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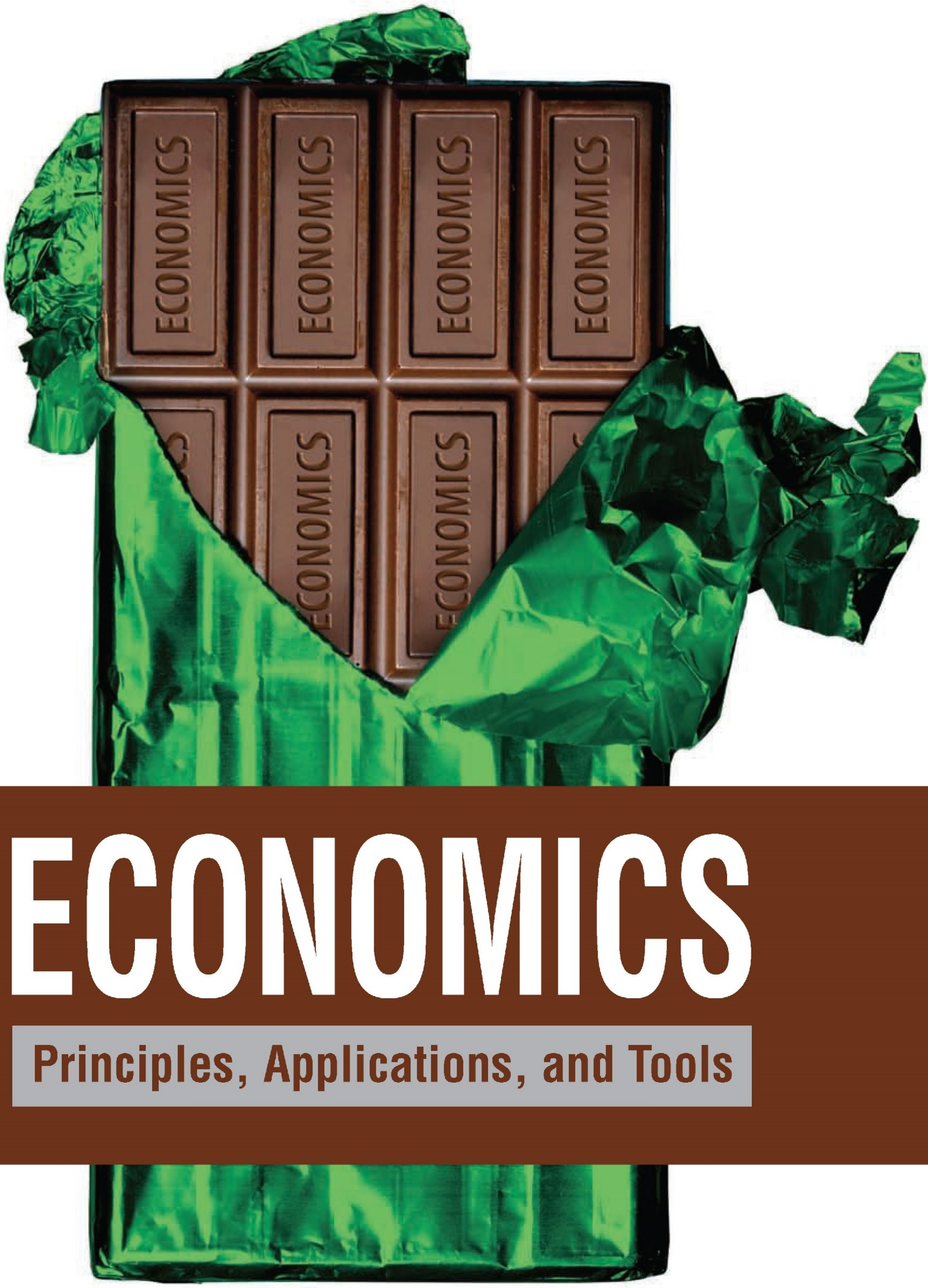


# ECONOMICS

## Principles, Applications, and Tools

NINTH EDITION

# Economics

## PRINCIPLES, APPLICATIONS, AND TOOLS

NINTH EDITION

Arthur O'Sullivan
*Lewis and Clark College*

Steven M. Sheffrin
*Tulane University*

Stephen J. Perez
*California State University, Sacramento*

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# Preface

In preparing this ninth edition, we had three primary goals. First, we wanted to incorporate the sweeping changes in the United States and world economies we have all witnessed in the last several years, and the difficulties that the world economics have continued to experience in recovering from the severe economic downturn. Second, we strived to update this edition to reflect the latest exciting developments in economic thinking and make these accessible to new students of economics. Finally, we wanted to stay true to the philosophy of the textbook—using basic concepts of economics to explain a wide variety of timely and interesting economic applications.

