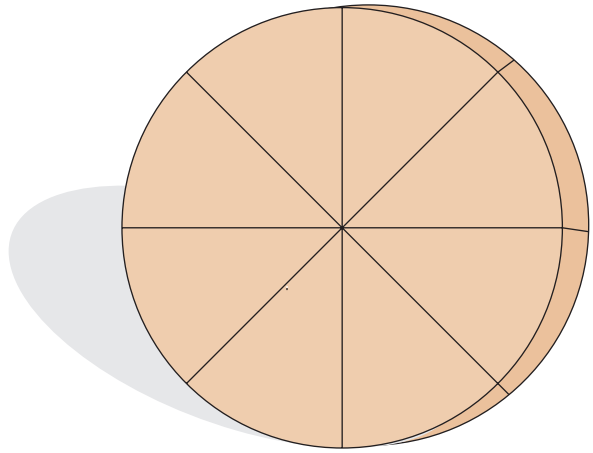
Equity
Fairness in the way production is distributed among members of society.

Consider a simple example. You are in line at the grocery store on a busy Friday afternoon. Many other customers are also in line. The store opens a new check-out lane to get more customers through the line faster (to increase efficiency). Typically, when a new lane opens, it's the customer at the back of the existing lines who is most able to move to the new lane as they do not yet have their items on the conveyor belt. Here we see the trade-off between efficiency, more items being scanned, and equity, those who have waited the shortest amount of time moving through more quickly.

Many economic policies encounter the efficiency versus equity trade-off. For example, it may be more efficient for foreign companies to produce a particular good because they have lower costs of production. This reduces the prices paid by consumers. However, this could also drive domestic firms out of businesses and create job loss in that industry. Many government policies face the efficiency versus equity trade-off including those pertaining to the environment, income taxes, international trade, and much more. Economists may disagree on the importance of efficiency versus equity in any given situation because of differences in their subjective value judgments concerning what they consider to be "fair" or "just." This brings us to the importance of distinguishing positive economics from normative economics.

Exhibit 1 Efficiency vs. Equity

Generally speaking, efficiency refers to maximizing the size of the economic pie while equity refers to fairly distributing the pie. Government policies often face a trade-off between the two.



1-5b Positive versus Normative Economics

Positive economics
An analysis limited to statements about "what is" that can be tested and determined to be true or false.

Normative economics
An analysis based on subjective value judgments regarding "what ought to be" that cannot be tested.

Economists must distinguish between positive economics and normative economics when analyzing any economic problem or issue. **Positive economics** objectively deals with facts that can be tested and therefore addresses "***what is***" true or false regarding how the economy works. "The minimum wage in California is $15 per hour" is a positive statement. It may be true or it may be false, but it can be tested. **Normative economics**, on the other hand, subjectively deals with "***what ought to be***" based on value judgments and cannot be proven by facts to be true or false. Certain words or phrases, such as "good," "bad," "need," and "should" indicate that we have entered the realm of normative economics. "All states should have a $15 minimum wage" is a normative statement. It reflects an opinion or value judgement that cannot be tested by facts.

These subjective value judgements are the result of ever-present social and political influences that shape our opinions. One person may argue that government *ought to* take steps to ensure a more *fair* distribution of income and wealth. Another may argue that health care is a basic human right that *needs* to be made available to all regardless of their ability to pay. And the real "art" of economics is applying the knowledge gained from positive economics, about "what is" true concerning how the economy actually works, to formulating policies that will best achieve our normative economic goals regarding "what ought to be."

Positive economics deals with "what is" while normative economics deals with "what ought to be." The "art" of economics is applying the knowledge gained from positive economics to formulate policies to best achieve the goals of "what ought to be" in normative economics.

3. Which of the following statements is a positive economic statement?

a. The unemployment rate is 4.5 percent.
b. Too many people are unemployed.
c. We should cut unemployment benefits to encourage people to go back to work.
d. The government needs to be an employer of last resort to ensure everyone has a job when they want one.

○ Answers at the end of chapter.

A Closer Look

Applicable Concepts: Positive and Normative Analyses

Does the Minimum Wage Really Help the Working Poor?

The distinction between positive and normative economics can be especially important when considering a controversial public policy proposal like raising the minimum wage. See if you can distinguish the positive and normative economic statements in this debate.

Minimum wages exist in more than 100 countries. In 1938, Congress enacted the federal Fair Labor Standards Act, commonly known as the "minimum-wage law." Today, a minimum wage worker who works full-time still earns a deplorably low annual income. One approach to help the working poor earn a living wage might be to raise the minimum wage. Many have recently argued that it should be raised to $15 per hour.

The dilemma for Congress is that a higher minimum wage for the employed is enacted at the expense of jobs for unskilled workers. Opponents forecast that the increased labor cost from a large minimum wage hike would jeopardize hundreds of thousands of unskilled jobs. For example, employers may opt to purchase more capital and less expensive labor. Restaurants can use iPads instead of servers to take orders and install robotic burger flippers. The fear of such sizable job losses forces Congress to perform a difficult balancing act to ensure that a minimum wage increase is large enough to help the working poor, but not so large as to threaten their jobs.

Some politicians claim that raising the minimum wage is a way to help the working poor without cost to taxpayers. Others believe the cost is hidden in inflation and lost employment opportunities for marginal workers, such as teenagers, older adults, and underrepresented groups. One study by economists, for example, examined 60 years of data and concluded that minimum wage increases resulted in reduced employment and hours of work for low-skilled workers.[1]

Another problem with raising the minimum wage to aid the working poor is that the minimum wage is a blunt weapon for redistributing wealth. Some studies show that only a small percentage of minimum wage earners are full-time workers whose family income falls below the poverty line. This means that most increases in the minimum wage go to workers who

Tony Stock/Shutterstock.com

are not poor. For example, many minimum wage workers are students living at home or workers whose spouse earns a much higher income. To help only the working poor, some economists argue that the government should target only those who need assistance, rather than using the "shotgun" approach of raising the minimum wage.

Supporters of raising the minimum wage are not convinced by these arguments. They say it just isn't right that a worker who works full-time should live in poverty. They point to the fact that the minimum wage has not kept pace with the typical worker's wage or with the cost of living. As a result, a growing underclass has to rely on some form of public assistance, like food stamps. And this, they argue, only adds to income inequality as taxpayers end up subsidizing profitable companies who don't pay their workers a living wage.

Moreover, people on this side of the debate believe that opponents exaggerate many of their claims, especially the extent to which unemployment and higher prices result from a higher minimum wage. They provide evidence that the benefits from a higher minimum wage may more than offset these costs.[2] For example, when earning a higher wage, workers will spend more money, generating a need for companies to expand production and to hire even more workers. In addition, the gain from these higher incomes far exceed the cost of higher prices, leaving workers better off. To proponents, increasing the minimum wage is a win-win proposition. We return to this issue in Chapter 4 as an application of supply and demand analysis.

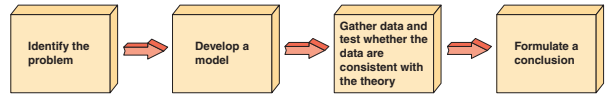
1. David Neumark and William Wascher, *Minimum Wages*, Cambridge, MA, The MIT Press, 2008.
2. Economic Policy Institute, "The impact of raising the federal minimum wage to $12 by 2020 on workers, businesses, and the economy." Testimony before the U.S. House Committee on Education and the Workforce Member Forum. April 27, 2016, found at http://www.epi.org/publication/the-impact-of-raising-the-federal-minimum-wage-to-12-by-2020-on-workers-businesses-and-the-economy-testimony-before-the-u-s-house-committee-on-education-and-the-workforce-member-forum/.

Key Terms

Scarcity
Resources
Land
Labor
Entrepreneurship
Capital
Economics
Equity
Macroeconomics
Microeconomics
Model
Efficiency
Ceteris paribus
Positive economics
Normative economics

Summary

- Scarcity is the fundamental economic problem that human wants exceed the available time, goods, and resources. Individuals and society therefore can never have everything they desire.
- Economics is the study of how individuals and society choose to allocate scarce resources to satisfy unlimited wants. Faced with unlimited wants and scarce resources, we must make choices among alternatives.
- Macroeconomics applies an economy-wide perspective that focuses on such issues as inflation, unemployment, and the growth rate of the economy while microeconomics examines individual decision-making units within an economy, such as a consumer's response to changes in the price of coffee and the reasons for changes in the market price of personal computers.
- Because of the problem of scarcity, whether rich or poor, every nation must answer the same three fundamental economic questions: (1) *What* goods and services to produce (2) *How* to produce those goods and services, and (3) *For Whom* will they be produced?
- Resources are factors of production classified as land, labor, and capital. Entrepreneurs seek profits by taking risks and combining resources to produce innovative products.
- Models are simplified descriptions of reality used to understand and predict economic events. If the event is not consistent with the model, the model is rejected.



