CASE · FAIR · OSTER

PRINCIPLES OF ECONOMICS

THIRTEENTH EDITION

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Economics

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Principles of
Economics

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THIRTEENTH EDITION

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Library of Congress Cataloging-in-Publication Data
Names: Case, Karl E., author. | Fair, Ray C., author. | Oster, Sharon M., author.
Title: Principles of economics / [Karl E. Case, Ray C. Fair, Sharon M. Oster].
Description: [13th edition]. | Upper Saddle River, NJ : Pearson, [2019] | Includes index.
Identifiers: LCCN 2018018204 | ISBN 9780135161104 (hardcover)
Subjects: LCSH: Economics.
Classification: LCC HB171.5 .C3123 2019 | DDC 330--dc23
LC record available at https://lccn.loc.gov/2018018204

10 9 8 7 6 5 4 3 2 1

ISBN 10: 0-13-516110-X
ISBN 13: 978-0-13-516110-4

This edition is dedicated to Chip Case, a wonderful colleague and friend. He was the inspiration for this textbook some 30 years ago, and he served as an inspiration to study economics for thousands of students.

About the Authors

Karl E. Case, who passed away in July, 2016, was a Professor of Economics Emeritus at Wellesley College where he taught for 34 years, serving several tours of duty as Department Chair. He was a Senior Fellow at the Joint Center for Housing Studies at Harvard University and a founding partner in the real estate research firm of Fiserv Case Shiller Weiss, which produces the S&P Case-Shiller Index of home prices. He served as a member of the Index Advisory Committee of Standard and Poor's, and on the Academic Advisory Board of the Federal Reserve Bank of Boston.

Professor Case received his B.A. from Miami University in 1968, spent three years on active duty in the Army, and received his Ph.D. in Economics from Harvard University in 1976.

Professor Case's research was in the areas of real estate, housing, and public finance. He authored or coauthored five books, including *Principles of Economics, Economics and Tax Policy*, and *Property Taxation: The Need for Reform,* and published numerous articles in professional journals, focused on real estate markets and prices.

Chip, as he was known to his many friends and colleagues, contributed to this textbook throughout its many editions. In his honor and with respect for his substantial contributions to the text and the discipline of economics, his co-authors plan to keep his name on the text for all future editions.

Ray C. Fair is Professor of Economics at Yale University. He is a member of the Cowles Foundation at Yale and a Fellow of the Econometric Society. He received a B.A. in Economics from Fresno State College in 1964 and a Ph.D. in Economics from MIT in 1968. He taught at Princeton University from 1968 to 1974. Professor Fair has taught introductory and intermediate macroeconomics at Yale since 1974. He has also taught graduate courses in macroeconomic theory and macroeconometrics.

Professor Fair's research has primarily been in the areas of macroeconomics and econometrics, with particular emphasis on macroeconometric model building. He has also done work in the areas of finance, voting behavior, and aging in sports. His publications include *Specification, Estimation, and Analysis of Macroeconometric Models* (Harvard Press, 1984); *Testing Macroeconometric Models* (Harvard Press, 1994); *Estimating How the Macroeconomy Works* (Harvard Press, 2004), and *Predicting Presidential Elections and Other Things* (Stanford University Press, 2012).

Professor Fair's U.S. and multicountry models are available for use on the Internet free of charge. The address is http://fairmodel.econ.yale.edu. Many teachers have found that having students work with the U.S. model on the Internet is a useful complement to an introductory macroeconomics course.

Sharon M. Oster is the Frederic Wolfe Professor of Economics and Management and former Dean of the Yale School of Management. Professor Oster joined Case and Fair as a coauthor in the ninth edition of this book. Professor Oster has a B.A. in Economics from Hofstra University and a Ph.D. in Economics from Harvard University.

Professor Oster's research is in the area of industrial organization. She has worked on problems of diffusion of innovation in a number of different industries, on the effect of regulations on business, and on competitive strategy. She has published a number of articles in these areas and is the author of several books, including *Modern Competitive Analysis* and *The Strategic Management of Nonprofits*.

Prior to joining the School of Management at Yale, Professor Oster taught for a number of years in Yale's Department of Economics. In the department, Professor Oster taught introductory and intermediate microeconomics to undergraduates as well as several graduate courses in industrial organization. Since 1982, Professor Oster has taught primarily in the Management School, where she teaches the core microeconomics class for MBA students and a course in the area of competitive strategy. Professor Oster also consults widely for businesses and nonprofit organizations and has served on the boards of several publicly traded companies and nonprofit organizations.

Brief Contents

Contents

Preface

New to this Edition

Updates for this edition of *Principles of Economics* include:

- It is our hope that students will come to see both how broad the tools of economics are and how exciting is much of the new research in the field. The 13th edition has continued the changes in the *Economics in Practice* boxes that we began several editions ago. In these boxes, we aim to bring economic thinking to the concerns of the typical student. In many cases, we do this by spotlighting recent research, much of it by young scholars. Here are some examples of the topics we cover in the new boxes:
  - Research on the role weather plays in reducing school achievement in rural India by changing the importance of child labor in agriculture (Chapter 1, "The Scope and Method of Economics").
  - The strength of the economics major in helping students avoid unemployment in a recession, showing how the skills students learn in an economics class can benefit them regardless of the career path they choose (Chapter 1, "The Scope and Method of Economics").
  - The E-Z pass and the role of price salience in determining a customer's response to price changes (Chapter 6, "Household Behavior and Consumer Choice"). This is one of the several new behavioral economics boxes we have in the new edition.
  - The Marshall Plan's effects on managerial training and company productivity (Chapter 7, "The Production Process: The Behavior of Profit-Maximizing Firms").
  - How researchers can use data on adopted children to explore whether generationally-correlated investing patterns are learned behavior or have some genetic component reflecting risk preference (Chapter 11, "Input Demand: The Capital Market and the Investment Decision").
  - Most coders are men. How much does this have to do with gender identity? We discuss an experiment in Peru by a nonprofit to see if more women can be encouraged to go into this lucrative field (Chapter 18, "Income Distribution and Proverty").
  - Whether shareholders or workers benefit from the 2017 Trump tax package's big reduction in the corporate income tax (Chapter 19, "Public Finance: The Economics of Taxation").
- We have reworked some of the chapters to streamline them and to improve readability. In the discussions of supply and demand and the discussions of perfect and imperfect competition, we have added simple algebraic material to the graphical, numeric and verbal explanations to aid in clarity of understanding.
  - Chapter 11, "Input Demand: The Capital Market and the Investment Decision," has been considerably reworked to include a more thorough discussion of finance, that should be especially interesting to students who anticipate a career in the financial sector.
  - Chapter 18, "Income Distribution and Poverty," has also been substantially reworked to reflect the increased worldwide concern with issues of inequality and economic mobility.
  - In Chapter 32, "Alternative Views in Macroeconomics," a discussion of behavioral macroeconomics has been added to the Alternative views of macroeconomics.
- We continue to be very excited about Chapter 36, "Critical Thinking About Research." This material is unique in an introductory economics text. This chapter covers the research methodology of economics, where we highlight some of the key concerns of empirical economics: selection issues, causality, statistical significance, and regression analysis. Methodology is a key part of economics these days, and we have tried to give the introductory student a sense of what this methodology is and how to apply it in class and beyond.
- All of the macro data have been updated through 2018. The slow recovery from the 2008–2009 recession is still evident in these data. This gives students a good idea of what has been happening to the economy since they left high school.

- Many end-of-chapter problems have been revised.
- We have added Critical Thinking questions to each Economics in Practice box and each end-of-chapter section, to reinforce the underlying economic principles and to give students practical application of what they've learned.

The *Principles of Economics* Program

Our goal in the 13th edition, as it was in the first edition, is to instill in students a fascination with both the functioning of the economy and the power and breadth of economics. The first line of every edition of our book has been "The study of economics should begin with a sense of wonder." We hope that readers come away from our book with a basic understanding of how market economies function, an appreciation for the things they do well, and a sense of the things they do poorly. We also hope that readers begin to learn the art and science of economic thinking and begin to look at some policy, and, even personal decisions, in a different way. We have prepared this edition of the text and MyLab Economics with this in mind. To improve student results, we recommend pairing the text content with **MyLab Economics,** which is the teaching and learning platform that empowers you to reach every student. By combining trusted author content with digital tools and a flexible platform, MyLab personalizes the learning experience and will help your students learn and retain key course concepts while developing skills that future employers are seeking in their candidates. From **Digital Interactives** to **Real-time Data Analysis Exercises**, MyLab Economics helps you teach your course, your way. Learn more at **www.pearson.com/mylab/economics**.

Solving Teaching and Learning Challenges

As authors and teachers, we understand the challenges of the principles of economics course. The foundational themes of *Principles of Economics*, 13th edition, are to introduce the discipline of economics and to provide a basic understanding of how economies function. This requires a blend of economic theory, institutional material, and real-world applications. We have maintained a balance between these ingredients in every chapter. There is such volume of material for teachers to cover, and for students to understand. We address this learning challenge through: (1) A three-tiered approach of explaining key concepts through relevant stories, graphs and equations (2) Pedagogical features in the text and accompanying digital resources in MyLab Economics that illustrate and reinforce key concepts through real-world examples and applications that are relevant to students; (3) Graphs and animations; and (4) A wide variety of questions and problems.

Three-Tiered Explanations: Stories-Graphs-Equations

Professors who teach principles of economics are faced with a classroom of students with different abilities, backgrounds, and learning styles. For some students, analytical material is difficult no matter how it is presented; for others, graphs and equations seem to come naturally. The problem facing instructors and textbook authors alike is how to convey the core principles of the discipline to as many students as possible without selling the better students short. Our approach to this problem is to present most core concepts in the following three ways.

First, we present each concept in the context of a simple intuitive ***story*** or example in words often followed by a table. Second, we use a ***graph*** in most cases to illustrate the story or example. And finally, in many cases where appropriate, we use an ***equation*** to present the concept with a mathematical formula. In this edition, we have strengthened this element without greatly increasing mathematical levels needed for the class. For students who would benefit from a math review, MyLab Economics offers math skills review Chapter R, accessible from the assignment manager and containing over 150 graphing, algebra, and calculus exercises for homework, quiz, and test use.

Economics in Practice

We know that students are best motivated when they see the relevance of what they're learning to the world they live in. We've created *Economics in Practice* with a focus on recent research or events that support a key concept in the chapter and help students think about the broad and exciting applications of economics to their lives and the world around them. Each box contains a Critical Thinking question or two to further connect the material they are learning with their lives.

ECONOMICS IN PRACTICE

Have You Bought This Textbook?

As all of you know full well, college textbooks are expensive. At first, it may seem as though there are few substitutes available for the cash-strapped undergraduate. After *all*, if your professor assigns Smith's *Principles of Biology* to you, you cannot go out and see if Jones' *Principles of Chemistry* is perhaps cheaper and buy it instead. As it turns out, as some recent work by Judy Chevalier and Austan Goolsbee[1] discovered, even when instructors require particular texts, when prices are high students have found substitutes. Even in the textbook market student demand does slope down!

Chevalier and Goolsbee collected data on textbooks from more than 1600 colleges for the years 1997–2001 to do their research. For that period, the lion's share of both new and used college textbooks was sold in college bookstores. Next, they looked at class enrollments for each college in the large majors: economics, biology, and psychology. In each of those classes they were able to learn which textbook had been assigned. At first, one might think that the total number of textbooks, used plus new, should match the class enrollment. After all, the text is required! In fact, what they found was the higher the textbook price, the more text sales fell below class enrollments.

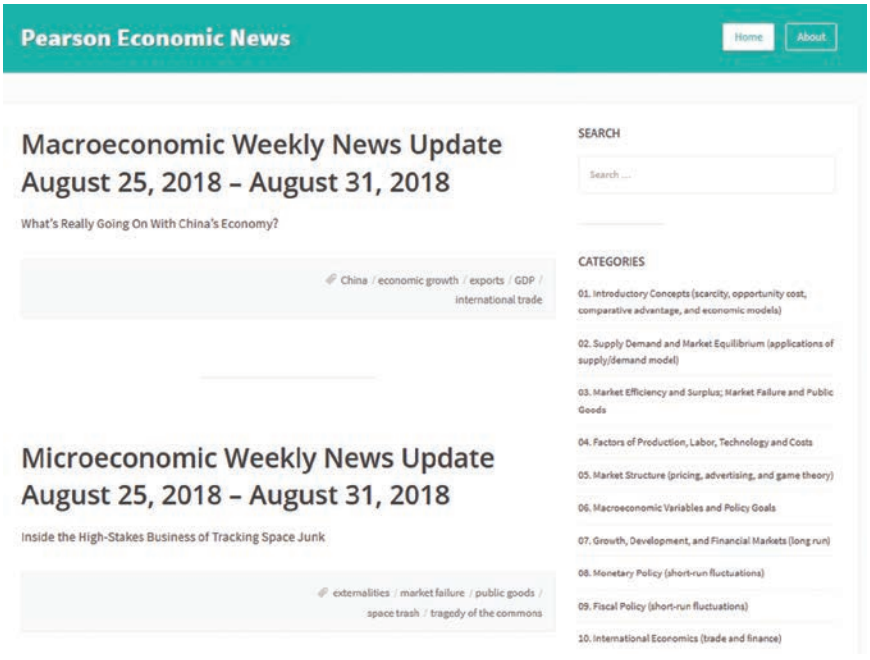
So what substitutes did students find for the required text? While the paper has no hard evidence on this, students themselves gave them lots of suggestions. Many decide to share books with roommates. Others use the library more. These solutions are not perfect, but when the price is high enough, students find it worth their while to walk to the library!

CRITICAL THINKING

1. If you were to construct a demand curve for a required text in a course, where would that demand curve intersect the horizontal axis?
2. And this much harder question: In the year before a new edition of a text is published, many college bookstores will not buy the older edition. Given this *fact*, what do you think happens to the gap between enrollments and new plus used book sales in the year before a new edition of a text is expected?