## ▶ WHAT'S NEW TO THIS EDITION

In addition to updating all the figures and data, we made a number of other key changes in this edition. They include the following:

- At the beginning of each chapter, we carefully refined our Learning Objectives to match the contents of the chapter closely. These give the students a preview of what they will learn in each section of the chapter, facilitating their learning.
- We discuss in Chapter 6 whether the recent major recession permanently affected labor force participation.
- We discuss in Chapter 8 the position of the pessimists who think that technological progress has slowed down.
- We also introduce in Chapter 8 the idea of controlled experiments in economic policy, as these experiments have been very influential in recent policy developments.
- We discuss in Chapter 13 the rationale and application of "stress tests" as a new tool for financial regulation.
- We introduce Janet Yellen, the new Chair of the Federal Reserve, in Chapter 14, and discuss her prior experience before she assumed her current role
- We revised and expanded our discussion of the euro in Chapter 19, reflecting the serious challenges now facing the European Monetary Union, particularly with the experience of Greece.
- We also incorporated a total of 44 exciting new Applications into this edition, including five in the common chapters (Chapters 1–4), 22 in macroeconomics, and 17 in microeconomics. In addition, we incorporated a total of 14 new chapter-opening stories, including one in the common chapters, seven in macroeconomics, and six in microeconomics. These fresh applications and chapter openers show the widespread relevance of economic analysis.
- In the chapters common to macroeconomics and microeconomics, the new applications include housing prices in Cuba (Chapter 1), property rights in urban slums (Chapter 3), and the effects of winds from the Sahara Desert on the price of chocolate (Chapter 4).
- In the macroeconomics chapters, the new applications include understanding the links between unemployment and unemployment insurance (Chapter 6), how the government promotes high levels of savings in Singapore (Chapter 7), how Greek citizens hoarded euros as the talk of crisis grew (Chapter 13), new research on " underwater" homeowners (Chapter 12), the debate on secular stagnation (Chapter 15), and how accounting for "missing" international financial flows changes our thinking of global investment patterns (Chapter 19).
- In the microeconomics chapters, the new applications include the market effects of a luxury tax (Chapter 21), the neuroscience of the "cola wars" between Coke and Pepsi (Chapter 22), the time path of blueberry prices triggered by publicity about the health benefits of eating blueberries (Chapter 24), the new advertising program for dairy products, "Milk Life" (Chapter 27), genetic discrimination in insurance (Chapter 29), clearing space debris (Chapter 30), responding to climate change by washing carbon out of the air (Chapter 31), and proposals to expand the earned income tax credit (Chapter 32).

# ▶ APPLYING THE CONCEPTS

This is an Applications-driven textbook. We carefully selected over 130 real-world Applications that help students develop and master essential economic concepts. Here is an example of our approach from Chapter 4, "Demand, Supply, and Market Equilibrium."

**Application 1**

THE LAW OF DEMAND FOR YOUNG SMOKERS

**APPLYING THE CONCEPTS #1: What is the law of demand?**

As price decreases and we move downward along the market demand for cigarettes, the quantity of cigarettes demanded increases for two reasons. First, people who smoked cigarettes at the original price respond to the lower price by smoking more. Second, some people start smoking.

In the United States, cigarette taxes vary across states, and studies of cigarette consumption patterns show that higher taxes mean less cigarette consumption by youths. Using data from the Youth Risk Behavior Surveys (YSBS), one study shows that increases in state cigarette taxes between 1990 and 2005 resulted in less participation (fewer smokers) and lower frequency (fewer cigarettes per smoker).

A change in cigarette taxes in Canada illustrates the second effect, the new-smoker effect. In 1994, several provinces in eastern Canada cut their cigarette taxes in response to the smuggling of cigarettes from the United States (where taxes are lower), and the price of cigarettes in the provinces decreased by roughly 50 percent. Researchers tracked the choices of 591 youths from the Waterloo Smoking Prevention Program and concluded that the lower price increased the smoking rate by roughly 17 percent. **Related to Exercises 1.6 and 1.8.**

SOURCES: (1) Anindya Sen and Tony Wirjanto, "Estimating the Impacts of Cigarette Taxes on Youth Smoking Participation, Initiation, and Persistence: Empirical Evidence from Canada," *Health Economics* 19 (2010), pp. 1264–1280. (2) Christopher Carpentera and Philip J. Cook, "Cigarette Taxes and Youth Smoking: New Evidence from National, State, and Local Youth Risk Behavior Surveys," *Journal of Health Economics* 27 (2008), pp. 287–299.