- Ceteris paribus holds "all other factors unchanged" that might affect a particular relationship. If this assumption is violated, a model may not predict accurately. Another reasoning pitfall is to think that *correlation* means *causation*.
- Society often faces a tradeoff between efficiency, or doing the best we can with our existing resources, and equity, which is concerned with distributing that limited production fairly among members of society.
- Positive economics deals with "what is" true about how the economy actually works, while normative economics deals with value judgments regarding "what ought to be." The "art" of economics is using the knowledge gained in positive economics to develop policies that will help us realize the goals established in normative economics.

Take Note Revisited

- Scarcity forces all societies to make choices regarding what combination of goods and services to produce, how to produce them and who will get the limited supply of those goods and services.
- Economics is the study of how society chooses to allocate its scarce resources to the production of goods and services to satisfy unlimited wants; microeconomics studies how decisions are made by individuals and firms, while macroeconomics is concerned with broader issues that impact the economy as a whole.
- It is important to make sure the ceteris paribus assumption, that all other things remain unchanged, is satisfied if we wish to correctly conclude there is a relationship between two variables.

- The fact that one event follows another does not necessarily mean that the first event caused the second event.
- Positive economics deals with "what is" while normative economics deals with "what ought to be." The "art" of economics is applying the knowledge gained from positive economics to formulate policies to best achieve the goals of "what ought to be" in normative economics.

Study Questions and Problems

Please see Appendix A for answers to the odd-numbered questions. Your instructor has access to the answers for even-numbered questions.

1. Explain why both nations with high living standards and nations with low living standards face the problem of scarcity. If you won $1 million in a lottery, would you escape the scarcity problem?
2. Why do you think economics is sometimes referred to as "the science of choice"?
3. Explain the difference between macroeconomics and microeconomics. Give examples of the areas of concern to each branch of economics.
4. Which of the following are microeconomic issues? Which are macroeconomic issues?
   a. How will an increase in the price of Coca-Cola affect the quantity of Pepsi Cola sold?
   b. What will cause the nation's inflation rate to fall?
   c. How does a quota on textile imports affect the textile industry?
   d. Does a large federal budget deficit reduce the rate of unemployment in the economy?
5. What are two other terms that might be used interchangeably with the term "resources"?
6. Why isn't money considered capital in economics?
7. Explain why it is important for an economic model to be an abstraction from the real world.
8. Explain the importance of the ceteris paribus assumption for an economic model.
9. Suppose Congress cuts spending for the military, and then unemployment rises in the U.S. defense industry. Is there causation in this situation, or are we observing a correlation between events?
10. Use the analogy of a pie to explain the terms efficiency and equity.
11. Suppose universities that belong to big-time athletic conferences have higher graduation rates than nonmembers. Does this mean Nebraska State should join a big-time athletic conference?

Am I on Track? Answers 1. **b** 2. **c** 3. **a**

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. Which of the following illustrates the concept of scarcity?
   a. More clean air is wanted than is available in large polluted metropolitan areas such as Mexico City.
   b. There is usually more than one use of your "free" time in the evening.
   c. There are many competing uses for the annual budget of your city, county, or state.
   d. All of the above are correct.

2. Which of the following correctly identifies the factors of production?
   a. The outputs generated by the production process transforming land, labor, and capital into goods and services
   b. Resources restricted to the land, such as natural resources that are unimproved by human economic activity
   c. Land (natural resources), labor (human capital, entrepreneurship), and capital (constructed inputs such as factories)
   d. Just labor and capital in industrialized countries, where natural resources are no longer used to produce goods and services
3. Which of the following *best* describes the three fundamental economic questions?
   a. What to produce, when to produce, and where to produce
   b. What time to produce, what place to produce, and how to produce
   c. What to produce, when to produce, and for whom to produce
   d. What to produce, how to produce, and for whom to produce
4. Which of the following is the best definition of economics?
   a. Economics is the study of how to manage corporations to generate the greatest return on shareholder investment.
   b. Economics is the study of how to manage city and county government to generate the greatest good to its citizens.
   c. Economics is the study of how society chooses to allocate its scarce resources.
   d. Economics is the study of how to track revenues and costs in a business.
5. Which of the following *best* illustrates the application of the model-building process to economics?
   a. On a Sunday morning talk show, two economists with differing political agendas argue about the best way to solve the Social Security problem.
   b. A labor economist notices that unemployment tends to be higher among teenagers than more experienced workers, develops a model, and gathers data to test the hypotheses in the model.
   c. A Ph.D. student in economics makes up data on the lumber market and develops a model for their dissertation that seems to be consistent with the data.
   d. Economists come to believe that some economic models are true simply because prominent leading economists say they are true.
6. Which of the following represents causality rather than correlation?
   a. In years that fashion dictates wider lapels on men's jackets, the stock market grows by at least 5 percent.
   b. Interest rates are higher in years ending with a 1 or a 6.
   c. Unemployment falls when the AFC champion wins the Super Bowl.
   d. Quantity demanded goes up when price falls because lower prices increase consumer purchasing power and because some consumers of substitute goods switch.
7. Which of the following describes the ceteris paribus assumption?
   a. If we increase the price of a good, reduce consumer income, and lower the price of substitutes and if quantity demanded is observed to fall, we know that the price increase caused the decline in quantity demanded.
   b. If the federal government increases government spending and the Federal Reserve Bank lowers interest rates, we know that the increase in government spending caused unemployment to fall.
   c. If a company reduces its labor costs, negotiates lower materials costs from its vendors, and advertises, we know that the reduced labor costs are why the company's profits are higher.
   d. If we decrease the price of a good and observe that there is an increase in the quantity demanded, holding all other factors that influence this relationship constant.
8. The condition of scarcity
   a. cannot be eliminated.
   b. prevails in poor economies.
   c. prevails in rich economies.
   d. all of the above are correct.
9. Which of the following *best* describes an entrepreneur?
   a. A person who works as an office clerk at a major corporation
   b. A person who combines the factors of production to produce innovative products

c. A special type of capital
d. Wealthy individuals who provide savings that stimulates the economy

10. If, in the current situation, no one is able to be made better off without someone else being made worse off, then this situation is said to be
a. equitable.
b. normative.
c. efficient.
d. effective.

11. Because of scarcity,
a. it is impossible to satisfy every desire and choices must be made.
b. the available supply of time, goods, and resources is greater than human wants.
c. every desire is fulfilled.
d. there are no limits on the economy's ability to satisfy unlimited wants.

12. Which of the following represents positive economics?
a. Policy X is fair.
b. Outcome Y is the best objective to achieve.
c. If policy X is followed, then outcome Y results.
d. All of the above are positive economic analyses.

13. Which of the following is the last step in the model-building process?
a. Collect data and test the model.
b. Develop a model based on simplified assumptions.
c. Identify the problem.
d. Formulate a conclusion.

14. Which of the following is *not* a type of economic analysis?
a. Positive
b. Resources
c. Normative
d. None of the above

15. All of the following describe positive economics *except*
a. describes "what ought to be."
b. can be tested.
c. describes "what is."
d. uses facts.

16. Which of the following would eliminate scarcity as an economic problem?
a. Moderation of people's competitive instincts
b. Discovery of new, sufficiently large energy reserves
c. Resumption of steady productivity growth
d. None of the above is correct

17. Which resource is *not* an example of capital?
a. Equipment
b. Machinery
c. Physical plants
d. Stocks and bonds

18. Which of the following is the second step in the model-building process?
a. Collect data and test the model.
b. Develop a model based on simplified assumptions.
c. Identify the problem.
d. Include all possible variables that affect the model.

19. Which of the following is a type of economic analysis?
a. Positive
b. Resources
c. Association
d. None of the above is correct.

20. Economic policies often face a trade-off between efficiency, or maximizing the size of the economic pie, and equity, which describes
a. the ingredients used to make the pie.
b. how the pie is sliced.
c. who owns the pie.
d. all of the above.

Appendix to Chapter 1

Applying Graphs to Economics

Economists are famous for their use of graphs. The reason is "a picture is worth a thousand words." Graphs are used throughout this text to present economic models. By drawing a line, you can use a two-dimensional illustration to analyze the effects of a change in one variable on another variable. You could describe the same information using other model forms, such as verbal statements, tables, or equations, but a graph is the simplest way to present and understand the relationship between economic variables.