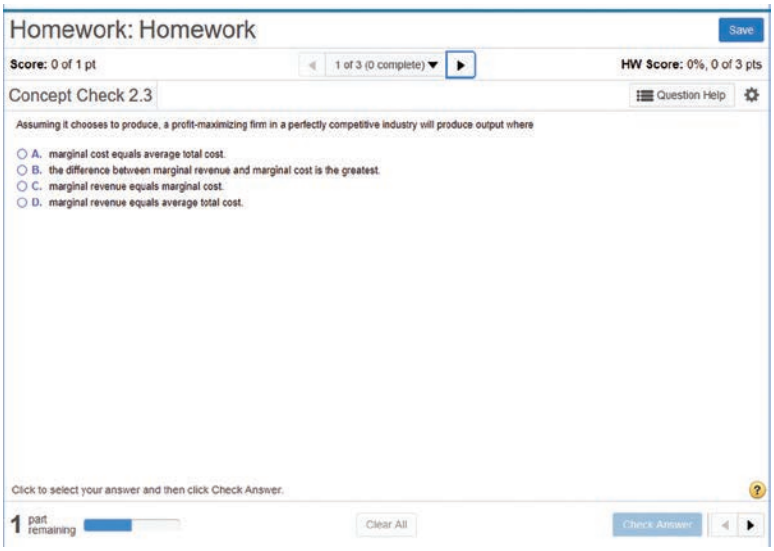
[1]Judith Chevalier and Austan Goolsbee, "Are Durable Goods Consumers Forward Looking? Evidence From College Textbooks," *Quarterly Journal of Economics*, 2009: 1853–1884.

To further promote the relevance of economics, *Current News Exercises* provide a turnkey way to assign gradable news-based exercises in MyLab Economics. Each week, Pearson scours the news, finds a current microeconomics and macroeconomics news article or video, creates exercises around these news articles, and then automatically adds them to MyLab Economics. Assigning and grading current news-based exercises that deal with the latest micro and macro events and policy issues has never been more convenient.



Concept Checks

Giving students the opportunity to practice what they are learning along the way is critical to their success in the principles of economics course. New for this edition, each section and subsection of each learning objective, and select key figures, is reinforced with a Concept Check in the eText of MyLab Economics that contains one or two multiple choice, true/false, or fill-in questions. These checks act as "speed bumps" that encourage students to stop and check their understanding of fundamental terms and concepts before moving on to the next section. The goal is to help students assess their progress on a section-by-section basis, so they can be better prepared for homework, quizzes, and exams.

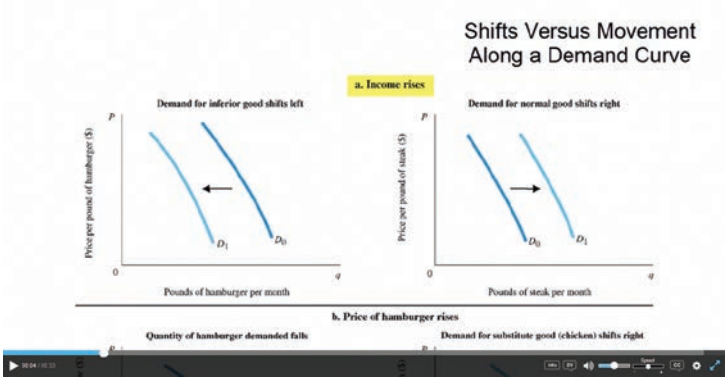


Graphing Animations

Graphs are the backbone of introductory economics, but many students struggle to understand and work with them. The Chapter 1 Appendix, "How to Read and Understand Graphs," shows readers how to interpret the over 200 graphs featured in this book. To make interpreting graphs easier for students, we use red curves to illustrate the behavior of firms, blue curves to show the behavior of households, and a different shade of red and blue to signify a shift in a curve.

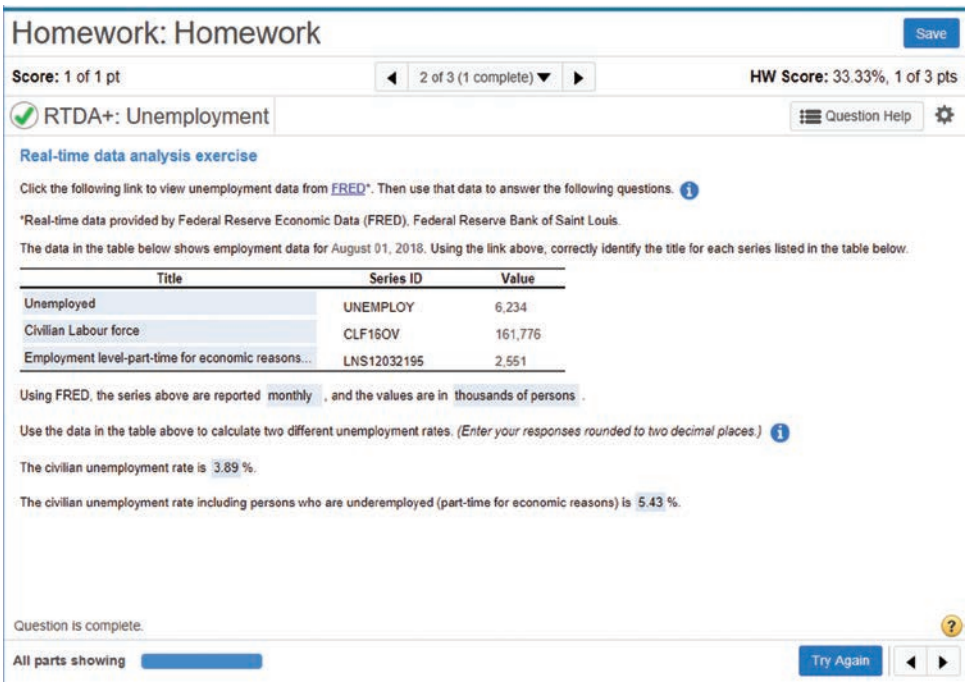
The figures in the book are also an integral part of our three-tiered approach to explain concepts in words, equations and graphs. They promote learning as students read an example or story, followed by a mathematical representation, and then see a graphical representation.

Select numbered figures in the text have a supporting animated version in MyLab Economics. The goal is to help students understand shifts in curves, movements along curves, and changes in equilibrium values by bringing graphs to life. Having an animated version of a graph helps students who have difficulty interpreting the static version in the printed text. Graded practice exercises are included with the animations to give students practice reading and interpreting graphs.



Real-Time Data

Currency is imperative in economics, particularly macroeconomics. We achieve this with real-time data analysis figures and exercises. Many of the key figures in the text have been updated in the MyLab with real-time data from the Federal Reserve's Economic Data (FRED™) — a comprehensive, up-to-date data set maintained by the Federal Reserve Bank of St. Louis. These animated graphs help students understand shifts in curves, movements along curves, and changes in equilibrium values. Easy to assign and automatically graded, Real-Time Data Analysis exercises use up-to-the-minute, real-time macroeconomic data. These exercises communicate directly with the Federal Reserve Bank of St. Louis's FRED™ site, so every time FRED posts new data, students see it.



Critical Thinking Questions

Throughout the course, and after graduation, students need to demonstrate critical thinking skills in their work and careers. To help develop these essential skills, we've added a new section of Critical Thinking questions to give students practice in higher-order thinking. Available in MyLab Economics, each end-of-chapter problem set ends with a *Critical Thinking Questions* section. These questions ask students to think more deeply about the concepts they've learned in the chapter when answering them. These assignable essay questions can be used on homework, tests, or quizzes. They require manual scoring; however, each essay question includes a sample correct answer to make grading easy.

CRITICAL THINKING QUESTIONS

QUESTION 1 When an unemployed individual gives up looking for work and leaves the labor force, she is no longer considered unemployed. What happens to the unemployment rate as a result? Does this mean that the unemployment rate understates or overstates the problem of joblessness?

QUESTION 2 According to the Efficiency Wage Theory, employers occasionally pay workers more than the equilibrium wage in the market in order to increase productivity. Explain how this would lead to reduced turnover.

Problems and Solutions

Each chapter and appendix ends with a problem set that asks students to think about and apply what they've learned in the chapter. These problems are not simple memorization questions. Rather, they ask students to perform graphical analysis or to apply economics to a real-world situation or policy decision. More challenging problems are indicated by an asterisk. Many problems have been updated. These problems can be assigned and auto-graded in MyLab Economics and are available with optional just-in-time learning aids to help students

when they need it the most. Students can also practice these problems in the Study Plan. The Study Plan gives students personalized recommendations, practice opportunities, and learning aids to help them stay on track.

Developing Employability Skills

For students to succeed in a rapidly changing job market, they should be aware of their career options and how to go about developing the many skills they will need to do so. We focus on developing these skills in a variety of ways.

In the text, the *Economics in Practice* boxes help students think deeply about concepts and make connections between what they learn in class and how it can apply to their job in the real world. Chapter 1's *Economics in Practice* box explores how majoring in economics can help make students less vulnerable to recession. Chapter 11's *Economics in Practice* boxes highlight investment banking, the stock market, and investing strategies, topics of particular interest and relevance to students studying economics and finance.

In MyLab Economics, the *Critical Thinking Questions* and *Current News* exercises encourage application of skills that will contribute toward success in this course and in the future, regardless of each students' career path.

Table of Contents Overview

Microeconomic Structure

The organization of the microeconomic chapters continues to reflect our belief that the best way to understand how market economies operate—and the best way to understand basic economic theory—is to work through the perfectly competitive model first, including discussions of output markets (goods and services) and input markets (land, labor, and capital), and the connections between them before turning to noncompetitive market structures such as monopoly and oligopoly. When students understand how a simple, perfectly competitive system works, they can start thinking about how the pieces of the economy "fit together." We think this is a better approach to teaching economics than some of the more traditional approaches, which encourage students to think of economics as a series of disconnected alternative market models. We also make extensive use of concrete examples, designed to help students see the power of the simple economic model. A mastery of this material is invaluable to students interested in careers in business and the public sector. Our core interest is in helping students to think about the world using economics.

Learning perfect competition first also enables students to see the power of the market system. It is impossible for students to discuss the efficiency of markets as well as the problems that arise from markets until they have seen how a simple, perfectly competitive market system produces and distributes goods and services. This is our purpose in Chapters 6 through 11.

Chapter 12, "General Equilibrium and the Efficiency of Perfect Competition," is a pivotal chapter that links simple, perfectly competitive markets with a discussion of market imperfections and the role of government. Chapters 13 through 15 cover three noncompetitive market structures—monopoly, monopolistic competition, and oligopoly. Chapter 16 covers externalities, public goods, and social choice. Chapters 17 covers uncertainty and asymmetric information. Chapters 18 and 19 cover income distribution as well as taxation and government finance. Figure II.2 from page 110 gives you an overview of our structure.

Macroeconomic Structure

We remain committed to the view that it is a mistake simply to throw aggregate demand and aggregate supply curves at students in the first few chapters of a principles book. To understand the *AS* and *AD* curves, students need to know about the functioning of both the goods market and the money market. The logic behind the simple demand curve is wrong when it is applied to the relationship between aggregate demand and the price level. Similarly, the logic behind the simple supply curve is wrong when it is applied to the relationship between aggregate supply and the price level. We thus build up to the *AS*/*AD* model slowly.

The goods market is discussed in Chapters 23 and 24 (the *IS* curve). The money market is discussed in Chapter 25 (material behind the Fed rule). Everything comes together in Chapter 26, which derives the *AD* and *AS* curves and determines the equilibrium values of aggregate output, the price level, and the interest rate. This is the core chapter and where the Fed rule plays a major role. Chapter 27 then uses the model in Chapter 26 to analyze policy effects and cost shocks. Chapter 28 then brings in the labor market. Figure V.1 on page 459 gives you an overview of this structure.

One of the big issues in the organization of the macroeconomic material is whether long-run growth issues should be taught before short-run chapters on the determination of national income and countercyclical policy. In the last four editions, we moved a significant discussion of growth to Chapter 22, "Unemployment, Inflation, and Long-Run Growth," and highlighted it. However, while we wrote Chapter 31, the major chapter on long-run growth, so that it can be taught before or after the short-run chapters, we remain convinced that it is easier for students to understand the growth issue once they have come to grips with the logic and controversies of short-run cycles, inflation, and unemployment.

Instructor Teaching Resources

The instructor supplements are designed to make teaching and testing flexible and easy and are available for *Micro, Macro,* and *Economics* volumes.

This program comes with the following teaching resources:

Supplements available to instructors at www.pearsonhighered.com/case	Features of the Supplement
Instructor's Manual authored by Tony Lima of California State University, East Bay	• Detailed Chapter Outlines include key terminology, teaching notes, and lecture suggestions. • Topics for Class Discussion provide topics and real-world situations that help ensure that economic concepts resonate with students. • Unique Economics in Practice features that are not in the main text provide extra real-world examples to present and discuss in class. • Teaching Tips provide tips for alternative ways to cover the material and brief reminders on additional help to provide students. These tips include suggestions for exercises and experiments to complete in class. • Extended Applications include exercises, activities, and experiments to help make economics relevant to students. • Solutions are provided for all problems in the book.
Test Bank authored by Randy Methenitis of Richland College and Richard Gosselin of Houston Community College	• Multiple-choice, true/false, short- answer, and graphing questions with these annotations: • Difficulty level (1 for straight recall, 2 for some analysis, 3 for complex analysis) • Type (Multiple-choice, true/false, short-answer, essay) • Topic (The term or concept the question supports) • Learning outcome • AACSB learning standard (Written and Oral Communication; Ethical Understanding and Reasoning; Analytical Thinking; Information Technology; Interpersonal Relations and Teamwork; Diverse and Multicultural Work; Reflective Thinking; Application of Knowledge)
Computerized TestGen	TestGen allows instructors to: • Customize, save, and generate classroom tests • Edit, add, or delete questions from the Test Item Files • Analyze test results • Organize a database of tests and student results.