Each chapter includes three to five thought-provoking Applying the Concepts questions that convey important economic concepts, paired with and illustrated by an Application that discusses the concept and conveys its real-world use.

For each Application and Applying the Concepts question, we provide end-of-chapter exercises that test students' understanding of the concepts.

KEY TERMS

**expectations of inflation,** p. 326
**expectations Phillips curve,** p. 329
**growth version of the quantity equation,** p. 337
**hyperinflation,** p. 338
**monetarists,** p. 340
**money illusion,** p. 326
**nominal wages,** p. 326
**quantity equation,** p. 336
**rational expectations,** p. 330
**real wages,** p. 326
**seignorage,** p. 339
**velocity of money,** p. 336

EXERCISES All problems are assignable in MyEconLab exercises that update with real-time data are marked with .

Money Growth, Inflation, and Interest Rates

Describe how an economy at full employment with inflation differs from one without inflation.

1.1 The expected real rate of interest is the nominal interest rate plus the expected inflation rate. ________ (True/False)

1.2 Countries with lower rates of money growth have ________ interest rates.

1.3 If the growth rate of money increases from 3 to 5 percent, initially interest rates will ________.

1.4 A firm that expects higher profits from higher prices but does not recognize its costs are increasing is suffering from ________.

1.5 **Nominal and Real Interest Rates.** In Japan in the 1990s interest rates were near zero on government bonds. Some economists said that it was still possible to stimulate investment by creating negative real interest rates. If nominal rates could not fall below zero, explain how real interest rates could be made negative. (Hint: Think about inflation.)

1.6 **Money Neutrality, Long-Run Inflation, and the Natural Rate.** Explain carefully the relationship between the concept of monetary neutrality and the idea that the natural rate is independent of the longrun inflation rate.

1.7 **Taxes, Inflation, and Interest Rates.** If a business borrows funds at 10 percent per year, the business has a 40 percent tax rate, and the annual inflation rate is 5 percent, what are the real after-tax costs of funds to the business? Similarly, if an investor receives a nominal return of 8 percent on a savings deposit, the tax rate is 30 percent, and the inflation rate is 6 percent, what is the after-tax rate of return?

1.8 **Examples of Money Illusion.** What do the following two quotes have in common?

a. "My wages are going up 5 percent a year. If only inflation weren't 5 percent a year, I would be rich."

b. "My bank is paying 10 percent a year, but the 8 percent inflation rate is just eating up all my real investment gains."

Understanding the Expectations Phillips Curve: The Relationship between Unemployment and Inflation

Explain the relationship between inflation and unemployment in the short run and long run.

2.1 If inflation increases less than expected, the actual unemployment rate will be ________ (above/below) the natural rate.

2.2 James Tobin explained business cycles with rational expectations. ________ (True/False)

2.3 The increase in the fraction of young people in the labor force that occurred when the baby-boom generation came of working age tended to ________ (raise/lower) the natural rate of unemployment.

2.4 In the late 1980s, as unemployment fell below the natural rate, inflation ________.

2.5 **Targeting the Natural Rate of Unemployment?** Because the natural rate of unemployment is the economists' notion of what constitutes "full employment," it might seem logical for the Fed to use monetary policy to move unemployment toward its natural rate. However, many economists believe such a policy would be unwise because the natural rate may shift over time and policymakers may misjudge the correct rate. What would happen if the Fed targeted a 5 percent unemployment rate but the true natural rate were 6 percent?

2.6 **Hysteresis and the Labor Force Participation Rate.** In economics the term "hysteresis" means that the history of the economy has a lingering effect on current economic performance. During the U.S. recession starting in 2007, the labor force participation rate continued to remain below the levels that prevailed before the recession. Could this be an example of hysteresis? Can you suggest any other explanations?

2.7 **Oil Price Changes, Vacancies, and the Natural Rate.** During the mid-1970s, changes in oil prices required products to be produced by different types of firms in different locations. This raised the number of vacancies relative to the unemployment rate. According to the theory of William Dickens, how did this

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5.6 **Using Open-Economy Multipliers.** In an open economy, the marginal propensity to consume is 0.9, and the marginal propensity to import is 0.3. How much of an increase in investment would be necessary to raise GDP by 200? What would be your answer if this was a closed economy?