Don't be worried that graphs will "throw you for a loop." Relax! This appendix explains all the basic graphical language you will need. The following illustrates the simplest use of graphs for economic analysis.

1A-1 A Direct Relationship

Basic economic analysis typically concerns the relationship between two variables, both having positive values. Hence, we can confine our graphs to the upper-right (northeast) quadrant of the coordinate number system. In Exhibit A-1, notice that the scales on the horizontal axis (x-axis) and the vertical axis (y-axis) do not necessarily measure the same numerical values.

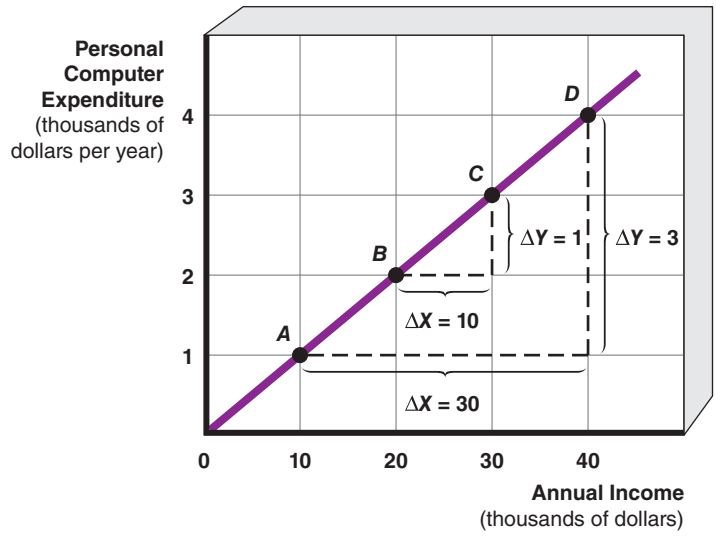
The horizontal axis in Exhibit A-1 measures annual income, and the vertical axis shows the amount spent per year for a personal computer (PC). The intersection of the horizontal and vertical axes is the *origin* and the point at which both income and expenditure are zero. In Exhibit A-1, each point is a coordinate that matches the dollar value of income and the corresponding expenditure for a PC. For example, point *A* on the graph shows that people with an annual income of $10,000 spent $1,000 per year for a PC. Other incomes are associated with different expenditure levels. For example, at $30,000 per year (point *C*), $3,000 will be spent annually for a PC.

Direct relationship
A positive association between two variables. When one variable increases, the other variable increases, and when one variable decreases, the other variable decreases.

The straight line in Exhibit A-1 allows us to determine the direction of change in PC expenditure as annual income changes. This relationship is *positive* because PC expenditure, measured along the vertical axis, and annual income, measured along the horizontal axis, move in the same direction. PC expenditure increases as annual income increases. As income declines, so does the amount spent on a PC. Thus, the straight line representing the relationship between income and PC expenditure is a direct relationship. A **direct relationship** is a positive association between two variables. When one variable increases, the other variable increases, and when one variable decreases, the other variable decreases. In short, both variables change in the *same* direction.

Exhibit A-1 Direct Relationship between Variables

The line with a positive slope shows that the expenditure per year for a personal computer has a direct relationship to annual income, ceteris paribus. As annual income increases along the horizontal axis, the amount spent on a PC also increases, as measured by the vertical axis. Along the line, each 10-unit increase in annual income results in a 1-unit increase in expenditure for a PC. Because the slope is constant along a straight line, we can measure the same slope between any two points. Between points *A* and *D*, the slope = $\Delta Y/\Delta X = +3/+30 = +1/+10 = 1/10$.



Expenditure for a Personal Computer at Different Annual Incomes

Point	Personal Computer Expenditure (thousands of dollars per year)	Annual Income (thousands of dollars)
A	1	10
B	2	20
C	3	30
D	4	40

Finally, an important point to remember: A two-variable graph, like any model, isolates the relationship between two variables and holds all other variables constant under the ceteris paribus assumption. In Exhibit A-1, for example, factors such as the prices of PCs and education are held constant by assumption. In Chapter 3, you will learn that allowing variables not shown in the graph to change can shift the position of the line or curve.

Take Note A direct (positive) relationship is expressed graphically as an upward sloping curve (or line).

1A-2 An Inverse Relationship

Inverse relationship
A negative association between two variables. When one variable increases, the other variable decreases, and when one variable decreases, the other variable increases.

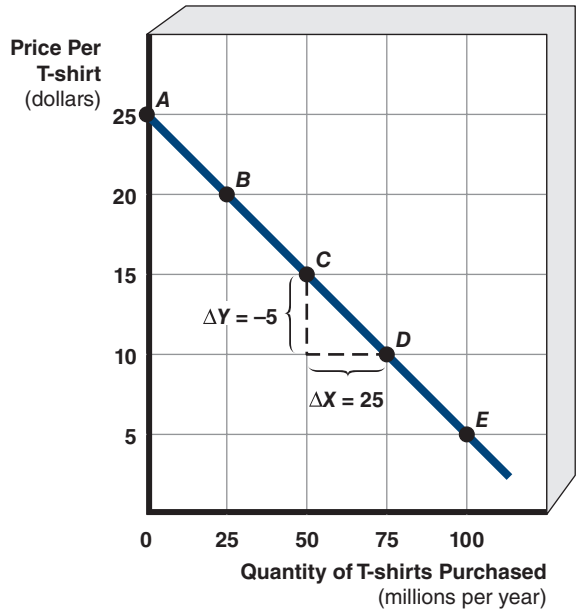
Now consider the relationship between the price of T-shirts and the quantity consumers will buy per year, shown in Exhibit A-2. These data indicate an *inverse* (or *negative*) relationship between the price and quantity variables. When the price is low, consumers purchase a greater quantity of T-shirts than when the price is high.

An **inverse relationship** is a negative association between two variables. When one variable increases, the other variable decreases, and when one variable decreases, the other variable increases. Stated simply, the variables move in *opposite* directions.

The line drawn in Exhibit A-2 is an inverse relationship. By long-established tradition, economists put price on the vertical axis and quantity on the horizontal axis. In Chapter 3, we will study in more detail the relationship between the price and the quantity demanded called the *law of demand*.

Exhibit A-2 An Inverse Relationship between Variables

The line with a negative slope shows an inverse relationship between the price per T-shirt and the quantity of t-shirts consumers purchase, ceteris paribus. As the price of a T-shirt rises, the quantity of T-shirts purchased falls. A lower price for T-shirts is associated with more T-shirts purchased by consumers. Along the line, with each $5 decrease in the price of T-shirts, consumers increase the quantity purchased by 25 units. The slope = $\Delta Y/\Delta X = -5/+25 = -1/5$.



The Quantity of T-Shirts Consumers Purchase at Different Prices

Point	Price per T-shirt	Quantity of T-shirts Purchased (millions per year)
A	$25	0
B	20	25
C	15	50
D	10	75
E	5	100

In addition to observing the inverse relationship (negative slope), you must interpret the *intercept* at point *A* in the exhibit. The intercept in this case means that at a price of $25, no consumer is willing to buy a single T-shirt.

Take Note An inverse (negative) relationship is expressed graphically as a downward sloping curve (or line).

1A-3 The Slope of a Straight Line

Plotting numbers provides a clear visual expression of the relationship between two variables, but it is also important to know how much one variable changes as another variable changes. To find out, we calculate the slope. The **slope** is the ratio of the change in the variable on the vertical axis (the rise or fall) to the change in the variable on the horizontal axis (the run). Algebraically, if *Y* is on the vertical axis and *X* is on the horizontal axis, the slope is expressed as follows (the delta symbol, Δ, means "change in"):

Slope
The ratio of the change in the variable on the vertical axis (the rise or fall) to the change in the variable on the horizontal axis (the run).

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in vertical axis}}{\text{change in horizontal axis}} = \frac{\Delta Y}{\Delta X}$$

Consider the slope between points *B* and *C* in Exhibit A-1. The change in expenditure for a PC, *Y*, is equal to +1 (from $2,000 to $3,000 per year), and the change in annual income, *X*, is equal to +10 (from $20,000 to $30,000 per year). The slope is therefore $+1/+10 = 0.10$. The sign is positive because computer expenditure is directly, or positively, related to annual income. The steeper the line, the greater the slope because the ratio of ΔY to ΔX rises. Conversely, the flatter the line, the smaller the slope. Exhibit A-1 also illustrates that the slope of a straight line is constant. That is, the slope between any two points along the line, such as between points *A* and *D*, is equal to $+3/+30 = 1/10 = 0.10$

What does the slope of 1/10 mean? It tells you that a $1,000 increase (decrease) in PC expenditure each year occurs for each $10,000 increase (decrease) in annual income. The line plotted in Exhibit A-1 has a *positive slope,* and we describe the line as "upward-sloping."