PowerPoints
authored by Jim Lee of Dickinson State University

- Slides include all the graphs, tables, and equations in the textbook.
- PowerPoints meet accessibility standards for students with disabilities. Features include, but not limited to:
  - Keyboard and Screen Reader access
  - Alternative text for images
  - High color contrast between background and foreground colors

Acknowledgments

We are grateful to the many people who helped us prepare the 13th edition. We thank David Alexander, our Portfolio Manager, and Carolyn Philips, our Content Producer, for their help and enthusiasm.

Jennifer Gavigan, project manager at Integra Software Services, Inc., kept us on schedule and ensured that the production process of the book went smoothly. We want to give special thanks to Patsy Balin, Murielle Dawdy, and Tracy Waldman for their research assistance.

We also owe a debt of gratitude to those who reviewed and checked the 13th edition for accuracy. They provided us with valuable insight as we prepared this edition and its supplement package.

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We welcome comments about the 13th edition. Please write to us care of David Alexander, Executive Editor, Pearson, 501 Boylston Street, 8th floor, Boston, MA 02116.

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The Scope and Method of Economics

1

The study of economics should begin with a sense of wonder. Pause for a moment and consider a typical day in your life. It might start with a bagel made in a local bakery with flour produced in Minnesota from wheat grown in Kansas. After class you drive with a friend on an interstate highway that is part of a system that took 20 years and billions of dollars to build. You stop for gasoline refined in Louisiana from Saudi Arabian crude oil. Later, you log onto the Web with a laptop assembled in Indonesia from parts made in China and Skype with your brother in Mexico City. You use or consume tens of thousands of things in a day. Someone organized men and women and materials to produce and distribute these things. Thousands of decisions went into their completion, and somehow they got to you.

In the United States, more than 160 million people—over half the total population—work at hundreds of thousands of different jobs producing more than $18 trillion worth of goods and services every year. Some cannot find work; some choose not to work. The United States imports more than $300 billion worth of automobiles and parts and more than $350 billion worth of petroleum and petroleum products each year; it exports around $140 billion worth of agricultural products, including food. In the modern economy, consumers' choices include products made all over the globe.

Economics is the study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided. The key word in this definition is *choose*. Economics is a behavioral, or social, science. In large measure, it is the study of how people make choices. The choices that people make, when added up, translate into societal choices.

The purpose of this chapter and the next is to elaborate on this definition and to introduce the subject matter of economics. What is produced? How is it produced? Who gets it? Why? Is the result good or bad? Can it be improved?

CHAPTER OUTLINE AND LEARNING OBJECTIVES

economics The study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided.

1.1 LEARNING OBJECTIVE

Identify three key reasons to study economics. Think of an example from your life in which understanding opportunity costs or the principle of efficient markets could make a difference in your decision making.

Why Study Economics?

There are three main reasons to study economics: to learn a way of thinking, to understand society, and to be an informed citizen.

To Learn a Way of Thinking MyLab Economics Concept Check

Probably the most important reason for studying economics is to learn a way of thinking. Economics has three fundamental concepts that, once absorbed, can change the way you look at everyday choices: opportunity cost, marginalism, and the working of efficient markets.

Opportunity Cost

What happens in an economy is the outcome of thousands of individual decisions. People must decide how to divide their incomes among all the goods and services available in the marketplace. They must decide whether to work, whether to go to school, and how much to save. Businesses must decide what to produce, how much to produce, how much to charge, and where to locate. Economic analysis provides a structured way of thinking about these types of decisions.

Nearly all decisions involve trade-offs. A key concept that recurs in analyzing the decision-making process is the notion of *opportunity cost*. The full "cost" of making a specific choice includes what we give up by not making the best alternative choice. The best alternative that we forgo, or give up, when we make a choice or a decision is called the **opportunity cost** of that decision.

opportunity cost The best alternative that we forgo, or give up, when we make a choice or a decision.

When asked how much a movie costs, most people cite the ticket price. For an economist, this is only part of the answer: to see a movie takes not only a ticket but also time. The opportunity cost of going to a movie is the value of the other things you could have done with the same money and time. If you decide to take time off from work, the opportunity cost of your leisure is the pay that you would have earned had you worked. Part of the cost of a college education is the income you could have earned by working full time instead of going to school.

scarce Limited.

Opportunity costs arise because resources are scarce. **Scarce** simply means limited. Consider one of our most important resources—time. There are only 24 hours in a day, and we must live our lives under this constraint. A farmer in rural Brazil must decide whether it is better to continue to farm or to go to the city and look for a job. A hockey player at the University of Vermont must decide whether to play on the varsity team or spend more time studying. In the Economics in Practice box on page 3, we use the idea of opportunity cost to help explain how rainfall in India affects math scores of rural children. As you will see, opportunity cost is a powerful idea.

Marginalism

marginalism The process of analyzing the additional or incremental costs or benefits arising from a choice or decision.

A second key concept used in analyzing choices is the notion of **marginalism**. In weighing the costs and benefits of a decision, it is important to weigh only the costs and benefits that arise from the decision. Suppose, for example, that you live in New Orleans and that you are weighing the costs and benefits of visiting your mother in Iowa. If business required that you travel to Kansas City anyway, the cost of visiting Mom would be only the additional, or *marginal*, time and money cost of getting to Iowa from Kansas City.

There are numerous examples in which the concept of marginal cost is useful. For an airplane that is about to take off with empty seats, the marginal cost of an extra passenger is essentially zero; the total cost of the trip is roughly unchanged by the addition of an extra passenger. Thus, setting aside a few seats to be sold at big discounts through www.priceline.com or other Web sites can be profitable even if the fare for those seats is far below the average cost per seat of making the trip. As long as the airline succeeds in filling seats that would otherwise have been empty, doing so is profitable.

Efficient Markets—No Free Lunch

Suppose you are ready to check out at a busy grocery store on the day before a storm and seven checkout registers are open with several people in each line. Which line should you choose? Clearly you should go to the shortest line! But if everyone thinks this way—as is likely—all the lines will be equally long as people move around. Economists often loosely refer to "good deals" or risk-free ventures as *profit opportunities*. Using the term loosely, a profit opportunity exists at the checkout lines when one line is shorter than the others. In general, such profit opportunities are rare. At any time, many people are searching for them; as a consequence, few exist. Markets like this, where any profit opportunities are eliminated almost

ECONOMICS IN PRACTICE

Rainfall and Schooling in India

As we indicated in the text, the idea of opportunity cost is one of the fundamental concepts in economics. When we look at the choices people make in the area of employment and education, the role of opportunity cost is especially large. Recent work looking at the effect of rainfall on children's education in India highlights the role that opportunity cost can play.[1]

Much of India is still rural and dependent on agriculture. Most adults, both male and female, are engaged in agriculture, and in most families the children also play a role in agricultural production. Irrigation is uncommon, especially in the poorer areas of India, and as a result agricultural production is highly dependent on rainfall. When rains are unusually plentiful, not only are harvests larger, but the gains from having people work the land increase. In a drought there is very little a farm worker can do to increase yields, and there is little produce to harvest. It follows then that when rains are unusually plentiful in an area, the opportunity cost of having someone out of the labor force increases.

Think for a moment about families with children, choosing between sending them to school, which would make them more productive in their later life, or sending them to the fields to help with the current harvest. The opportunity cost of sending your children to school is the loss in current agricultural output. If there have been ample rains, that opportunity cost is high. In a drought, the cost is low.

It follows from this opportunity cost differential that one would expect fewer children at school when the rains have been plentiful in rural India than in a drought. This is precisely what Shah and Steinberg find. Using data from more than 2 million children ages 5–16 across rural India, these economists find that an unusually high rainfall reduces school

enrollments by a significant amount. And, unsurprisingly, these children end up with significantly lower math scores on tests administered by the state. You should be able to see the power of the concept of opportunity cost. In this example, it allows us to see the effect of rainfall on rural math scores.

CRITICAL THINKING

1. For urban children in India, work opportunities are few. What would you expect to see happen to the urban-rural gap in test scores in high rainfall periods?

[1]Manisha Shah and Bryce Millett Steinberg, "Drought of Opportunities: Contemporaneous and Long Term Impacts of Rainfall Shocks on Human Capital" *Journal of Political Economy*, April 2017, 527–561.

instantaneously, are said to be **efficient markets**. (We discuss *markets*, the institutions through which buyers and sellers interact and engage in exchange, in detail in Chapter 2.)

efficient market A market in which profit opportunities are eliminated almost instantaneously.

The common way of expressing the efficient markets concept is "there's no such thing as a free lunch." How should you react when a stockbroker calls with a hot tip on the stock market? With skepticism. Thousands of individuals each day are looking for hot tips in the market. If a particular tip about a stock is valid, there will be an immediate rush to buy the stock, which will quickly drive up its price. This view that very few profit opportunities exist can, of course, be carried too far. There is a story about two people walking along, one an economist and one not. The non-economist sees a $20 bill on the sidewalk and says, "There's a $20 bill on the sidewalk." The economist replies, "That is not possible. If there were, somebody would already have picked it up."

There are clearly times when profit opportunities exist. Someone has to be first to get the news, and some people have quicker insights than others. Nevertheless, news travels fast, and there are thousands of people with quick insights. The general view that large profit opportunities are rare is close to the mark and is powerful in helping to guide decision making. The Economics in Practice box on page 4 describes the way in which learning this way of thinking can pay off in labor market outcomes.

The study of economics teaches us a way of thinking and helps us make decisions.

ECONOMICS IN PRACTICE

Majoring in Economics Makes You Less Vulnerable to a Recession!

It is well known that a college education, on average, increases one's income. Economists estimate that over one's lifetime, a college degree holder will earn on average almost 70% more than someone with only a high school degree. Part of the returns to a college education come from higher wages and part from being less likely to suffer long spells of unemployment. It is perhaps less well known that both wage and unemployment effects also vary considerably with the majors of college graduates. Economics is, along with engineering, one of the majors with the highest wage premia.

Recent work has shown yet another advantage of the economics major: It helps to protect graduates from the long-term effects of graduating in a recession.[1] As Lisa Kahn found in some of her earlier work, graduating in a recession (a period of high unemployment and low economic growth) has long-term negative effects on one's career. One's first job under these circumstances tends to be worse than otherwise, and this bad placement affects the next few job opportunities and hence one's lifetime earnings. But Kahn's recent work suggests that the extent of this long-term recession handicap varies considerably with one's major. Majors like economics are less hurt by graduating in a recession than sociology or journalism, for example. Learning to think like an economist not only generates a higher wage but provides insurance against volatility in the economy!

CRITICAL THINKING

1. Why does a recent graduate's first job matter for his or her long-term earnings, even if he or she only stays at that job for three years?

[1]Joseph Altonji, Lisa Kahn, Jamin Speer, "Cashier or Consultant? Entry Labor Market Conditions, Field of Study and Career Success." *Journal of Labor Economics*, 2016, (34) S361–S401.

To Understand Society MyLab Economics Concept Check

Another reason for studying economics is to understand society better. Past and present economic decisions have an enormous influence on the character of life in a society. The current state of the physical environment, the level of material well-being, and the nature and number of jobs are all products of the economic system.

Industrial Revolution The period in England during the late eighteenth and early nineteenth centuries in which new manufacturing technologies and improved transportation gave rise to the modern factory system and a massive movement of the population from the countryside to the cities.

At no time has the impact of economic change on a society been more evident than in England during the late eighteenth and early nineteenth centuries, a period that we now call the **Industrial Revolution**. Increases in the productivity of agriculture, new manufacturing technologies, and development of more efficient forms of transportation led to a massive movement of the British population from the countryside to the city. At the beginning of the eighteenth century, approximately 2 out of 3 people in Great Britain worked in agriculture. By 1812, only 1 in 3 remained in agriculture; by 1900, the figure was fewer than 1 in 10. People jammed into overcrowded cities and worked long hours in factories. England had changed completely in two centuries—a period that in the run of history was nothing more than a blink of an eye.

The discipline of economics began to take shape during this period. Social critics and philosophers looked around and knew that their philosophies must expand to accommodate the changes. Adam Smith's *Wealth of Nations* appeared in 1776. It was followed by the writings of David Ricardo, Karl Marx, Thomas Malthus, and others. Each tried to make sense out of what was happening. Who was building the factories? Why? What determined the level of wages paid to workers or the price of food? What would happen in the future, and what *should* happen? The people who asked these questions were the first economists.

Societal changes are often driven by economics. Consider the developments in the early years of the World Wide Web. Changes in the ways people communicate with one another and

with the rest of the world, largely created by private enterprise seeking profits, have affected almost every aspect of our lives, from the way we interact with friends and family to the jobs that we have and the way cities and governments are organized.

The study of economics is an essential part of the study of society.

To Be an Informed Citizen MyLab Economics Concept Check

A knowledge of economics is essential to being an informed citizen. Between 2008 and 2013, much of the world struggled with a major recession and slow recovery, leaving millions of people around the world out of work. Understanding what happens in a recession and what the government can and cannot do to help in a recovery is an essential part of being an informed citizen. In the early years of President Trump's administration, the country grappled with questions of immigration, trade policy, and tax structure. An understanding of economics is fundamental to making national policy in all of these areas.

Economics is also essential in understanding a range of other everyday government decisions at the local and federal levels. Why do governments pay for public schools and roads, but not cell phones? The federal government under President Barack Obama moved toward universal health care for U.S. citizens, while President Trump moved to limit the Affordable Care Act. What are the pros and cons of these policies? In some states, scalping tickets to a ball game is illegal. Is this a good policy or not? Every day, across the globe, people engage in political decision making around questions like these, questions that depend on an understanding of economics.

To be an informed citizen requires a basic understanding of economics.

The Scope of Economics

1.2 LEARNING OBJECTIVE

Describe microeconomics, macroeconomics, and the diverse fields of economics.

Most students taking economics for the first time are surprised by the breadth of what they study. Some think that economics will teach them about the stock market or what to do with their money. Others think that economics deals exclusively with problems such as inflation and unemployment. In fact, it deals with all those subjects, but they are pieces of a much larger puzzle. Economists use their tools to study a wide range of topics.

The easiest way to get a feel for the breadth and depth of what you will be studying is to explore briefly the way economics is organized. First, there are two major divisions of economics: microeconomics and macroeconomics.