5.7 **Export-Led Growth Strategies.** Many countries believe that they need to increase exports in order to grow. Some of this belief is based on long-run considerations, as competing in export markets may induce their firms to innovate. But some countries also focus on the short-run benefits. What are these benefits? (Related to Application 4 on page 238.)

The Income-Expenditure Model and the Aggregate Demand Curve

Explain how the aggregate demand curve is related to the income-expenditure model.

6.1 An increase in the price level will ________ GDP and thereby move the economy ________ the aggregate demand curve.

6.2 At any price level, the income-expenditure model determines the level of equilibrium output and the corresponding point on the ________ curve.

6.3 An increase in the price level will not shift the aggregate demand curve. ________ (True/False)

6.4 A leftward shift in the aggregate demand curve responds to a(n) ________ in equilibrium income

6.5 **Using Multipliers to Determine the Shift of Aggregate Demand Curve.**

a. Suppose the MPC is equal to 0.8. Governr spending increases by $20 billion. How far doe aggregate demand curve shift to the right?

b. Now suppose that the MPC is 0.8 and the marg propensity to import is 0.2. How far to the r will the $20 billion in government spending the aggregate demand curve?

6.6 **Falling Exports and Aggregate Demand.** Sup foreign countries grow less rapidly than anticipated U.S. exports also fall.

a. Using the income-expenditure model, first s how the decrease in exports will decrease U.S. G

b. Using your results in part (a), explain how aggregate demand curve shifts with the decrea exports.

6.7 **The Size of the Wealth Effect and the Slop the Aggregate Demand Curve.** Suppose the w effect is very small; that is, a large fall in prices wil increase consumption by very much. Explain care why this will imply that the aggregate demand c will have a steep slope.

ECONOMIC EXPERIMENT

ESTIMATING THE MARGINAL PROPENSITY TO CONSUME

For this experiment, each class member is asked to fill out the following table. Given a certain monthly income, how would you spend it and how much would you save? The top row of each column gives you the monthly disposable income. How would you allocate it each month among the various categories of spending in the table and savings? Complete each column in the table. The sum of your entries should equal your disposable income at the top of each column. After you have filled out the chart, compute the changes in your savings and total consumption as your income goes up. What is your marginal propensity to save (MPS)? What is your marginal propensity to consume (MPC) over your total expenditures? Graph your consumption function.

| Monthly Disposable Income | $1,250 | $1,500 | $1,750 | $2,0 |
|---|---|---|---|---|
| Expenditures and savings | | | | |
| Food | | | | |
| Housing | | | | |
| Transportation | | | | |
| Medical | | | | |
| Entertainment | | | | |
| Other expenses | | | | |
| Savings | | | | |

MyEconLab
For additional economic experiments, please visit *www.myeconlab.com*.

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In addition, some chapters contain an Economic Experiment section that gives students the opportunity to do their own economic analysis.

## ▶ WHY FIVE KEY PRINCIPLES?

In Chapter 2, "The Key Principles of Economics," we introduce the following five key principles and then apply them throughout the book:

1. **The Principle of Opportunity Cost.** The opportunity cost of something is what you sacrifice to get it.
2. **The Marginal Principle.** Increase the level of an activity as long as its marginal benefit exceeds its marginal cost. Choose the level at which the marginal benefit equals the marginal cost.
3. **The Principle of Voluntary Exchange.** A voluntary exchange between two people makes both people better off.
4. **The Principle of Diminishing Returns.** If we increase one input while holding the other inputs fixed, output will increase, but at a decreasing rate.
5. **The Real-Nominal Principle.** What matters to people is the real value of money or income—its purchasing power—not the face value of money or income.

This approach of repeating five key principles gives students the big picture—the framework of economic reasoning. We make the key concepts unforgettable by using them repeatedly, illustrating them with intriguing examples, and giving students many opportunities to practice what they've learned. Throughout the text, economic concepts are connected to the five key principles when the following callout is provided for each principle:

PRINCIPLE OF OPPORTUNITY COST
The opportunity cost of something is what you sacrifice to get it.

## ▶ HOW IS THE BOOK ORGANIZED?

Chapter 1, "Introduction: What Is Economics?" uses three current policy issues—traffic congestion, poverty in Africa, and Japan's prolonged recession—to explain the economic way of thinking. Chapter 2, "The Key Principles of Economics," introduces the five principles we return to throughout the book. Chapter 3, "Exchange and Markets," is devoted entirely to exchange and trade. We discuss the fundamental rationale for exchange and introduce some of the institutions modern societies developed to facilitate trade.