On the other hand, the line in Exhibit A-2 has a *negative slope*. The change in *Y* between points *C* and *D* is equal to −5 (from $15 down to $10), and the change in *X* is equal to +25 (from 50 million up to 75 million T-shirts purchased per year). The slope is therefore $-5/+25 = -1/5$, and this line is described as "downward-sloping."

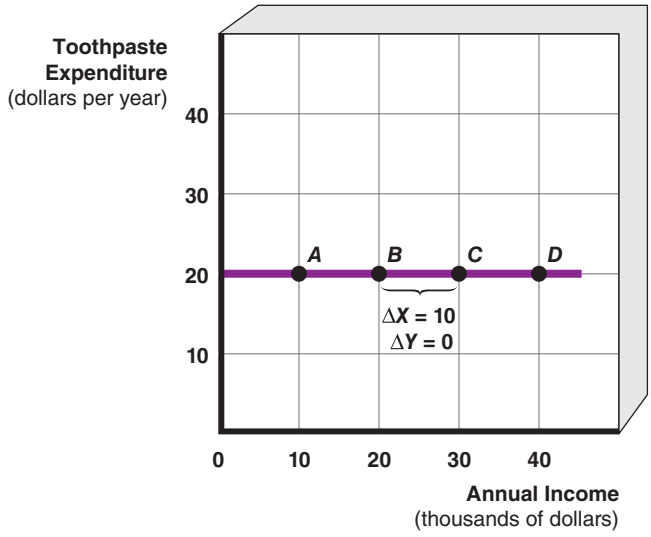
What does this slope of $-1/5$ mean? It means that raising (lowering) the price per T-shirt by $1 decreases (increases) the quantity of T-shirts purchased by 5 million per year.

Suppose we calculate the slope between any two points on a flat line—for example, points *B* and *C* in Exhibit A-3. In this case, there is no change in *Y* (expenditure for toothpaste) as *X* (annual income) increases. Consumers spend $20 per year on toothpaste regardless of annual income. It follows that $\Delta Y = 0$ for any ΔX, so the slope is equal to 0. The two variables along a flat line (horizontal or vertical) have an independent relationship. An **independent relationship** is a zero association between two variables. When one variable changes, the other variable remains unchanged.

Independent relationship
A zero association between two variables. When one variable changes, the other variable remains unchanged.

Exhibit A-3 An Independent Relationship between Variables

The flat line with a zero slope shows that the expenditure per year for toothpaste is unrelated to annual income. As annual income increases along the horizontal axis, the amount spent each year for toothpaste remains unchanged at 20 units. If annual income increases 10 units, the corresponding change in expenditure is zero. The Slope $= \Delta Y/\Delta X = 0/+10 = 0$



Expenditure for Toothpaste at Different Annual Incomes

Point	Toothpaste Expenditure (dollars per year)	Annual Income (thousands of dollars)
A	20	10
B	20	20
C	20	30
D	20	40

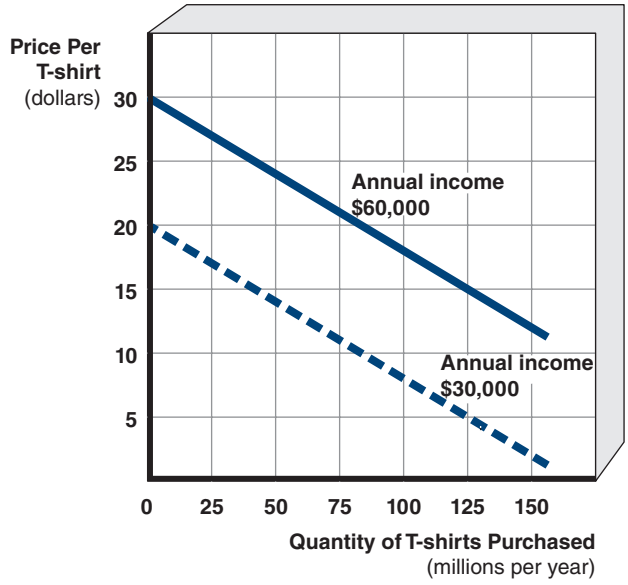
1A-4 A Three-Variable Relationship in One Graph

The two-variable relationships drawn so far conform to a two-dimensional flat piece of paper. For example, the vertical axis measures the price per T-shirt variable, and the horizontal axis measures the quantity of T-shirts purchased variable. All other factors, such as consumer income, that may affect the relationship between the price and quantity variables are held constant by the ceteris paribus assumption. But reality is frequently not so accommodating. Often a model must take into account the impact of changes in a third variable (consumer income) drawn on a two-dimensional piece of paper.

Economists' favorite method of depicting a three-variable relationship is shown in Exhibit A-4. As explained earlier, the cause-and-effect relationship between price and quantity of T-shirts determines the downward-sloping curve. A change in the price per T-shirt causes a movement downward along either of the two separate curves. As the price falls, consumers increase the quantity of T-shirts demanded. The location of each curve on the graph, however, depends on the annual income of consumers. As the annual

Exhibit A-4 Changes in Price, Quantity, and Income in Two Dimensions

Economists use a multicurve graph to represent a three-variable relationship in a two-dimensional graph. A decrease in the price per T-shirt causes a movement downward along each curve. As the annual income of consumers rises, there is a shift rightward in the position of the demand curve.



income variable increases from $30,000 to $60,000 and consumers can afford to purchase more at any price, or pay more at any quantity, the price–quantity demanded curve shifts rightward. Conversely, as the annual income variable decreases and consumers have less to spend, the price–quantity demand curve shifts leftward.

This is an extremely important concept that you must understand: throughout this text, you must distinguish between *movements along* and *shifts in* a curve. Here's how to tell the difference. A change in one of the variables shown on either of the coordinate axes of the graph causes *movement along* a curve. On the other hand, a change in a variable not shown on one of the coordinate axes of the graph causes a *shift* in a curve's position on the graph.

Take Note A shift in a curve occurs only when the ceteris paribus assumption is relaxed and a third variable not shown on either axis of the graph is allowed to change.

1A-5 A Helpful Study Hint for Using Graphs

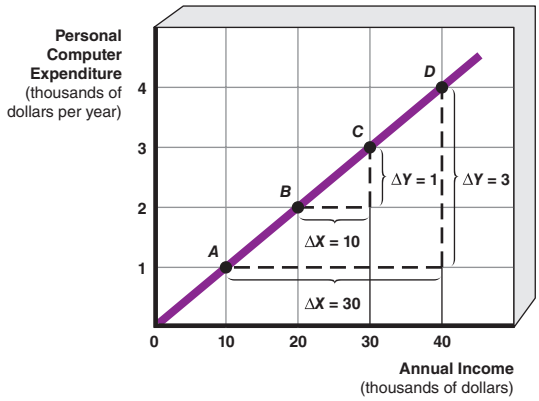
To some students, studying economics is a little frightening because many chapters are full of graphs. Just remember that a graph is simply a visual aid that illustrates the relationship between economic variables. Noting these relationships is the ticket to understanding how the economy really works. So, keep in mind that all inverse (negative) relationships are expressed as downward sloping curves (or lines), and all direct (positive) relationships are expressed as upward sloping curves. This will help you to do well on tests!