Microeconomics and Macroeconomics MyLab Economics Concept Check

Microeconomics deals with the functioning of individual industries and the behavior of individual economic decision-making units: firms and households. Firms' choices about what to produce and how much to charge and households' choices about what and how much to buy help to explain why the economy produces the goods and services it does.

microeconomics The branch of economics that examines the functioning of individual industries and the behavior of individual decision-making units—that is, firms and households.

Another big question addressed by microeconomics is who gets the goods and services that are produced. Understanding the forces that determine the distribution of output is the province of microeconomics. Microeconomics helps us to understand how resources are distributed among households. Recent research has shown an increase in income inequality in the United States. Why has this occurred? What determines who is rich and who is poor?

Macroeconomics looks at the economy as a whole. Instead of trying to understand what determines the output of a single firm or industry or what the consumption patterns are of a single household or group of households, macroeconomics examines the factors that determine national output, or national product. Microeconomics is concerned with *household* income; macroeconomics deals with *national income*.

macroeconomics The branch of economics that examines the economic behavior of aggregates—income, employment, output, and so on—on a national scale.

Whereas microeconomics focuses on individual product prices and relative prices, macroeconomics looks at the overall price level and how quickly (or slowly) it is rising (or falling). Microeconomics questions how many people will be hired (or fired) this year in a particular industry or in a certain geographic area and focuses on the factors that determine how much labor a firm or an industry will hire. Macroeconomics deals with *aggregate* employment and unemployment: how many jobs exist in the economy as a whole and how many people who are willing to work are not able to find work.

To summarize:

> Microeconomics looks at the individual unit—the household, the firm, the industry. It sees and examines the "trees." Macroeconomics looks at the whole, the aggregate. It sees and analyzes the "forest."

ECONOMICS IN PRACTICE

iPod and the World

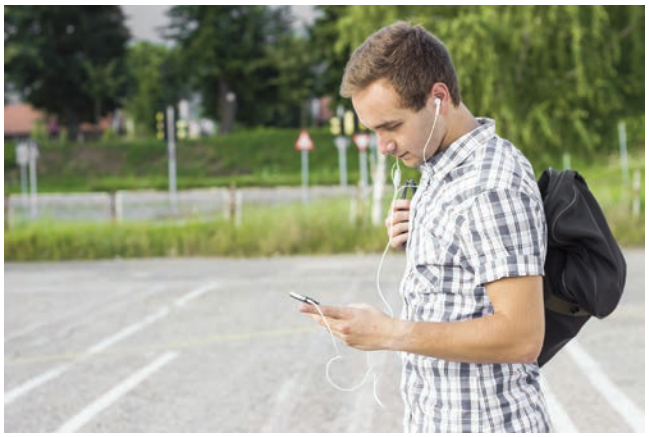
It is impossible to understand the workings of an economy without first understanding the ways in which economies are connected across borders. The United States was importing goods and services at a rate of more than $2.8 trillion per year in 2014 and was exporting at a rate of more than $2.3 trillion per year.

For literally hundreds of years, the virtues of free trade have been the subject of heated debate. Opponents have argued that buying foreign-produced goods costs Americans jobs and hurts U.S. producers. Proponents argue that there are gains from trade—that all countries can gain from specializing in the production of the goods and services they produce best.

In the modern world, it is not always easy to track where products are made. A sticker that says "Made in China" can often be misleading. Recent studies of two iconic U.S. products, the iPod and the Barbie doll, make this complexity clear.

The Barbie doll is one of Mattel's best and longest-selling products. The Barbie was designed in the United States. It is made of plastic fashioned in Taiwan, which came originally from the Mideast in the form of petroleum. Barbie's hair comes from Japan, while the cloth for her clothes mostly comes from China. Most of the assembly of the Barbie is also done in China, using, as we see, pieces from across the globe. A doll that sells for $10 in the United States carries an export value when leaving Hong Kong of $2, of which only 35 cents is for Chinese labor, with most of the rest covering transportation and raw materials. Because the Barbie comes to the United States from assembly in China and transport from Hong Kong, some would count it as being produced in China. Yet, for this Barbie, $8 of its retail value of $10 is captured by the United States![1]

The iPod is similar. A recent study by three economists, Greg Linden, Kenneth Kraemer, and Jason Dedrick, found that once one includes Apple's payment for its intellectual property, distribution costs, and production costs for some components, almost 80 percent of the retail price of the iPod



is captured by the United States.[2] Moreover, for some of the other parts of the iPod, it is not easy to tell exactly where they are produced. The hard drive, a relatively expensive component, was produced in Japan by Toshiba, but some of the components of that hard drive were actually produced elsewhere in Asia. Indeed, for the iPod, which is composed of many small parts, it is almost impossible to accurately tell exactly where each piece was produced without pulling it apart.

So, next time you see a label saying "Made in China," keep in mind that from an economics point of view, one often has to dig a little deeper to see what is really going on.

CRITICAL THINKING

1. What do you think accounts for *where* components of the iPod and Barbie are made?

[1] For a discussion of the Barbie see Robert Feenstra, "Integration of Trade and Disintegration of Production in the Global Economy," *Journal of Economic Perspectives*, Fall 1998: 31–50.

[2] Greg Linden, Kenneth Kraemer, and Jason Dedrick, "Who Profits from Innovation in Global Value Chains?" *Industrial and Corporate Change*, 2010: 81–116.

TABLE 1.1 Examples of Microeconomic and Macroeconomic Concerns

Division of Economics	Production	Prices	Income	Employment
Microeconomics	*Production/output in individual industries and businesses* How much steel How much office space How many cars	*Prices of individual goods and services* Price of medical care Price of gasoline Food prices Apartment rents	*Distribution of income and wealth* Wages in the auto industry Minimum wage Executive salaries Poverty	*Employment by individual businesses and industries* Jobs in the steel industry Number of employees in a firm Number of accountants
Macroeconomics	*National production/output* Total industrial output Gross domestic product Growth of output	*Aggregate price level* Consumer prices Producer prices Rate of inflation	*National income* Total wages and salaries Total corporate profits	*Employment and unemployment in the economy* Total number of jobs Unemployment rate

Table 1.1 summarizes these divisions of economics and some of the subjects with which they are concerned.

The Diverse Fields of Economics MyLab Economics Concept Check

Individual economists focus their research and study in many different areas. The subfields of economics are listed in Table 1.2 along with a sample research or policy question that an economist in this subfield might study.

TABLE 1.2 The Fields of Economics

Behavioral economics	Do aggregate household savings increase when we automatically enroll people in savings programs and let them opt out as opposed to requiring them to sign up?
Comparative economic systems	How does the resource allocation process differ in market versus command and control systems?
Econometrics	What inferences can we make based on conditional moment inequalities?
Economic development	Does increasing employment opportunities for girls in developing nations increase their educational achievement?
Economic history	How did the growth of railroads and improvement in transportation more generally change the U.S. banking systems in the nineteenth century?
Environmental economics	What effect would a tax on carbon have on emissions? Is a tax better or worse than rules?
Finance	Is high frequency trading socially beneficial?
Health economics	Do co-pays by patients change the choice and use of medicines by insured patients?
The history of economic thought	How did Aristotle think about just prices?
Industrial organization	How do we explain price wars in the airline industry?
International economics	What are the benefits and costs of free trade? Does concern about the environment change our views of free trade?
Labor economics	Will increasing the minimum wage decrease employment opportunities?
Law and economics	Does the current U.S. patent law increase or decrease the rate of innovation?
Public economics	Why is corruption more widespread in some countries than in others?
Urban and regional economics	Do enterprise zones improve employment opportunities in central cities?

1.3 LEARNING OBJECTIVE

Think about an example of bad causal inference leading to erroneous decision making. Identify the four main goals of economic policy.

The Method of Economics

Economics asks and attempts to answer two kinds of questions: positive and normative. **Positive economics** attempts to understand behavior and the operation of economic systems *without making judgments* about whether the outcomes are good or bad. It strives to describe what exists and how it works. What determines the wage rate for unskilled workers? What would happen if the United States substantially lowered the corporate profit tax, as it did in 2018? The answers to such questions are the subject of positive economics.

positive economics An approach to economics that seeks to understand behavior and the operation of systems without making judgments. It describes what exists and how it works.

In contrast, **normative economics** looks at the outcomes of economic behavior and asks whether they are good or bad and whether they can be made better. Normative economics involves judgments and prescriptions for courses of action. Should the government subsidize or regulate the cost of higher education? Should the United States allow importers to sell foreign-produced goods that compete with U.S.-made products? Should we reduce or eliminate inheritance taxes? Normative economics is often called *policy economics*.

normative economics An approach to economics that analyzes outcomes of economic behavior, evaluates them as good or bad, and may prescribe courses of action. Also called *policy economics*.

Of course, most normative questions involve positive questions. To know whether the government *should* take a particular action, we must know first if it *can* and second what the consequences are likely to be.

Theories and Models MyLab Economics Concept Check

In many disciplines, including physics, chemistry, meteorology, political science, and economics, theorists build formal models of behavior. A **model** is a formal statement of a theory. It is usually a mathematical statement of a presumed relationship between two or more variables.

model A formal statement of a theory, usually a mathematical statement of a presumed relationship between two or more variables.

A **variable** is a measure that can change from time to time or from observation to observation. Income is a variable—it has different values for different people and different values for the same person at different times. The price of a quart of milk is a variable; it has different values at different stores and at different times. There are countless other examples.

variable A measure that can change from time to time or from observation to observation.

Because all models simplify reality by stripping part of it away, they are abstractions. Critics of economics often point to abstraction as a weakness. Most economists, however, see abstraction as a real strength.

The easiest way to see how abstraction can be helpful is to think of a map. A map is a representation of reality that is simplified and abstract. A city or state appears on a piece of paper as a series of lines and colors. The amount of reality that the mapmaker can strip away before the map loses something essential depends on what the map will be used for. If you want to drive from St. Louis to Phoenix, you need to know only the major interstate highways and roads. However, to travel around Phoenix, you may need to see every street and alley.

Like maps, economic models are abstractions that strip away detail to expose only those aspects of behavior that are important to the question being asked. The principle that irrelevant detail should be cut away is called the principle of **Ockham's razor**, named after the 14th-century philosopher William of Ockham.

Ockham's razor The principle that irrelevant detail should be cut away.

Be careful: Although abstraction is a powerful tool for exposing and analyzing specific aspects of behavior, it is possible to oversimplify. Economic models often strip away a good deal of social and political reality to get at underlying concepts. When an economic theory is used to help formulate actual government or institutional policy, political and social reality must often be reintroduced if the policy is to have a chance of working.

The appropriate amount of simplification and abstraction depends on the use to which the model will be put. To return to the map example: You do not want to walk around San Francisco with a map made for drivers—there are too many very steep hills.

All Else Equal It is usually true that whatever you want to explain with a model depends on more than one factor. Suppose, for example, that you want to explain the total number of miles driven by automobile owners in the United States. Many things might affect total miles driven. More or fewer people may be driving. This number, in turn, can be affected by changes in the driving age, by population growth, or by changes in state laws. Other factors might include the price of gasoline, the household's income, the number and age of children in the household, the distance from home to work, the location of shopping facilities, and the availability and quality of public transport. When any of these variables change, the members of the household may

drive more or less. If changes in any of these variables affect large numbers of households across the country, the total number of miles driven will change.

Very often we need to isolate or separate these effects. For example, suppose we want to know the impact on driving of a higher tax on gasoline. This increased tax would raise the price of gasoline at the pump, and this could reduce driving.

To isolate the impact of one single factor, we use the device of **ceteris paribus,** or **all else equal**. We ask, "What is the impact of a change in gasoline price on driving behavior, ceteris paribus, or assuming that nothing else changes?" If gasoline prices rise by 10 percent, how much less driving will there be, assuming no simultaneous change in anything else—that is, assuming that income, number of children, population, laws, and so on, all remain constant? Using the device of ceteris paribus is one part of the process of abstraction. In formulating economic theory, the concept helps us simplify reality to focus on the relationships that interest us.

ceteris paribus, or **all else equal** A device used to analyze the relationship between two variables while the values of other variables are held unchanged.

Expressing Models in Words, Graphs, and Equations

Consider the following statements: Lower airline ticket prices cause people to fly more frequently. Higher gasoline prices cause people to drive less and to buy more fuel-efficient cars. By themselves, these observations are of some interest. But for a firm, government, or an individual to make good decisions, oftentimes they need to know more. How much does driving fall when prices rise? Quantitative analysis is an important part of economics as well. Throughout this book, we will use both graphs and equations to capture the quantitative side of our economic observations and predictions. The appendix to this chapter reviews some graphing techniques.

Cautions and Pitfalls

In formulating theories and models, it is especially important to separate causation from correlation.

What Is Really Causal? In much of economics, we are interested in cause and effect. But cause and effect are often difficult to figure out. Recently, many people in the United States have begun to worry about consumption of soda and obesity. Some areas have begun taxing soda, trying to raise the price so that people will drink less of it. Is this working? Answering this question turns out to be hard. Suppose we see that one city raises the tax and at more or less the same time, soda consumption falls. Did the increased tax and price really *cause* all or most of the change in behavior? Or perhaps the city that voted the soda tax increase is more health conscious than its neighbors and it is that health consciousness that accounts for both the town's decision to raise taxes *and* its reduction in soda purchases. In this case, raising taxes in the neighboring towns will not necessarily reduce soda consumption. Sorting out causality from correlation is not always easy, particularly when one wants a quantitative answer to a question.

In our everyday lives, we often confuse causality. When two events occur in a sequence, it seems natural to think A caused B. I walked under a ladder and subsequently stubbed my toe. Did the ladder cause my bad luck? Most of us would laugh at this. But everyday we hear stock market analysts make a similar causal jump. "Today the Dow Jones industrial average rose 100 points on heavy trading due to progress in talks between Israel and Syria." How do they know this? Investors respond to many news events on any given day. Figuring out which one, if any, causes the stock market to rise is not easy. The error of inferring causality from two events happening one after the other is called the **post hoc, ergo propter hoc** fallacy ("after this, therefore because of this"). The *Economics in Practice* box describes a causality confusion in looking at peer effects.

post hoc, ergo propter hoc Literally, "after this (in time), therefore because of this." A common error made in thinking about causation: If Event A happens before Event B, it is not necessarily true that A caused B.

Testing Theories and Models: Empirical Economics

In science, a theory is rejected when it fails to explain what is observed or when another theory better explains what is observed. The collection and use of data to test economic theories is called **empirical economics**.

empirical economics The collection and use of data to test economic theories.

Numerous large data sets are available to facilitate economic research. For example, economists studying the labor market can now test behavioral theories against the actual working experiences of thousands of randomly selected people who have been surveyed continuously since the 1960s. Macroeconomists continuously monitoring and studying the behavior of the national economy at the National Bureau of Economic Research (NBER) analyze thousands of items of data, collected by both government agencies and private companies, over the Internet. Firms like Google, Uber, and Amazon have an enormous amount of data about individual consumers that they analyze with the help of PhD economists to understand consumers' buying behavior and improve the profitability of their businesses. In doing this analysis, economists have learned to be especially careful about causality issues.

ECONOMICS IN PRACTICE

Does Your Roommate Matter for Your Grades?

Most parents are concerned about their children's friends. Often they worry that if one of their children has a misbehaving friend, their own child will be led astray. And, in fact, in many areas of life, there are strong indications that *peer effects* matter. The likelihood that a child will be obese, have difficulties in school, or engage in criminal activity all seem to be higher if their friends also have these issues. And yet, in looking at peer effects, it is not hard to see the problem of causality we described in the text. At least to some extent, children choose their own friends. The father worried about the bad influence of his son's friends on his own son should perhaps be equally worried about what his son's choice of friends says about that son's inclinations. Did the friends cause the misbehavior or did an inclination toward mischief cause the son's choice of friends?

Sorting out causality in peer effects, given that peer groups are oftentimes partially a matter of choice, is difficult. But several recent economics studies of the effect of roommates on college grades do a nice job of sorting out the causality puzzle. Dartmouth College, in common with many other schools, randomly assigns roommates to freshmen. In this case, part of a student's peer group—his or her roommate—is not a matter of choice, but a matter of chance. Bruce Sacerdote, a professor at Dartmouth, used data on freshmen academic and social performance, combined with their background data, to test the peer effects from different types of roommates.[1] Sacerdote found that after taking into account many background characteristics, there were strong roommate effects both on grade point average, effort in school, and fraternity membership.

Of course, a roommate is only part of one's peer group. At the U.S. Air Force Academy, students are assigned to 30-person squadrons with whom they eat, study, live, and do intramural sports. Again, these groups were randomly assigned, so one

did not have the problem of similarly inclined people choosing one another. Scott Carrell, Richard Fullerton, and James West found that for this intense peer group, there were strong peer effects on academic effort and performance.[2] The bottom line: Choose your friends wisely!

CRITICAL THINKING

1. Would you expect college seniors who choose their own roommates to have more or less similar grades than college freshmen who are assigned as roommates? Why or why not?

[1] Bruce Sacerdote, "Peer Effects with Random Assignment: Results for Dartmouth Roommates," *Quarterly Journal of Economics,* 2001: 681–704.
[2] Scott E. Carrell, Richard L. Fullerton, and James E. West, "Does Your Cohort Matter? Measuring Peer Effects in College Achievement," *Journal of Labor Economics,* 2009: 439–464.

In the natural sciences, controlled experiments, typically done in the lab, are a standard way of testing theories. In recent years, economics has seen an increase in the use of experiments, both in the field and in the lab, as a tool to test its theories. One economist, John List of Chicago, tested the effect on prices of changing the way auctions for rare baseball cards were run by sports memorabilia dealers in trade shows. (The experiment used a standard Cal Ripken Jr. card.) Another economist, Keith Chen of UCLA, has used experiments with monkeys to investigate the deeper biological roots of human decision making.

Economic Policy MyLab Economics Concept Check

Economic theory helps us understand how the world works, but the formulation of *economic policy* requires a second step. We must have objectives. What do we want to change? Why? What is good and what is bad about the way the system is operating? Can we make it better?

Such questions force us to be specific about the grounds for judging one outcome superior to another. What does it mean to be better? Four criteria are frequently applied in judging economic outcomes:

1. Efficiency
2. Equity

3. Growth
4. Stability

Efficiency In physics, "efficiency" refers to the ratio of useful energy delivered by a system to the energy supplied to it. An efficient automobile engine, for example, is one that uses a small amount of fuel per mile for a given level of power.

In economics, **efficiency** means *allocative efficiency*. An efficient economy is one that produces what people want at the least possible cost. If the system allocates resources to the production of goods and services that nobody wants, it is inefficient. If all members of a particular society were vegetarians and somehow half of all that society's resources were used to produce meat, the result would be inefficient.

efficiency The condition in which the economy is producing what people want at the least possible cost.

The clearest example of an efficient change is a voluntary exchange. If you and I each want something that the other has and we agree to exchange, we are both better off and no one loses. When a company reorganizes its production or adopts a new technology that enables it to produce more of its product with fewer resources, without sacrificing quality, it has made an efficient change. At least potentially, the resources saved could be used to produce more of something else.

Inefficiencies can arise in numerous ways. Sometimes they are caused by government regulations or tax laws that distort otherwise sound economic decisions. Suppose that land in Ohio is best suited for corn production and that land in Kansas is best suited for wheat production. A law that requires Kansas to produce only corn and Ohio to produce only wheat would be inefficient. If firms that cause environmental damage are not held accountable for their actions, the incentive to minimize those damages is lost and the result is inefficient.

Equity While efficiency has a fairly precise definition that can be applied with some degree of rigor, **equity** (fairness) lies in the eye of the beholder. To many, fairness implies a more equal distribution of income and wealth. For others, fairness involves giving people what they earn. In 2013, French economist Thomas Piketty's popular new book *Capital in the Twenty-First Century*, brought new historical data to our attention on the extent of inequality across the Western world. More recent work by Raj Chetty of Stanford University has greatly improved our understanding of economic mobility in the United States, documenting the extent to which parental and adult children's incomes are correlated.

equity Fairness.

Growth As the result of technological change, the building of machinery, and the acquisition of knowledge, societies learn to produce new goods and services and to produce old ones better. In the early days of the U.S. economy, it took nearly half the population to produce the required food supply. Today less than 2 percent of the country's population works in agriculture.

When we devise new and better ways of producing the goods and services we use now and when we develop new goods and services, the total amount of production in the economy increases. **Economic growth** is an increase in the total output of an economy. If output grows faster than the population, output per person rises and standards of living increase. Rural and agrarian societies become modern industrial societies as a result of economic growth and rising per capita output.

economic growth An increase in the total output of an economy. Growth occurs when a society acquires new resources or when it learns to produce more using existing resources.

Some policies discourage economic growth, and others encourage it. Tax laws, for example, can be designed to encourage the development and application of new production techniques. Research and development in some societies are subsidized by the government. Building roads, highways, bridges, and transport systems in developing countries may speed up the process of economic growth. If businesses and wealthy people invest their wealth outside their country rather than in their country's industries, growth in their home country may be slowed.

Stability Economic **stability** refers to the condition in which national output is growing steadily, with low inflation and full employment of resources. During the 1950s and 1960s, the U.S. economy experienced a long period of relatively steady growth, stable prices, and low unemployment. The decades of the 1970s and 1980s, however, were not as stable. The United States experienced two periods of rapid price inflation (more than 10 percent) and two periods of severe unemployment. In 1982, for example, 12 million people (10.8 percent of the workforce) were looking for work. The beginning of the 1990s was another period of instability, with a recession occurring in 1990–1991. In 2008–2009, much of the world, including the United States, experienced a large contraction in output and rise in unemployment. The period since 2009 in the United States has been one of modest growth and falling unemployment. The causes of instability and the ways in which governments have attempted to stabilize the economy are the subject matter of macroeconomics.

stability A condition in which national output is growing steadily, with low inflation and full employment of resources.

1.4 LEARNING OBJECTIVE

Begin to get a sense of the many ways economics touches one's life.

An Invitation

This chapter has prepared you for your study of economics. The first part of the chapter invited you into an exciting discipline that deals with important issues and questions. You cannot begin to understand how a society functions without knowing something about its economic history and its economic system.

The second part of the chapter introduced the method of reasoning that economics requires and some of the tools that economics uses. We believe that learning to think in this powerful way will help you better understand the world.

As you proceed, it is important that you keep track of what you have learned in previous chapters. This book has a plan; it proceeds step-by-step, each section building on the last. It would be a good idea to read each chapter's table of contents at the start of each chapter and scan each chapter before you read it to make sure you understand where it fits in the big picture.

1.5 LEARNING OBJECTIVE

Describe economics as a career and the key skills you can learn from studying economics.

Economic Skills and Economics as a Career

In this book, we will explore economic principles that you will find very useful in understanding what is happening in the world of economics and business and in your everyday life. Individuals use economic principles to improve how they make important decisions, such as what career to pursue or what financial investment to make. Managers in businesses use economic principles to improve how they make important decisions, such as what prices to charge for their products or whether to invest in new software. Government policymakers use economic principles to make decisions, such as how to allocate additional funds to research in certain areas. Whether or not you pursue a career in economics, you can still benefit from the skills learned by taking economics classes.

SUMMARY

1. *Economics* is the study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided.

1.1 WHY STUDY ECONOMICS? *p. 2*

2. There are many reasons to study economics, including (a) to learn a way of thinking, (b) to understand society, and (c) to be an informed citizen.
3. The best alternative that we forgo when we make a choice or a decision is the *opportunity cost* of that decision.

1.2 THE SCOPE OF ECONOMICS *p. 5*

4. *Microeconomics* deals with the functioning of individual markets and industries and with the behavior of individual decision-making units: business firms and households.
5. *Macroeconomics* looks at the economy as a whole. It deals with the economic behavior of aggregates—national output, national income, the overall price level, and the general rate of inflation.
6. Economics is a broad and diverse discipline with many special fields of inquiry. These include economic history, international economics, and urban economics.

1.3 THE METHOD OF ECONOMICS *p. 8*

7. Economics asks and attempts to answer two kinds of questions: positive and normative. *Positive economics* attempts to understand behavior and the operation of economies without making judgments about whether the outcomes are good or bad. *Normative economics* looks at the results of economic behavior and asks whether they are good or bad and whether they can be improved.
8. An economic *model* is a formal statement of an economic theory. Models simplify an abstract from reality.
9. It is often useful to isolate the effects of one variable on another while holding "all else constant." This is the device of *ceteris paribus*.
10. Models and theories can be expressed in many ways. The most common ways are in words, in graphs, and in equations.
11. Figuring out causality is often difficult in economics. Because one event happens before another, the second event does not necessarily happen as a result of the first. To assume that "after" implies "because" is to commit the fallacy of *post hoc, ergo propter hoc*.
12. *Empirical economics* involves the collection and use of data to test economic theories. In principle, the best model is the one that yields the most accurate predictions.
13. To make policy, one must be careful to specify criteria for making judgments. Four specific criteria are used most often in economics: *efficiency, equity, growth,* and *stability*.

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REVIEW TERMS AND CONCEPTS

ceteris paribus, or *all else equal*, *p. 9*
economic growth, *p. 11*
economics, *p. 1*
efficiency, *p. 11*
efficient market, *p. 3*
empirical economics, *p. 9*
equity, *p. 11*
Industrial Revolution, *p. 4*
macroeconomics, *p. 5*
marginalism, *p. 2*
microeconomics, *p. 5*
model, *p. 8*
normative economics, *p. 8*
Ockham's razor, *p. 8*
opportunity cost, *p. 2*
positive economics, *p. 8*
post hoc, ergo propter hoc, *p. 9*
scarce, *p. 2*
stability, *p. 11*
variable, *p. 8*

PROBLEMS

All problems are available on MyLab Economics.

1.1 WHY STUDY ECONOMICS?

LEARNING OBJECTIVE: Identify three key reasons to study economics. Think of an example from your life in which understanding opportunity costs or the principle of efficient markets could make a difference in your decision making.

1.1 One of the scarce resources that constrain our behavior is time. Each of us has only 24 hours in a day. How do you go about allocating your time in a given day among competing alternatives? How do you go about weighing the alternatives? Once you choose a most important use of time, why do you not spend all your time on it? Use the notion of opportunity cost in your answer.

1.2 Every Friday night, Gustavo pays $41.99 to eat nothing but crab legs at the all-you-can-eat seafood buffet at the M Resort in Las Vegas. On average, he consumes 28 crab legs each Friday. What is the average cost of each crab leg to Gustavo? What is the marginal cost of an additional crab leg?

1.3 **[Related to the** *Economics in Practice* **on *p. 3*]** The financial costs of obtaining a college education include tuition and fees, textbooks, and for many students the interest they will pay on student loans. There are also opportunity costs associated with obtaining a college education. What are the opportunity costs you experience by choosing to go to college? What are the opportunity costs you would have faced had you chosen to not attend college?

1.4 For each of the following situations, identify the full cost (opportunity cost) involved:

a. Monique quits her $50,000 per-year job as an accountant to become a full-time volunteer at a women's shelter.
b. The Agrizone Corporation invests $12 million in a new inventory tracking system.
c. Taylor receives $500 from his grandmother for his birthday and uses it all to buy shares of stock in Harley-Davidson, Inc.
d. Hector decides to spend the summer backpacking across Europe after he graduates from Tulane University.
e. After receiving her master's degree, Molly chooses to enter the doctoral program in Behavioral Science at the University of Texas.
f. Monica chooses to use her vacation time to paint the exterior of her house.
g. After a night of karaoke, Tiffany forgets to set her alarm and sleeps through her Calculus final exam.

1.5 On the *Forbes* 2018 list of the World's Billionaires, Jeff Bezos, founder and CEO of Amazon, ranks at the top with a net worth of $112 billion. Does this "richest man in the world" face scarcity, or does scarcity only affect those with more limited incomes and lower net worth?