Key Terms

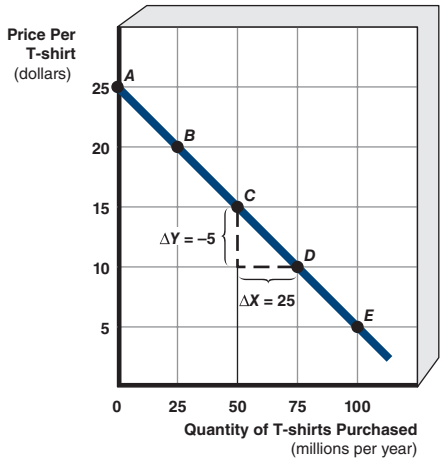
Direct relationship Inverse relationship Slope Independent relationship

Summary

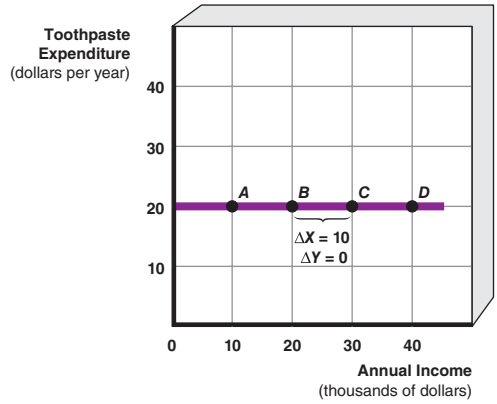
- Graphs provide a means to clearly show economic relationships in two-dimensional space. Economic analysis is often concerned with two variables confined to the upper-right (northeast) quadrant of the coordinate number system.
- A direct relationship occurs when two variables change in the *same* direction. A direct relationship is expressed graphically as an upward sloping curve (or line).



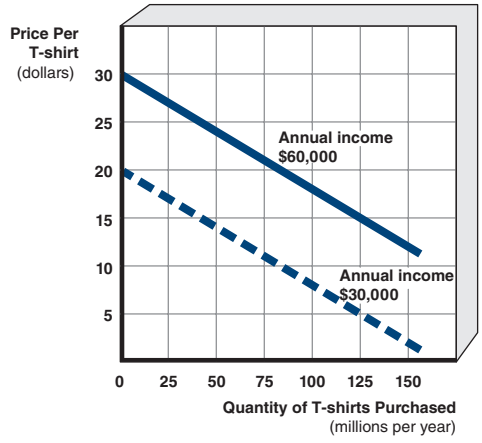
- An inverse relationship occurs when two variables change in *opposite* directions. An inverse relationship is expressed graphically as a downward sloping curve (or line).



- An independent relationship occurs when two variables are unrelated.



- A three-variable relationship is depicted by a graph showing a shift in a curve when the ceteris paribus assumption is relaxed and a third variable (such as annual income) not on either axis of the graph is allowed to change.



Study Questions and Problems

Please see Appendix A for answers to the odd-numbered questions. Your instructor has access to the answers for even-numbered questions.

1. Draw a graph without specific data for the expected relationship between the following variables:
   a. The probability of living and age
   b. Annual income and years of education
   c. Inches of snow and sales of bathing suits
   d. Number of football games won and the athletic budget

   In each case, state whether the expected relationship is *direct* or *inverse*. Explain an additional factor that would be included in the *ceteris paribus* assumption because it might change and influence your theory.
2. Assume a research firm collects survey sales data that reveal the relationship between the possible selling prices of hamburgers and the quantity of hamburgers consumers would purchase per year at alternative prices. The report states that if the price of a hamburger is $4, then 20,000 will be bought. However, at a price of $3, there will be 40,000 hamburgers bought. At $2, there will be 60,000 hamburgers bought, and at $1, there will be 80,000 hamburgers purchased.

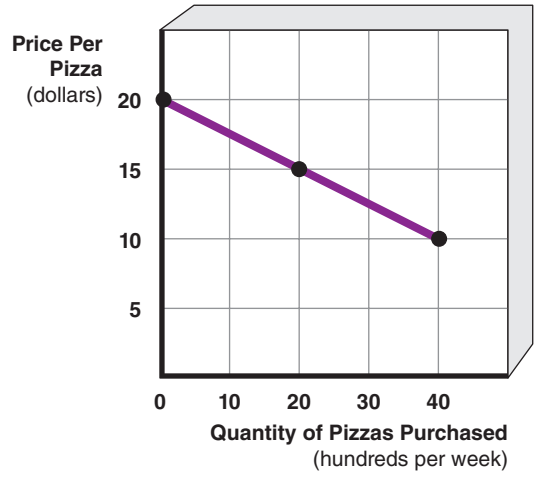
   Based on these data, describe the relevant relationship between the price of a hamburger and the quantity consumers are willing to purchase, using a verbal statement, a numerical table, and a graph. Which model do you prefer? Why?

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. What is used to illustrate an independent relationship between two variables?
   a. An upward-sloping curve
   b. A downward-sloping curve
   c. A hill-shaped curve
   d. A horizontal or vertical line
2. Which of the following pairs is *most* likely to exhibit an inverse relationship?
   a. The amount of time you study and your grade point average
   b. People's annual income and their expenditure on personal computers
   c. Baseball players' salaries and their batting averages
   d. The price of a concert and the number of tickets that people purchase
3. According to Exhibit A-5, what is the relationship between the price per pizza and the quantity of pizzas purchased?
   a. Direct
   b. Inverse
   c. Complex
   d. Independent
4. What is the slope of the line shown in Exhibit A-5?
   a. −1
   b. −1/2
   c. −1/4
   d. 0

Exhibit A-5 Straight Line Relationship



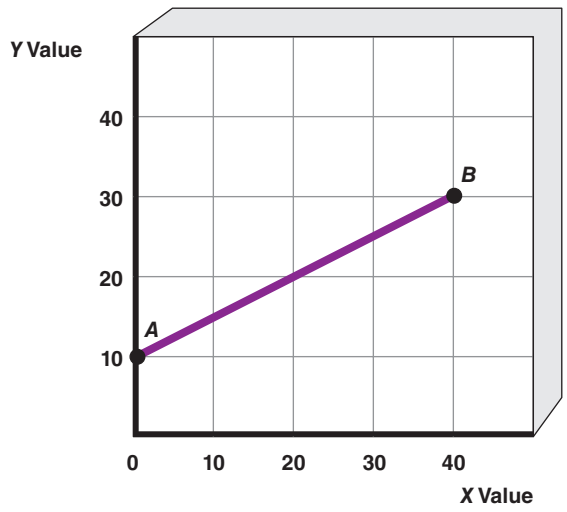
5. Which of the following would cause a leftward shift in the relationship shown in Exhibit A-5?
   a. A fall in household incomes
   b. A fall in the price of pizza
   c. A fall in the quantity of pizza that people want to purchase
   d. All of the above would shift the line in the graph

6. Suppose two variables are directly related. If one variable rises, the other variable
   a. also rises.
   b. falls.
   c. remains unchanged.
   d. reacts unpredictably.

7. When an inverse relationship is graphed, the resulting line or curve is
   a. horizontal.
   b. vertical.
   c. upward-sloping.
   d. downward-sloping.

8. Line AB in Exhibit A-6 shows that
   a. increasing values for *X* decreases the values of *Y*.
   b. decreasing values for *X* increases the values of *Y*.
   c. there is a direct relationship between *X* and *Y*.
   d. all of the above are true.

Exhibit A-6 Straight Line Relationship



9. In Exhibit A-6, what is the slope of line AB?
   a. Positive
   b. Zero
   c. Negative
   d. Variable

10. In Exhibit A-6, what is the slope of line AB?
    a. 1
    b. 5
    c. 1/2
    d. −1

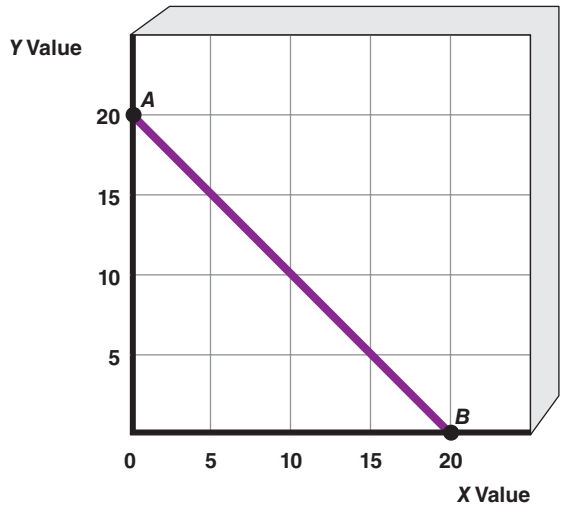
11. As shown in Exhibit A-6, the slope of line AB
    a. decreases with increases in *X*.
    b. increases with increases in *X*.
    c. increases with decreases in *X*.
    d. remains constant with changes in *X*.

12. In Exhibit A-6, as *X* increases along the horizontal axis, the *Y* values increase. What is the relationship between the *X* and *Y* variables?
    a. Direct
    b. Inverse
    c. Independent
    d. Variable

13. In Exhibit A-7, as *X* increases along the horizontal axis, the *Y* values decrease. What is the relationship between the *X* and *Y* variables?
    a. Direct
    b. Inverse
    c. Independent
    d. Variable

14. Line AB in Exhibit A-7 shows that
    a. increasing values for *X* reduces the values of *Y*.
    b. decreasing values for *X* increases the values of *Y*.
    c. there is an inverse relationship between *X* and *Y*.
    d. all of the above are true.