Source: "The World's Billionaires," *Forbes, March 6, 2018.*

1.6 **[Related to the** *Economics in Practice* **on *p. 4*]** The U.S. Bureau of Labor Statistics' Occupational Outlook Handbook provides career information on education, pay, and outlook for hundreds of occupations. Go to www.bls.gov/ooh/occupation-finder.htm and select "Bachelor's degree" from the Entry-Level Education drop down menu. Look up three occupations that interest you and compare the projected number of new jobs, projected growth rate, and median pay for those occupations. How does this information compare to what you expected? Explain how this information might influence your choice of occupation.

1.2 THE SCOPE OF ECONOMICS

LEARNING OBJECTIVE: Describe microeconomics, macroeconomics, and the diverse fields of economics.

2.1 **[Related to the *Economics in Practice* on *p. 6*]** Log onto www.census.gov/foreign-trade/statistics/state/. In the State Trade by Commodity and Country section, click on "Exports and Imports", then click on "Exports" for your state. There you will find a list of the top 25 commodities produced in your state which are exported around the world. In looking over that list, are you surprised by anything? Do you know any of the firms that produce these items? Search the Internet to find a company that does. Do some research and write a paragraph about this company: what it produces, how many people it employs, and whatever else you can learn about the firm. You might even call the company to obtain the information.

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2.2 Explain whether each of the following is an example of a macroeconomic concern or a microeconomic concern.
- **a.** The Federal Aviation Administration (FAA) is considering increasing the number of takeoff and landing slots available at Ronald Reagan Washington National Airport.
- **b.** In 2018, the U.S. federal corporate income tax rate was reduced from 35% to 21%.
- **c.** In 2018, Maine raised its minimum wage from $9.00 per hour to $10.00 per hour.
- **d.** Congress extends the maximum duration for the collection of unemployment benefits from 26 weeks to 52 weeks.

1.3 THE METHOD OF ECONOMICS

LEARNING OBJECTIVE: Think about an example of bad causal inference leading to erroneous decision making. Identify the four main goals of economic policy.

3.1 Prior to 2018, people could deduct the taxes they pay to their home state before calculating their federal tax bill. So, for example, if you earned $100,000 and paid $20,000 in state taxes, the federal government would only tax you as if your income was $80,000. The tax law passed at the end of 2017 reduced that deduction to a maximum of $10,000. In 2018, we nevertheless saw a growth in population in two high-tax states, New York and California. One observer suggests that this means that the elimination of the deduction had no effect on people's residential choices. Do you agree?

3.2 Which of the following statements are examples of positive economic analysis? Which are examples of normative analysis?
- **a.** A devaluation of the U.S. dollar would increase exports from the United States.
- **b.** Increasing the federal tax on gasoline would cause shipping costs in the United States to increase.
- **c.** Florida should devote all revenues from its state lottery to improving public education.
- **d.** Eliminating the trade embargo with Cuba would increase the number of Cuban cigars available in the United States.
- **e.** As a public safety measure, the state of Texas should repeal legislation that allows people with concealed handgun permits to carry concealed weapons on college campuses.

3.3 In 2012, Colorado and Washington became the first states to legalize marijuana for recreational use, and have since been joined by a number of other states. In 2017, Colorado is reported to have received more than $247 million in tax revenue from the sale of recreational marijuana, much of which was slated to be used to supplement education and public health funding. The potential for increased tax revenues and the benefits these revenues can provide has a number of other states, including New Jersey, contemplating the possible legalization of recreational-use marijuana.
- **a.** Recall that efficiency means producing what people want at the least cost. Can you make an efficiency argument in favor of states allowing the recreational use of marijuana?
- **b.** What nonmonetary costs might be associated with legalizing marijuana use? Would these costs have an impact on the efficiency argument you presented in part a?
- **c.** Using the concept of equity, argue for or against the legalization of recreational-use marijuana.
- **d.** What do you think would happen to the flow of tax revenue to state governments if all 50 states legalized marijuana?

3.4 **[Related to the *Economics in Practice* on p. 10]** Most college students either currently have, or at one time have had, roommates or housemates. Think about a time when you have shared your living space with one or more students, and describe the effect this person (or people) had on your college experience, such as your study habits, the classes you took, your grade point average, and the way you spent time away from the classroom. Now describe the effect you think you had on your roommate(s). Were these roommates or housemates people you chose to live with, or were they assigned randomly? Explain if you think this made a difference in your or their behavior?

3.5 Explain the pitfalls in the following statements.
- **a.** People who eat quinoa on a regular basis are more likely to exercise every day than people who do not eat quinoa. Therefore, exercising daily causes people to eat quinoa.
- **b.** Whenever the Chicago Cubs are down by 2 runs in the eighth inning, they usually come back to win whenever self-proclaimed Cubs fanatic Cassandra decides to watch the game with her pet ferret Bobo. Last night with the Cubs down by 2 runs in the eighth, Cassandra rushed to grab Bobo and as she expected, the Cubs won the game. Obviously, the Cubs won because Cassandra watched the game with Bobo by her side.
- **c.** The manager of a large retail furniture store found that sending his least productive salespeople to a week-long motivational training workshop resulted in a 15 percent increase in sales for those employees. Based on this success, the manager decided to spend the money to send all of his other salespeople to this workshop so sales would increase for everyone.

CRITICAL THINKING QUESTIONS

QUESTION 1 The State of Florida recently decided to substantially increase the funding for the University of Florida, the state's flagship university. This policy was evaluated by various government agencies and independent policy institutes. Identify one positive and one normative question that may have been considered.

QUESTION 2 Economists have identified educational attainment as potential predictor of who marries whom. Highly educated individuals marry other highly educated individuals, and people with less education marry similar people. Explain why this may or may not be a causal relationship.

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Chapter 1 Appendix: How to Read and Understand Graphs

LEARNING OBJECTIVE

Understand how data can be graphically represented.

Economics is the most quantitative of the social sciences. If you flip through the pages of this or any other economics text, you will see countless tables and graphs. These serve a number of purposes. First, they illustrate important economic relationships. Second, they make difficult problems easier to understand and analyze. Finally, they can show patterns and regularities that may not be discernible in simple lists of numbers.

A **graph** is a two-dimensional representation of a set of numbers, or data. There are many ways that numbers can be illustrated by a graph.

graph A two-dimensional representation of a set of numbers or data.

Time Series Graphs

It is often useful to see how a single measure or variable changes over time. One way to present this information is to plot the values of the variable on a graph, with each value corresponding to a different time period. A graph of this kind is called a **time series graph**. On a time series graph, time is measured along the horizontal scale and the variable being graphed is measured along the vertical scale. Figure 1A.1 is a time series graph that presents total disposable personal income in the U.S. economy for each year between 1975 and 2017.[1] This graph is based on the data found in Table 1A.1. By displaying these data graphically, we can see that total disposable personal income has increased every year between 1975 and 2017, except for a small dip in 2009.

time series graph A graph illustrating how a variable changes over time.

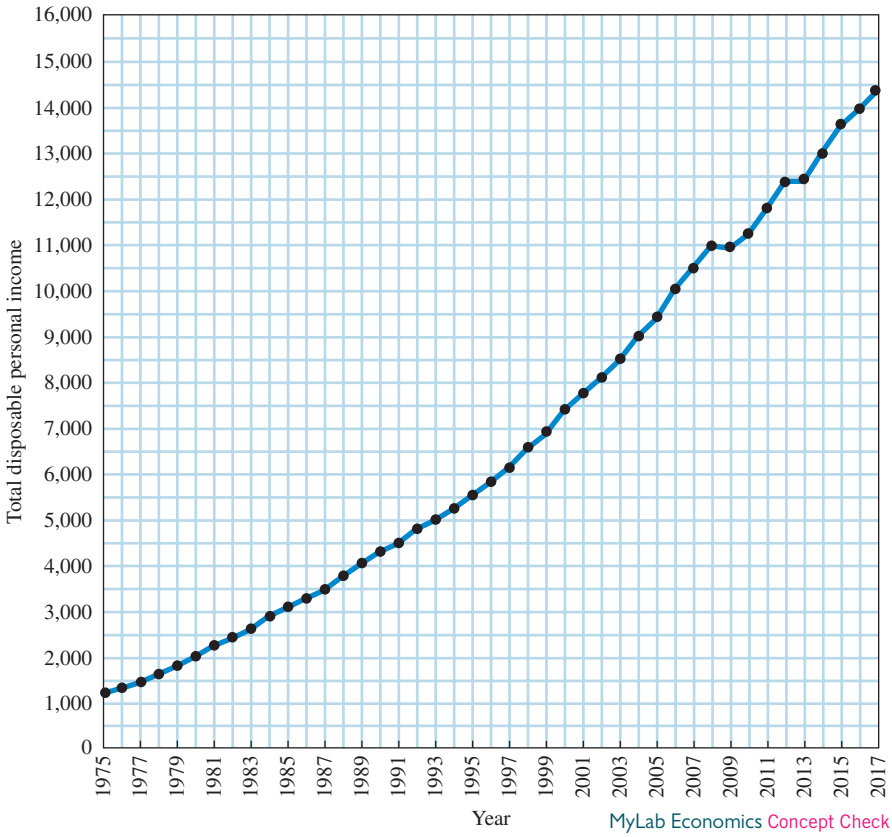

FIGURE 1A.1 Total Disposable Personal Income in the United States: 1975–2017 (in billions of dollars)

Source: See Table 1A.1.

[1]The measure of income presented in Table 1A.1 and in Figure 1A.1 is disposable personal income in billions of dollars. It is the total personal income received by all households in the United States minus the taxes that they pay.

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TABLE 1A.1 Total Disposable Personal Income in the United States, 1975–2017 (in billions of dollars)

Year	Total Disposable Personal Income	Year	Total Disposable Personal Income
1975	1,219	1997	6,149
1976	1,326	1998	6,561
1977	1,457	1999	6,876
1978	1,630	2000	7,401
1979	1,809	2001	7,752
1980	2,018	2002	8,099
1981	2,251	2003	8,486
1982	2,425	2004	9,002
1983	2,617	2005	9,401
1984	2,904	2006	10,037
1985	3,099	2007	10,507
1986	3,288	2008	10,994
1987	3,466	2009	10,943
1988	3,770	2010	11,238
1989	4,052	2011	11,801
1990	4,312	2012	12,404
1991	4,485	2013	12,396
1992	4,800	2014	13,033
1993	5,000	2015	13,615
1994	5,244	2016	13,969
1995	5,533	2017	14,379
1996	5,830		

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Graphing Two Variables

X-axis The horizontal line against which a variable is plotted.

Y-axis The vertical line against which a variable is plotted.

origin The point at which the horizontal and vertical axes intersect.

Y-intercept The point at which a graph intersects the *Y*-axis.

X-intercept The point at which a graph intersects the *X*-axis.

More important than simple graphs of one variable are graphs that contain information on two variables at the same time. The most common method of graphing two variables is a graph constructed by drawing two perpendicular lines: a horizontal line, or ***X*-axis**, and a vertical line, or ***Y*-axis**. The axes contain measurement scales that intersect at 0 (zero). This point is called the **origin**. On the vertical scale, positive numbers lie above the horizontal axis (that is, above the origin) and negative numbers lie below it. On the horizontal scale, positive numbers lie to the right of the vertical axis (to the right of the origin) and negative numbers lie to the left of it. The point at which the graph intersects the *Y*-axis is called the ***Y*-intercept**. The point at which the graph intersects the *X*-axis is called the ***X*-intercept**. When two variables are plotted on a single graph, each point represents a pair of numbers. The first number is measured on the *X*-axis, and the second number is measured on the *Y*-axis.

Plotting Income and Consumption Data for Households

Table 1A.2 presents data from the Bureau of Labor Statistics (BLS) for 2016. This table shows average after-tax income and average consumption spending for households ranked by income. For example, the average income for the top fifth (20 percent) of the households was $157,215 in 2016. The average consumption spending for the top 20 percent was $112,221.

Figure 1A.2 presents the numbers from Table 1A.2 graphically. Along the horizontal scale, the *X*-axis, we measure average income. Along the vertical scale, the *Y*-axis, we measure average consumption. Each of the five pairs of numbers from the table is represented by a point on the graph. Because all numbers are positive numbers, we need to show only the upper right quadrant of the coordinate system.

TABLE 1A.2 Consumption Expenditures and After-Tax Income, 2016

	Average After-Tax Income	Average Consumption Expenditures
Bottom fifth	$ 11,832	$ 25,138
2nd fifth	29,423	36,770
3rd fifth	47,681	47,664
4th fifth	75,065	64,910
Top fifth	157,215	112,221

Source: Consumer Expenditures in 2016, U.S. Bureau of Labor Statistics.

To help you read this graph, we have drawn a dotted line connecting all the points where consumption and income would be equal. *This 45-degree line does not represent any data.* Instead, it represents the line along which all variables on the *X*-axis correspond exactly to the variables on the *Y*-axis, for example, (10,000, 10,000), (20,000, 20,000), and (37,000, 37,000). The heavy blue line traces the data; the purpose of the dotted line is to help you read the graph.

There are several things to look for when reading a graph. The first thing you should notice is whether the line slopes upward or downward as you move from left to right. The blue line in Figure 1A.2 slopes upward, indicating that there seems to be a **positive relationship** between income and spending: The higher a household's income, the more a household tends to consume. If we had graphed the percentage of each group receiving welfare payments along the *Y*-axis, the line would presumably slope downward, indicating that welfare payments are lower at higher income levels. The income level/welfare payment relationship is thus a **negative relationship**.

positive relationship A relationship between two variables, *X* and *Y*, in which a decrease in *X* is associated with a decrease in *Y*, and an increase in *X* is associated with an increase in *Y*.

negative relationship A relationship between two variables, *X* and *Y*, in which a decrease in *X* is associated with an increase in *Y* and an increase in *X* is associated with a decrease in *Y*.

Slope

The **slope** of a line or curve is a measure that indicates whether the relationship between the variables is positive or negative and how much of a response there is in *Y* (the variable on the vertical axis) when *X* (the variable on the horizontal axis) changes. The slope of a line between two points is the change in the quantity measured on the *Y*-axis divided by the change in the quantity measured on the *X*-axis. We will normally use Δ (the Greek letter *delta*) to refer to a change in a variable. In Figure 1A.3, the slope of the line between points *A* and *B* is Δ*Y* divided by Δ*X*. Sometimes it is easy to remember slope as "the rise over the run," indicating the vertical change over the horizontal change.

slope A measurement that indicates whether the relationship between variables is positive or negative and how much of a response there is in *Y* (the variable on the vertical axis) when *X* (the variable on the horizontal axis) changes.

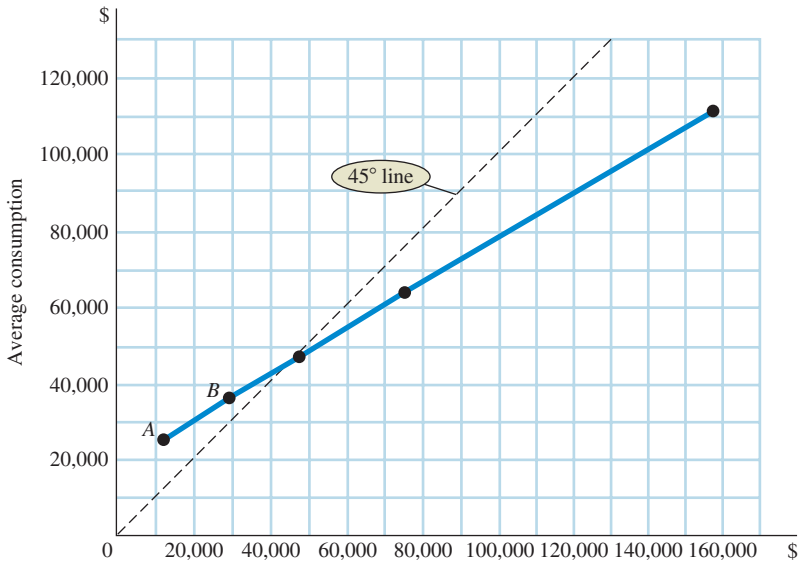

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FIGURE 1A.2
Household Consumption and Income
A graph is a simple two-dimensional geometric representation of data. This graph displays the data from Table 1A.2. Along the horizontal scale (*X*-axis), we measure household income. Along the vertical scale (*Y*-axis), we measure household consumption.

Note: At point *A*, consumption equals $25,138 and income equals $11,832. At point ***B***, consumption equals $36,770 and income equals $29,423.

Source: See Table 1A.2.

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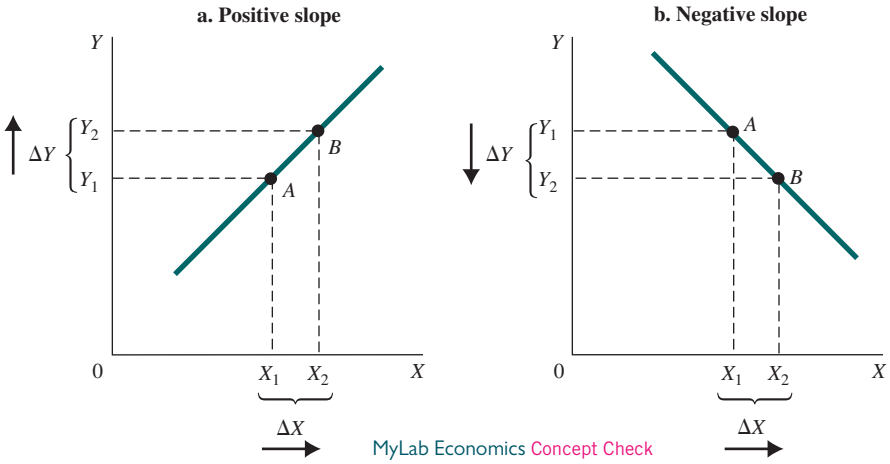


▲ **FIGURE 1A.3 A Curve with (a) Positive Slope and (b) Negative Slope**
A *positive* slope indicates that increases in *X* are associated with increases in *Y* and that decreases in *X* are associated with decreases in *Y*. A *negative* slope indicates the opposite—when *X* increases, *Y* decreases; and when *X* decreases, *Y* increases.

To be precise, ΔX between two points on a graph is simply X_2 minus X_1, where X_2 is the *X* value for the second point and X_1 is the *X* value for the first point. Similarly, ΔY is defined as Y_2 minus Y_1, where Y_2 is the *Y* value for the second point and Y_1 is the *Y* value for the first point. Slope is equal to

$$\frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1}.$$

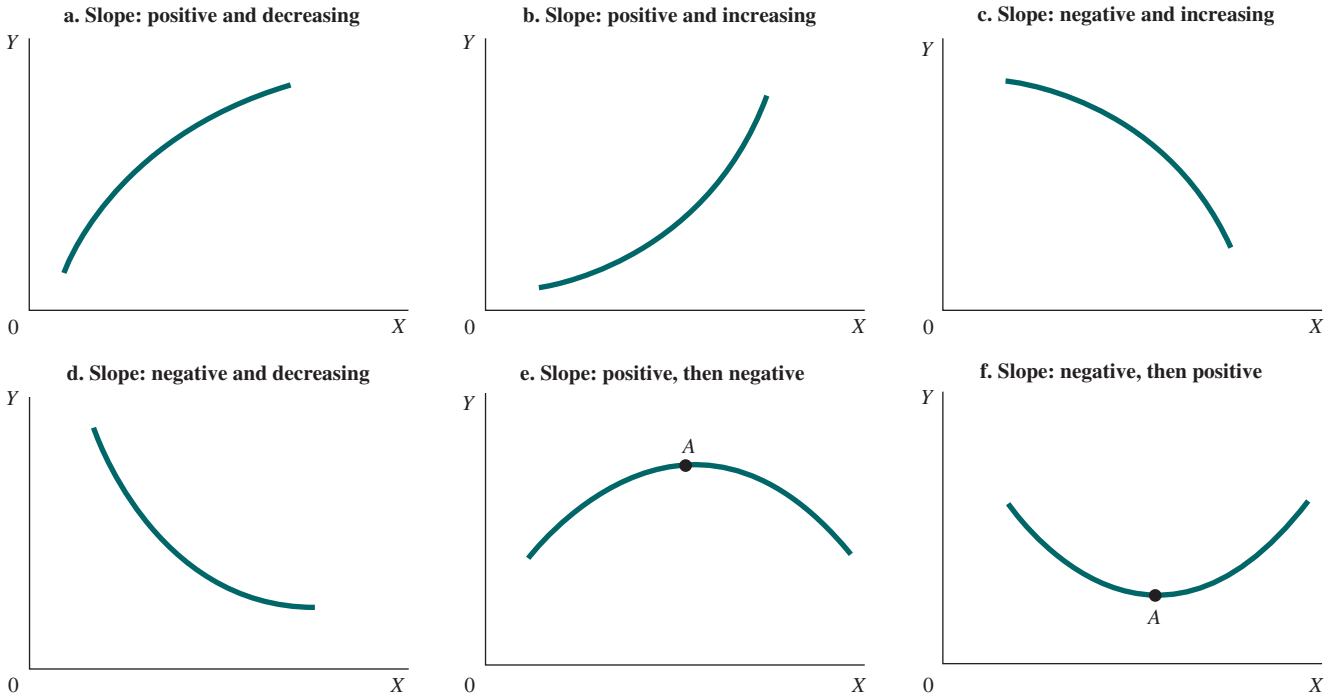
As we move from *A* to *B* in Figure 1A.3(a), both *X* and *Y* increase; the slope is thus a positive number. However, as we move from *A* to *B* in Figure 1A.3(b), *X* increases [$(X_2 - X_1)$ is a positive number], but *Y* decreases [$(Y_2 - Y_1)$ is a negative number]. The slope in Figure 1A.3(b) is thus a negative number because a negative number divided by a positive number results in a negative quotient.

To calculate the numerical value of the slope between points *A* and *B* in Figure 1A.2, we need to calculate ΔY and ΔX. Because consumption is measured on the *Y*-axis, ΔY is 11,632 $(Y_2 - Y_1) = (36{,}770 - 25{,}138)$]. Because income is measured along the *X*-axis, ΔX is 17,591 $(X_2 - X_1) = (29{,}423 - 11{,}832)$]. The slope between *A* and *B* is

$$\frac{\Delta Y}{\Delta X} = \frac{11{,}632}{17{,}591} = +0.66.$$

Another interesting thing to note about the data graphed in Figure 1A.2 is that all the points lie roughly along a straight line. (If you look very closely, however, you can see that the slope declines as you move from left to right; the line becomes slightly less steep.) A straight line has a constant slope. That is, if you pick any two points along it and calculate the slope, you will always get the same number. A horizontal line has a zero slope (ΔY is zero); a vertical line has an "infinite" slope because ΔY is too big to be measured.

Unlike the slope of a straight line, the slope of a *curve* is continually changing. Consider, for example, the curves in Figure 1A.4. Figure 1A.4(a) shows a curve with a positive slope that decreases as you move from left to right. The easiest way to think about the concept of increasing or decreasing slope is to imagine what it is like walking up a hill from left to right. If the hill is steep, as it is in the first part of Figure 1A.4(a), you are moving more in the *Y* direction for each step you take in the *X* direction. If the hill is less steep, as it is further along in Figure 1A.4(a), you are moving less in the *Y* direction for every step you take in the *X* direction. Thus, when the hill is steep, slope



▲ FIGURE 1A.4 **Changing Slopes Along Curves**

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($\Delta Y/\Delta X$) is a larger number than it is when the hill is flatter. The curve in Figure 1A.4(b) has a positive slope, but its slope *increases* as you move from left to right.

The same analogy holds for curves that have a negative slope. Figure 1A.4(c) shows a curve with a negative slope that increases (in absolute value) as you move from left to right. This time think about skiing down a hill. At first, the descent in Figure 1A.4(c) is gradual (low slope), but as you proceed down the hill (to the right), you descend more quickly (high slope). Figure 1A.4(d) shows a curve with a negative slope that *decreases* (in absolute value) as you move from left to right.

In Figure 1A.4(e), the slope goes from positive to negative as X increases. In Figure 1A.4(f), the slope goes from negative to positive. At point A in both, the slope is zero. (Remember, slope is defined as $\Delta Y/\Delta X$. At point A, Y is not changing ($\Delta Y = 0$). Therefore, the slope at point A is zero.)

Some Precautions

When you read a graph, it is important to think carefully about what the points in the space defined by the axes represent. Table 1A.3 and Figure 1A.5 present a graph of consumption and income that is different from the one in Table 1A.2 and Figure 1A.2. First, each point in Figure 1A.5 represents a different year; in Figure 1A.2, each point represented a different group of households at the *same* point in time (2016). Second, the points in Figure 1A.5 represent *total* consumption and income for the whole nation measured in *billions* of dollars; in Figure 1A.2, the points represented average *household* income and consumption measured in dollars.

It is interesting to compare these two graphs. All points on the total consumption curve in Figure 1A.5 lie below the 45-degree line, which means that total consumption is always less than total income. However, the graph of average household income and consumption in Figure 1A.2 crosses the 45-degree line, implying that for some households, consumption is larger than income.

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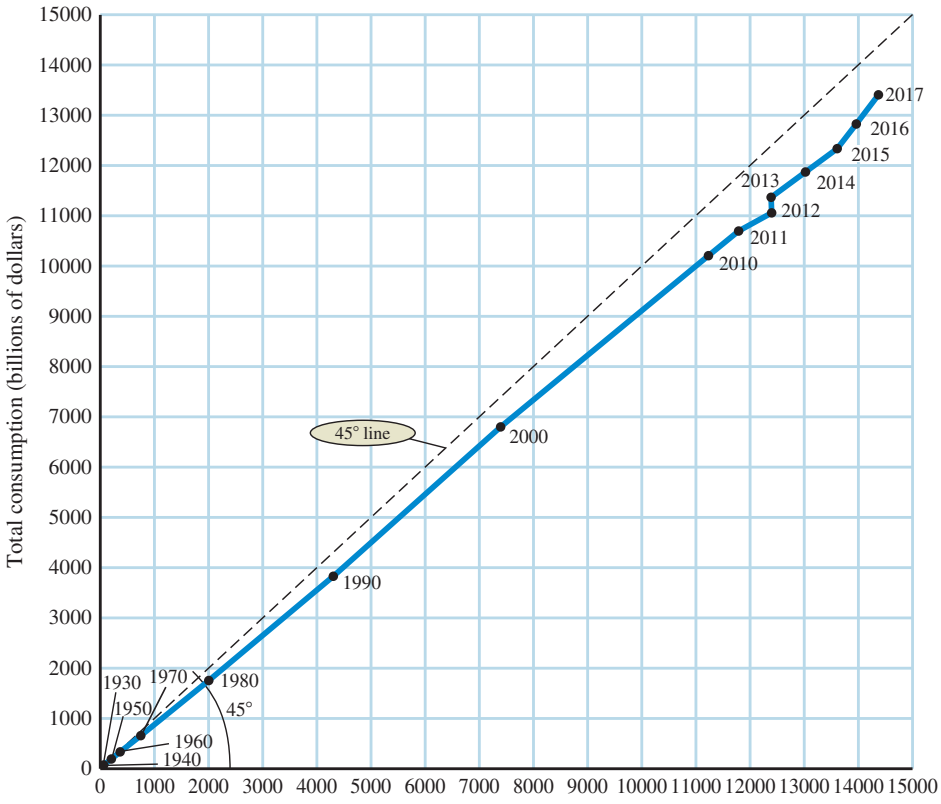
TABLE 1A.3 Total Disposable Personal Income and Consumption for the United States, 1930–2017 (in billions of dollars)

	Total Disposable Personal Income	Total Consumption
1930	75	70
1940	78	71
1950	215	192
1960	377	332
1970	762	648
1980	2,018	1,755
1990	4,312	3,826
2000	7,401	6,792
2010	11,238	10,202
2011	11,801	10,689
2012	12,404	11,051
2013	12,396	11,361
2014	13,033	11,864
2015	13,615	12,332
2016	13,969	12,821
2017	14,379	13,396

Source: U.S. Department of Commerce, Bureau of Economic Analysis.