Exhibit A-7 Straight Line Relationship



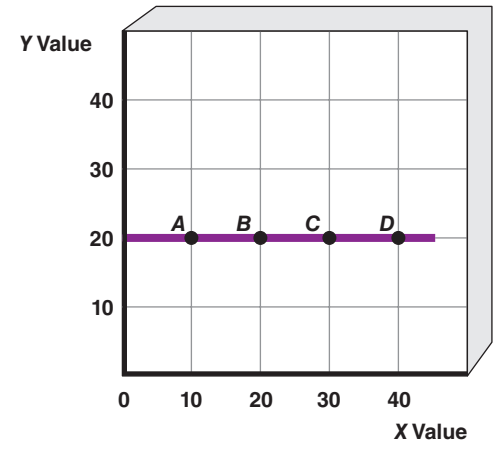
15. As shown in Exhibit A-7, the slope of line AB
    a. decreases with increases in *X*.
    b. increases with increases in *X*.
    c. increases with decreases in *X*.
    d. remains constant with changes in *X*.

16. In Exhibit A-7, what is the slope for line AB?
    a. 3
    b. 1
    c. −1
    d. −5

17. In Exhibit A-7, what is the slope of line AB?
    a. Positive
    b. Zero
    c. Negative
    d. Variable

18. In Exhibit A-8, as *X* increases along the horizontal axis, corresponding to points A–D on the line, the *Y* values remain unchanged at 20 units. What is the relationship between the *X* and *Y* variables?
    a. Direct
    b. Inverse
    c. Independent
    d. Undefined

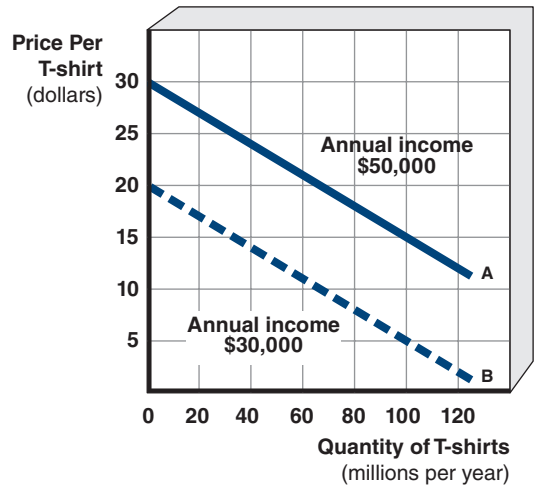
Exhibit A-8 Straight Line Relationship



19. In Exhibit A-8, what is the slope of line A–D?
    a. Greater than 1
    b. Equal to 1
    c. Less than 1
    d. Zero

20. Exhibit A-9 represents a three-variable relationship. As the annual income of consumers falls from $50,000 (line A) to $30,000 (line B), the result is a(n)
    a. upward movement along each curve.
    b. downward movement along each curve.
    c. leftward shift in curve A to curve B.
    d. rightward shift in curve A to curve B.

Exhibit A-9 Multicurve Graph



Chapter 2

Production Possibilities, Opportunity Cost, and Economic Growth

Chapter Objectives

1. Explain the relationship between opportunity cost and scarcity.
2. Describe how the production possibilities curve models aggregate production.
3. Use the production possibilities curve to analyze opportunity costs in production decisions.
4. Use the production possibilities curve to analyze economic growth.

In Chapter 1 we learned that every nation must answer three fundamental economic questions: what to produce, how to produce, and for whom to produce. In this chapter we develop one of the most fundamental economic models, the production possibilities model. This model helps us understand the choices that must be made because of scarcity when answering these questions.

2-1 Opportunity Cost

Because of scarcity, the three basic questions cannot be answered without sacrifice or cost. But what does the term *cost* really mean? The common response would be to say that the purchase price is the cost. A movie ticket *costs* $10, or a shirt *costs* $50. Applying the economic way of thinking, however, *cost* is defined differently. A well-known phrase from Nobel Prize–winning economist Milton Friedman says, "*There is no such thing as a free lunch.*" This expression captures the links among the concepts of scarcity, choice, and cost. Because of scarcity, people must make choices, and each choice incurs a cost (sacrifice). Once one option is chosen, another option is given up. The money you spend on a movie ticket cannot also buy a pizza. The time you spend studying cannot also be spent working out. A business may purchase a new

textile machine to manufacture towels, but this same money cannot be used to buy a new recreation facility for employees.

These examples illustrate that the true cost of these decisions is what was sacrificed when making the choice, or the opportunity cost. **Opportunity cost** is the next best alternative that was sacrificed when making a choice. The highest-valued good or use of time given up for the chosen good or use of time, therefore, measures the opportunity cost. We may omit the word "opportunity" before the word cost, but the concept remains the same. Exhibit 1 illustrates the causation chain linking scarcity, choice, and opportunity cost.

Opportunity cost
The next best alternative that was sacrificed when making a choice.

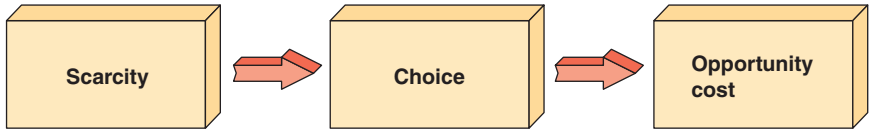
Examples are endless, but let's consider a few. Suppose your economics professor decides to become a rock star in the Rolling in Dough band. Now all your professor's working hours are devoted to creating hit music, and the opportunity cost is the educational services no longer provided. Opportunity cost also applies to national economic decisions. Suppose the federal government decides to spend tax revenues on a space station. The opportunity cost depends on the next best program *not* funded. Assume roads and bridges are the highest-valued projects not built as a result of the decision to construct the space station. Then the opportunity cost of the decision to devote resources to the space station is the forgone roads and bridges and not the money actually spent to build the space station.

To personalize the relationship between time and opportunity cost, ask yourself what you would be doing if you were not reading this text. Your answer might be watching television, sleeping, or working out at the gym. If sleeping is your next best choice, then the opportunity cost of reading this text is the sleep you sacrifice. Have you ever wondered why very few rock stars or movie stars attend college? The concept of opportunity cost can help us understand the answer to this question. Rock stars and movie stars would need to forfeit a large amount of income to spend time attending college, that is, the opportunity cost of doing so would be very high.

Take Note Because of scarcity, society must make choices. The opportunity cost is the next best alternative that must be given up when making any choice.

Exhibit 1 The Links between Scarcity, Choice, and Opportunity Cost

Scarcity means that no society has enough resources to produce all the goods and services necessary to satisfy all human wants. As a result, society is always confronted with the problem of making choices. This means that each decision has a sacrifice in terms of an alternative choice that has to be foregone, which is the opportunity cost of that decision.



Am I on Track?

1. Niki has exams in calculus, English, and biology this week. She studies in one-hour blocks of time. Niki has decided that studying for biology is most important, calculus second most important, and English least important. When Niki decides to spend her first hour studying biology, the opportunity cost of this is:

   a. $10
   b. Not studying calculus
   c. Not studying English
   d. Not studying calculus and not studying English

Answers at the end of chapter.

2-2 Marginal Analysis

Marginal analysis
An examination of the effects of incremental additions to or subtractions from a current situation.

At the heart of all rational decision-making is marginal analysis. **Marginal analysis** examines the effects of incremental additions to or subtractions from a current situation. This is a very valuable tool in the economic way of thinking toolkit because it considers the "marginal" effects of change. The ***rational*** decision maker decides on an option only if the marginal benefit exceeds the marginal cost. For example, you must decide how to use your scarce time. Should you devote an extra hour to reading this text, going to the gym, watching television, or sleeping? Which of your many options do you choose? The answer depends on marginal analysis. If you decide the benefit of a higher grade in economics exceeds the opportunity cost of, say sleep, then you allocate the extra hour to studying economics.

Businesses also use marginal analysis. Hotels, for example, rent space to student groups for dances and other events. Assume you are the hotel manager, and a student group offers to pay $400 to use the ballroom for a party. To decide whether to accept the offer requires marginal analysis. The marginal benefit of renting otherwise vacant space is $400, and the marginal cost is $300 for extra electricity and cleaning services. Since the marginal benefit exceeds the marginal cost, the manager sensibly accepts the offer.

Marginal analysis is also an important concept when the government considers changes in various programs. For example, as demonstrated in the next section, an increase in the production of military goods will result in an opportunity cost of fewer consumer goods being produced and that trade-off will need to be considered.

2-3 The Production Possibilities Model

The economic problem of scarcity means that society's capacity to produce combinations of goods is constrained by its limited resources and existing technology. This condition can be represented in a model called the production possibilities curve (*PPC*), which we will now explore.

2-3a Assumptions

It is important when building any model to first be clear about the assumptions you are making. Three basic assumptions underlie the production possibilities curve model we are about to develop:

1. **Fixed Resources.** The quantities and qualities of all resources remain unchanged during the time period. But the economy can shift any resource from the production of one output to the production of another output. For example, an economy might shift workers from producing ***consumer goods*** (such as iPhones, pizza, clothing, etc.) to producing ***capital goods*** (such as machinery, office buildings, roads, etc.). Although the number of workers remains unchanged, this transfer of labor will produce fewer consumer goods and more capital goods.
2. **Fully Employed Resources.** The economy operates with all its factors of production fully employed and producing the greatest output possible without waste or mismanagement.
3. **Fixed Technology.** Holding the level of existing technology fixed creates limits, or constraints, on the amounts and types of goods any economy can produce. **Technology** is the body of knowledge applied to how goods are produced.

Technology
The body of knowledge applied to how goods are produced.

2-3b The Production Possibilities Curve

We are now ready to create the **production possibilities curve**, which shows the maximum combinations of two outputs that an economy can produce in a given period of time with its available resources and technology.

Production possibilities curve
A curve that shows the maximum combinations of two outputs an economy can produce in a given period of time with its available resources and technology.

Exhibit 2 shows a hypothetical economy that has the capacity to manufacture any combination of military goods (guns) and consumer goods (butter) per year along its production possibilities curve (*PPC*), including points *A*, *B*, *C*, and *D*. For example, if this economy uses all of its resources to make military goods (and therefore none of its resources to producing consumer goods), it can produce a *maximum* of 160 billion units of military goods and zero units of consumer goods (combination *A*). Another possibility is for the economy to use all of its resources to produce a *maximum* of 100 billion units of consumer goods and zero units of military goods (point *D*). Between the extremes of points *A* and *D* lie other production possibilities where the economy devotes some of its resources to military goods and the rest to consumer goods. For example, combination *B* represents a situation where the economy is producing 140 billion units of military goods and 40 billion units of consumer goods while point *C* shows the economy producing 80 billion units of military goods and 80 billion units of consumer goods. Each point along the production possibilities curve represents the **maximum production possible** with existing resources and technology.

2-3c Efficiency and the Production Possibilities Curve

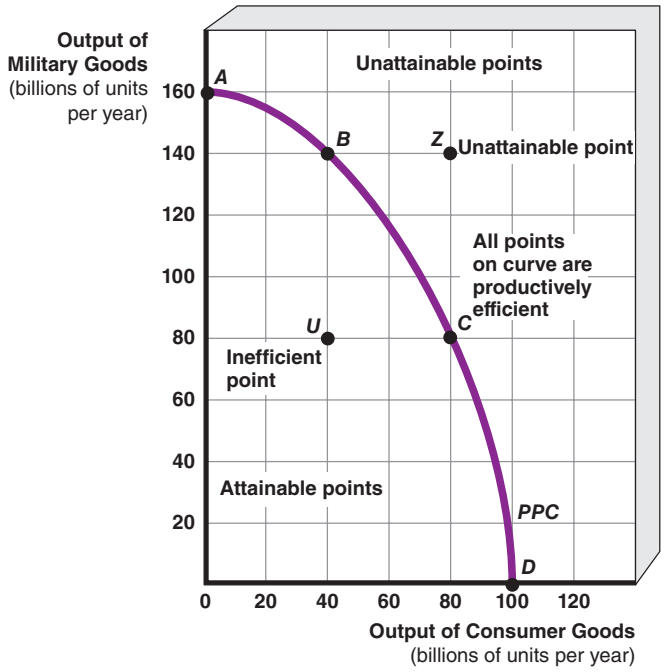
Recall that economists use the term efficiency to describe a situation where society is doing the best it can with its existing resources. **Productive efficiency** occurs when society *produces* the most it can with its existing resources and technology; a situation where more of one good can only be produced by producing less of the other good. Let's see how this relates to our production possibilities curve.

Productive efficiency
A situation where society is producing the most it can with its existing resources and technology; when more of one good can only be produced by producing less of another good.

As we have seen, all points along the *PPC* are *maximum* output levels with the given resources and technology. As such, all points on the production possibilities curve are *productively efficient* points. A movement between any two productively

Exhibit 2 The Production Possibilities Curve for Military Goods and Consumer Goods

All points along the production possibilities curve (*PPC*) are productively efficient representing the maximum possible combinations of the production of military goods and consumer goods. One possibility, point *A*, would be to produce 160 billion units of military goods and zero units of consumer goods each year. At the other extreme, point *D*, the economy uses all its resources to produce 100 billion units of consumer goods and zero units of military goods each year. Points *B* and *C* are obtained by using some resources to produce each of the two outputs. If the economy fails to utilize its resources fully and has some unemployment, the result is an inefficient combination given by a point inside the *PPC*, like point *U*. Any point outside the *PPC*, like point *Z*, lies beyond the economy's present production capabilities and is currently unattainable.



Production Possibilities Schedule for Military and Consumer Goods per Year

Output (billions of units per year)	Production Possibilities			
	A	B	C	D
Military goods	160	140	80	0
Consumer goods	0	40	80	100

efficient points on the curve means that *more* of one good is produced only by producing *less* of the other good. Consider the movement from point *A* to point *B* in Exhibit 2. At point *A*, the economy is devoting all of its resources to the production of military goods. As such, it can produce 160 billion units of military goods and no consumer goods. Moving to point *B* requires reallocating some resources away from the production of military goods and toward the production of consumer goods. This will result in fewer military goods being produced.

What happens if the economy does not use all its resources to their maximum productive capacity? For example, some workers may not find work, or plants and

equipment may be idle for any number of reasons. The result is our hypothetical economy fails to reach any of the combinations along the *PPC*. In Exhibit 2, point *U* illustrates an *inefficient* output level indicating our economy is operating without all its resources fully and efficiently employed. At point *U*, our model economy is producing 80 billion units of military goods and 40 billion units of consumer goods per year. Such an economy is underproducing because it could satisfy more of society's wants if it were producing at some point along the *PPC*.

Even if an economy fully and efficiently employs all its resources, it is impossible to produce certain output quantities. Any point outside the production possibilities curve is *currently unattainable* because it is beyond the economy's present production capabilities. Point Z, for example, represents an unattainable output of 140 billion units of military goods and 80 billion units of consumer goods. The economy simply cannot reach this point with its existing resources and technology.

Take Note Scarcity limits an economy to points on or below its production possibilities curve.

How does society choose which point to actually produce, among all the productively efficient points along the *PPC*? In our discussion of marginal analysis, we said that a rational decision maker decides on an option only if the marginal benefit (which is determined by consumer preferences) exceeds the marginal cost (opportunity cost). In our example, this means society will continue to allocate resources to the production of say, consumer goods, as long as the marginal benefit of doing so is greater than the marginal cost. And society will stop allocating more resources to the production of consumer goods when the marginal benefit of doing so is just equal to the marginal cost. **Allocative efficiency** occurs when society allocates, or channels, its limited resources into the production of those products that are most desired by society. In Exhibit 2, only one point on the *PPC* will be allocatively efficient—the one point where the marginal benefit of the next unit of consumer goods produced, which will depend on the preferences of members of society, is exactly equal to its marginal cost.

Allocative efficiency
Situation where society allocates, or channels, its limited resources into the production of those products most desired by society.

Take Note Productive efficiency is illustrated by all points along a production possibilities curve where more of one good can only be produced by producing less of another good. Only one point on the *PPC* will be allocatively efficient, reflecting the one combination of products most desired by society.

Am I on Track?

2. All points on the *PPC*:

a. Are productively inefficient
b. Represent a situation where more of one good can only be produced by producing less of the other good
c. Are allocatively efficient
d. All of the above

Answers at the end of chapter.

2-4 Opportunity Cost and the Production Possibilities Curve

We now know that every point on the *PPC* is productively efficient, meaning the only way to produce more of one good is to produce less of the other. Let's look more carefully at what happens when an economy produces more of one good.