MyLab Economics Concept Check Total disposable personal income (billions of dollars)

▲ **FIGURE 1A.5 Disposable Personal Income and Consumption**

It is important to think carefully about what is represented by points in the space defined by the axes of a graph. In this graph, we have graphed income with consumption, as in Figure 1A.2, but here each observation point is total disposable personal income and total consumption in *different years*, measured in billions of dollars.

Source: See Table 1A.3.

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APPENDIX SUMMARY

1. A *graph* is a two-dimensional representation of a set of numbers, or data. A *time series graph* illustrates how a single variable changes over time.
2. A graph of two variables includes an *X* (horizontal)-*axis* and a *Y* (vertical)-*axis*. The points at which the two axes intersect is called the *origin*. The point at which a graph intersects the *Y*-axis is called the *Y-intercept*. The point at which a graph intersects the *X*-axis is called the *X-intercept*.
3. The *slope* of a line or curve indicates whether the relationship between the two variables graphed is positive or negative and how much of a response there is in *Y* (the variable on the vertical axis) when *X* (the variable on the horizontal axis) changes. The slope of a line between two points is the change in the quantity measured on the *Y*-axis divided by the change in the quantity measured on the *X*-axis.

APPENDIX REVIEW TERMS AND CONCEPTS

graph, p. 15
negative relationship, p. 17
origin, p. 16
positive relationship, p. 17
slope, p. 17
time series graph, p. 15
X-axis, p. 16
X-intercept, p. 16
Y-axis, p. 16
Y-intercept, p. 16

APPENDIX PROBLEMS

All problems are available on MyLab Economics.

CHAPTER 1 APPENDIX: HOW TO READ AND UNDERSTAND GRAPHS

LEARNING OBJECTIVE: Understand how data can be graphically represented.

1A.1 Graph each of the following sets of numbers. Draw a line through the points and calculate the slope of each line.

1		2		3		4		5		6	
X	*Y*	*X*	*Y*	*X*	*Y*	*X*	*Y*	*X*	*Y*	*X*	*Y*
1	5	1	25	0	0	0	40	0	0	0.1	100
2	10	2	20	10	10	10	30	10	10	0.2	75
3	15	3	15	20	20	20	20	20	20	0.3	50
4	20	4	10	30	30	30	10	30	10	0.4	25
5	25	5	5	40	40	40	0	40	0	0.5	0

1A.2 For each of the graphs in Figure 1, determine whether the curve has a positive or negative slope. Give an intuitive explanation for what is happening with the slope of each curve.

1A.3 The following table shows the relationship between the price of organic turkeys and the number of turkeys sold by Godfrey's Free-Range Gobblers.

a. Is the relationship between the price of turkeys and the number of turkeys sold by Godfrey's Free-Range Gobblers a positive relationship or a negative relationship? Explain.

b. Plot the data from the table on a graph, draw a line through the points, and calculate the slope of the line.

Price per Turkey	Quantity of Turkeys	Month
$ 16	70	September
20	80	October
52	160	November
36	120	December
8	50	January

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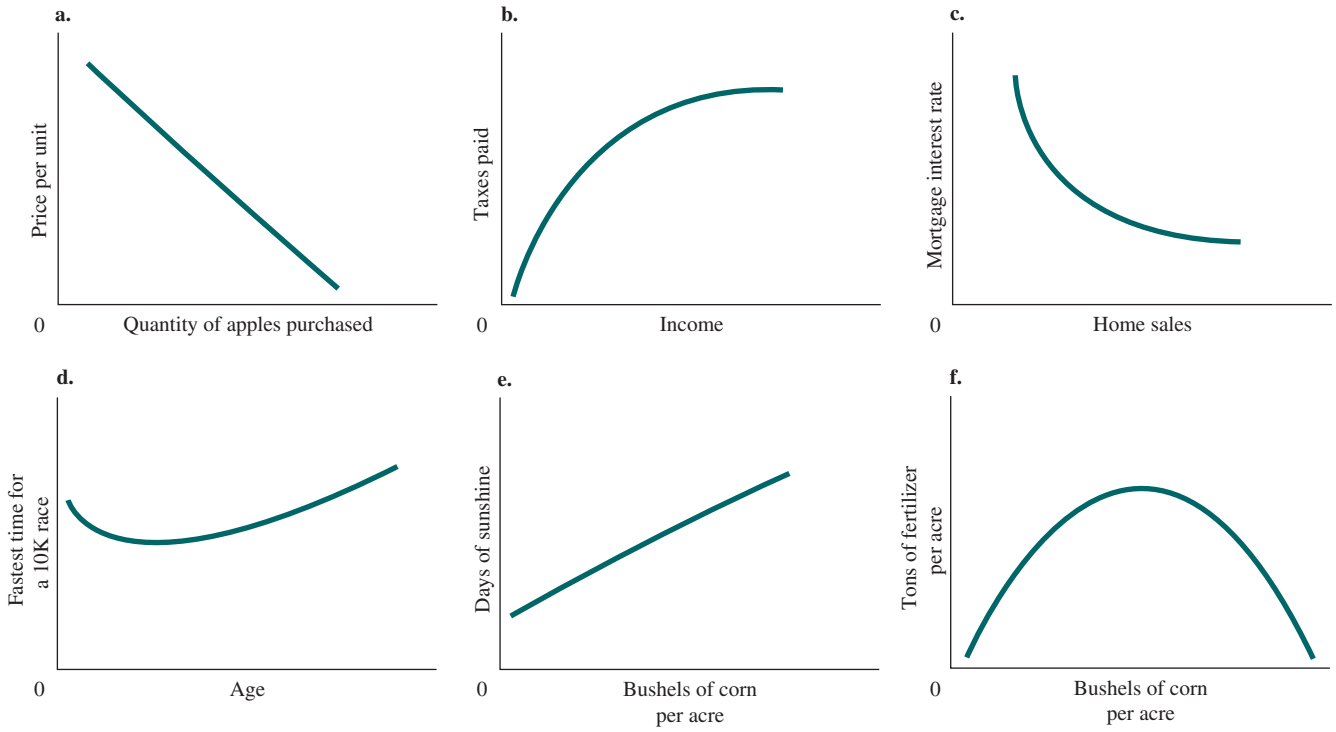
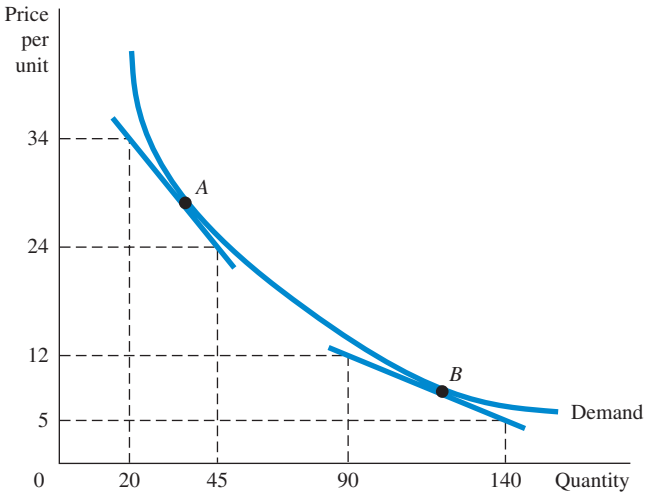


▲ FIGURE 1

1A.4 Calculate the slope of the demand curve at point *A* and at point *B* in the following figure.



[1]The measure of income presented in Table 1A.1 and in Figure 1A.1 is disposable personal income in billions of dollars. It is the total personal income received by all households in the United States minus the taxes that they pay.

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2 The Economic Problem: Scarcity and Choice

In the last chapter we provided you with some sense of the questions asked by economists and the broad methods that they use. As you read that chapter, some of you may have been surprised by the range of topics covered by economics. A look at the work done by the economists teaching at your own university will likely reveal a similarly broad range of interests. Some of your faculty will study how Apple and Samsung compete in smartphones. Others will look at discrimination in labor markets. Still others may be exploring the effects of microfinance in India. On the surface, these issues seem quite different from one another. But fundamental to each of these inquiries is the concern with choice in a world of scarcity. Economics explores how individuals make choices in a world of scarce resources and how those individual's choices come together to determine three key features of their society:

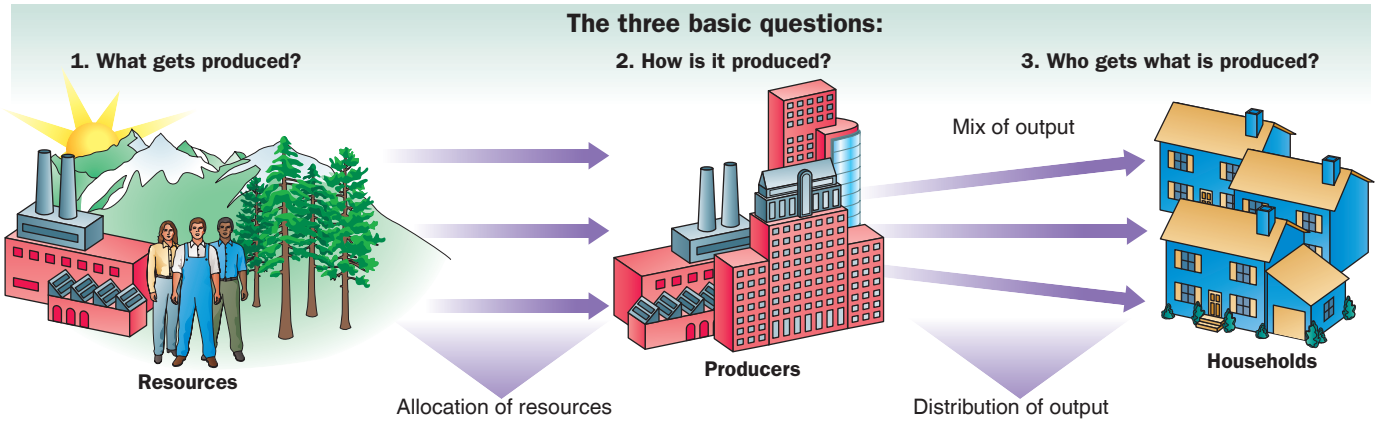
- What gets produced?
- How is it produced?
- Who gets what is produced?

This chapter explores these questions in detail. In a sense, this entire chapter *is* the definition of economics. It lays out the central problems addressed by the discipline and presents a framework that will guide you through the rest of the book. The starting point is the presumption that *human wants are unlimited but resources are not*. Limited or scarce resources force individuals and societies to choose among competing uses of resources—alternative combinations of produced goods and services—and among alternative final distributions of what is produced among households.

These questions are *positive or descriptive*. Understanding how a system functions is important before we can ask the normative questions of whether the system produces good or bad outcomes and how we might make improvements.

Economists study choices in a world of scarce resources. What do we mean by resources? If you look at Figure 2.1, you will see that resources are broadly defined. They include products of nature like minerals and timber, but also the products of past generations like buildings and factories. Perhaps most importantly, resources include the time and talents of the human population.

CHAPTER OUTLINE AND LEARNING OBJECTIVES



▲ **FIGURE 2.1 The Three Basic Questions** MyLab Economics Concept Check

Every society has some system or process that transforms its scarce resources into useful goods and services. In doing so, it must decide what gets produced, how it is produced, and to whom it is distributed. The primary resources that must be allocated are land, labor, and capital.

capital Those goods produced by the economic system that are used as inputs to produce other goods and services in the future.

factors of production (*or* factors) The inputs into the production process. Land, labor, and capital are the three key factors of production.

production The process that transforms scarce resources into useful goods and services.

Things that are produced and then used in the production of other goods and services are called capital resources, or simply **capital**. Buildings, equipment, desks, chairs, software, roads, bridges, and highways are a part of the nation's stock of capital.

The basic resources available to a society are often referred to as **factors of production, *or* simply factors**. The three key factors of production are land, labor, and capital. The process that transforms scarce resources into useful goods and services is called **production**. In many societies, most of the production of goods and services is done by private firms. Private airlines in the United States use land (runways), labor (pilots and mechanics), and capital (airplanes) to produce transportation services. But in all societies, some production is done by the public sector, or government. Examples of government-produced or government-provided goods and services include national defense, public education, police protection, and fire protection.

Resources or factors of production are the **inputs** into the process of production; goods and services of value to households are the **outputs** of the process of production.

2.1 LEARNING OBJECTIVE

Understand why even in a society in which one person is better than a second at all tasks, it is still beneficial for the two to specialize and trade.

Scarcity, Choice, and Opportunity Cost

In the second half of this chapter we discuss the global economic landscape. Before you can understand the different types of economic systems, it is important to master the basic economic concepts of scarcity, choice, and opportunity cost.

Scarcity and Choice in a One-Person Economy MyLab Economics Concept Check

inputs *or* resources Anything provided by nature or previous generations that can be used directly or indirectly to satisfy human wants.

outputs Goods and services of value to households.

The simplest economy is one in which a single person lives alone on an island. Consider Bill, the survivor of a plane crash, who finds himself cast ashore in such a place. Here individual and society are one; there is no distinction between social and private. *Nonetheless, nearly all the same basic decisions that characterize complex economies must also be made in a simple economy*. That is, although Bill will get whatever he produces, he still must decide how to allocate the island's resources, what to produce, and how and when to produce it.

First, Bill must decide *what* he wants to produce. Notice that the word *needs* does not appear here. Needs are absolute requirements; but beyond just enough water, basic nutrition, and shelter to survive, needs are very difficult to define. In any case, Bill must put his wants in some order of priority and make some choices.

Next, he must look at the *possibilities*. What can he do to satisfy his wants given the limits of the island? In every society, no matter how simple or complex, people are constrained in what they can do. In this society of one, Bill is constrained by time, his physical condition, his knowledge, his skills, and the resources and climate of the island.