2-4a Identifying Opportunity Cost Using the *PPC* Model

Exhibit 3 presents a production possibilities curve for a hypothetical economy that must choose between producing tanks and producing sailboats. Consider point *A*, which represents the situation where this economy is devoting all of its resources to the production of tanks and can produce 80,000 tanks. As we have seen, the only way to increase the production of sailboats, given the existing resources and technology, is to decrease the production of tanks. We can use this idea to calculate the opportunity cost of sailboat production.

Let's examine the movement from point *A* to point *B* along the *PPC*. To increase the production of sailboats by 20,000 units requires decreasing the production of tanks from 80,000 to 70,000. This 10,000-unit reduction in the production of tanks, then, is the opportunity cost of producing 20,000 sailboats. It represents what the economy must give up in order to produce those sailboats.

2-4b The Law of Increasing Opportunity Cost

What happens in Exhibit 3 if we continue to expand the production of sailboats in 20,000-unit increments? If we move from producing at combination *B* to producing at combination *C*, the next 20,000 sailboats produced will require a reduction in tank production from 70,000 to 50,000. The opportunity cost, then, of producing these additional 20,000 sailboats is 20,000 tanks. What if we continue to produce more sailboats? As we move from *C* to *D*, the opportunity cost increases again, now to 50,000 tanks (as production of these last 20,000 sailboats requires tank production fall from 50,000 to 0). The **law of increasing opportunity costs** states that the opportunity cost increases as production of one output expands. Holding the stock of resources and technology constant (ceteris paribus), the law of increasing opportunity costs, therefore, causes the production possibilities curve to display a *bowed-out* shape.

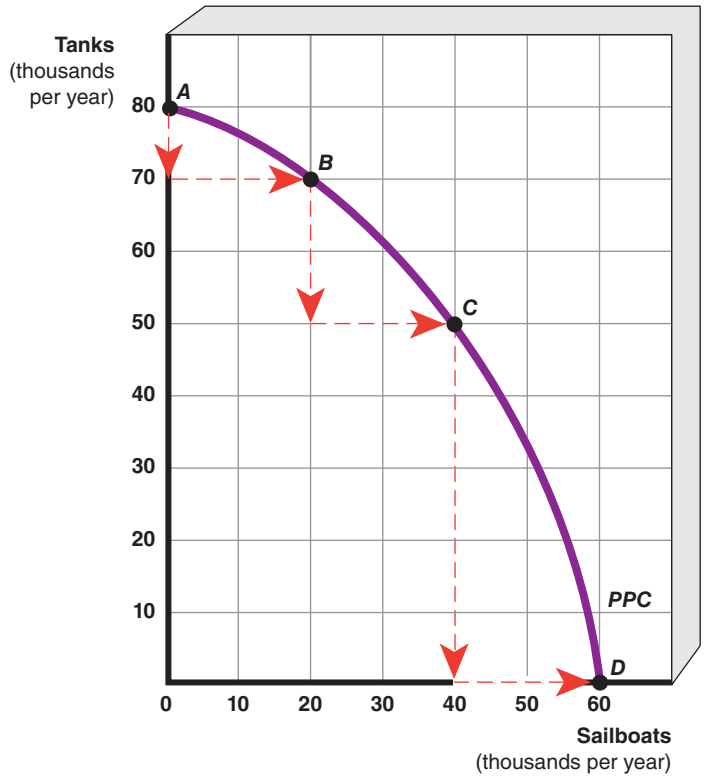
Law of increasing opportunity costs
The principle that the opportunity cost increases as production of one output expands.

Why must our hypothetical economy sacrifice larger and larger quantities of tank production in order to produce each additional 20,000 sailboats? The reason is that resources, like workers, are not equally suited to the production of both goods. For example, expanding the output of sailboats requires shifting the use of resources, like workers, from tank production to sailboat production. When our hypothetical economy produces no sailboats (point *A*) and then decides to produce them, initially, the least-skilled tank workers are transferred to making sailboats. As such, only 10,000 tanks are sacrificed to move to point *B*. However, as the economy moves from point *B* to point *C*, more highly skilled tank makers become sailboat makers, and the opportunity cost rises to 20,000 tanks. Finally, if the economy decides to move from point *C* to point *D*, the remaining tank workers, who are superb tank makers, but poor sailboat makers, must adapt to the techniques of sailboat production and the opportunity cost increases even more—to 50,000 tanks.

It should be noted that the production possibilities curve model could assume that resources are equally well-suited to the production of all goods and the opportunity

Exhibit 3 The Law of Increasing Opportunity Costs

Points *A* through *D* on the production possibilities curve (*PPC*) below represent a hypothetical economy increasing production of sailboats in equal increments of 20,000 sailboats per year. If the economy moves from point *A* to point *B*, the opportunity cost of 20,000 sailboats is a reduction in tank output of 10,000 per year. This opportunity cost rises to 20,000 tanks if the economy moves from point *B* to point *C*. Finally, production at point *D*, rather than point *C*, results in an opportunity cost of 50,000 tanks per year. The opportunity cost rises because workers are not equally suited to making both tanks and sailboats.



Production Possibilities Schedule for Tanks and Sailboats per Year

Output (thousands per year)	Production Possibilities			
	A	B	C	D
Tanks	80	70	50	0
Sailboats	0	20	40	60

cost remains constant. In this case, the production possibilities curve would be a straight line, which is the model employed in the chapter on international trade and finance.

Take Note

Because resources are not equally suited to the production of all goods, it's common to experience increasing opportunity costs and a bowed-out production possibilities curve.

2-5 Sources of Economic Growth

Economic growth
The ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve.

The economy's production capacity is not permanently fixed. The points on our production possibilities curve (*PPC*) are productively efficient, meaning society is producing the most it can *with its existing resources and technology*. If either the quantity or the quality of resources increase or technology advances, the economy will experience economic growth, and the *PPC* will shift outward. **Economic growth** is the ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve. Exhibit 4 illustrates this outward shift.

At point *A* on PPC_1, a hypothetical full-employment, productively efficient economy produces 40,000 computers and 200 million pizzas per year. If the economy experiences economic growth, then the production possibilities curve will shift outward to PPC_2. One option now will be to produce at point *B* and increase computer output to 70,000 per year. Another possibility would be to increase pizza output to 400 million per year. Yet another choice is to produce more of both at some point between points *B* and *C* on PPC_2.

Let's explore further these sources of economic growth, which, as we've indicated, include:

1. More or better resources (land, labor, capital)
2. New technologies

2-5a Changes in Resources

One way to realize economic growth is to obtain more resources. Any increase in resources, for example, more natural resources (land), a baby boom (labor), or more factories (capital) will shift the production possibilities curve outward. Conversely, a reduction in resources, for example, a natural disaster like fires that destroy forests and therefore lumber available for construction (land), a pandemic that causes many casualties (labor), or the destruction of factories during a war (capital) will cause the production possibilities curve to shift inward.

Another way to promote economic growth is by increasing the productivity of existing resources, particularly labor. Investments in health, education, and training of the existing labor force increase the productivity of those workers and shifts the *PPC* outward. In addition, if the quality of capital (our physical facilities like factories and machinery) is improved, then this too creates more growth.

2-5b Technological Change

Another way to achieve economic growth is through technological advances. This will also make it possible to produce more with existing resources, shifting the production possibilities curve outward. For example, the knowledge of how to transform a stone into a wheel vastly improved the prehistoric standard of living. One source of technological change is the creation of new technologies, called *invention*. Computer chips, satellites, video conferencing, and 3D printing are all examples of technological advances resulting from the use of science and engineering knowledge.

Technological change also results from the innovations of entrepreneurship, introduced in the previous chapter. ***Innovation*** involves developing new productive processes. Seeking profits, entrepreneurs create new, better, or less expensive products. This requires organizing an improved mix of resources, which expands the production possibilities curve and giving us economic growth. Henry Ford, for example, changed the auto industry by pioneering the use of the assembly line for making cars. Another entrepreneur, law student Chester Carlson, became so frustrated copying

Exhibit 4 An Outward Shift of the Production Possibilities Curve for Computers and Pizzas

The economy begins with the capacity to produce combinations along the first production possibilities curve PPC_1. Growth in the quantity or quality of resources, or technological advances can shift the production possibilities curve outward from PPC_1 to PPC_2. Points along PPC_2 represent new production possibilities that were previously impossible. This outward shift permits the economy to produce greater quantities of output. Instead of producing combination A, the economy can produce, for example, more computers at point B or more pizzas at point C. If the economy grows and produces at a point between B and C, more of both pizzas and computers can be produced, compared to point A.