Students need to have a solid understanding of demand and supply to be successful in the course. Many students have difficulty understanding movement along a curve versus shifts of a curve. To address this difficulty, we developed an innovative way to organize topics in Chapter 4, "Demand, Supply, and Market Equilibrium." We examine the law of demand and changes in quantity demanded, the law of supply and changes in quantity supplied, and then the notion of market equilibrium. After students have a firm grasp of equilibrium concepts, we explore the effects of changes in demand and supply on equilibrium prices and quantities. You can present either macroeconomics or microeconomics chapters first, depending on your preference.

### Summary of the Macroeconomics Chapters

Part 2, "The Basic Concepts of Macroeconomics" (Chapters 5 and 6), introduces students to the key concepts—GDP, inflation, unemployment—that are used throughout the text and in everyday economic discussion. The two chapters in this section provide the building blocks for the rest of the book. Part 3, "The Economy in the Long Run" (Chapters 7 and 8), analyzes how the economy operates at full employment and explores the causes and consequences of economic growth.

Next we turn to the short run. We begin the discussion of business cycles, economic fluctuations, and the role of government in Part 4, "Economic Fluctuations and Fiscal Policy" (Chapters 9 through 12). We devote an entire chapter to the structure of government spending and revenues and the role of fiscal policy. In Part 5, "Money, Banking, and Monetary Policy" (Chapters 13 and 14), we introduce the key elements of both monetary theory and policy into our economic models. Part 6, "Inflation, Unemployment, and Economic Policy" (Chapters 15 through 17), brings the important questions of the dynamics of inflation and unemployment into our analysis. Finally, the last two chapters in Part 7, "The International Economy" (Chapter 18 and 19), provide an in-depth analysis of both international trade and finance.

## A Few Features of Our Macroeconomics Chapters

The following are a few features of our macroeconomics chapters:

- **Flexibility.** A key dilemma confronting economics professors has always been how much time to devote to long-run topics, such as growth and production, versus short-run topics, such as economic fluctuations and business cycles. Our book is designed to let professors choose. It works like this: To pursue a long-run approach, professors should initially concentrate on Chapters 1 through 4, followed by Chapters 5 through 8.
- To focus on economic fluctuations, start with Chapters 1 through 4, present Chapter 5, "Measuring a Nation's Production and Income," and Chapter 6, "Unemployment and Inflation," and then turn to Chapter 9, "Aggregate Demand and Aggregate Supply."
- Chapter 11, "The Income-Expenditure Model," is self-contained, so instructors can either skip it completely or cover it as a foundation for aggregate demand.
- **Long Run.** Throughout most of the 1990s, the U.S. economy performed very well—low inflation, low unemployment, and rapid economic growth. This robust performance led to economists' increasing interest in trying to understand the processes of economic growth. Our discussion of economic growth in Chapter 8, "Why Do Economies Grow?" addresses the fundamental question of how long-term living standards are determined and why some countries prosper while others do not. This is the essence of economic growth. As Nobel Laureate Robert E. Lucas, Jr., once wrote, "Once you start thinking about growth, it is hard to think of anything else."
- **Short Run.** The great economic expansion of the 1990s came to an end in 2001, as the economy started to contract. The recession beginning in 2007 was the worst downturn since World War II. Difficult economic times remind us that macroeconomics is also concerned with understanding the causes and consequences of economic fluctuations. Why do economies experience recessions and depressions, and what steps can policymakers take to stabilize the economy and ease the devastation people suffer from them? This has been a constant theme of macroeconomics throughout its entire history and is covered extensively in the text.
- **Policy.** Macroeconomics is a policy-oriented subject, and we treat economic policy in virtually every chapter. We discuss both important historical and more recent macroeconomic events in conjunction with the theory. In addition, we devote Chapter 17, "Macroeconomic Policy Debates," to three important policy topics that recur frequently in macroeconomic debates: the role of government deficits, whether the Federal Reserve should target inflation or other objectives, and whether income or consumption should be taxed.

## Summary of the Microeconomics Chapters

A course in microeconomics starts with the first four chapters of the book, which provide a foundation for more detailed study of individual decision making and markets.

Part 8, "A Closer Look at Demand and Supply," (Chapters 20 through 22), provides a closer look at demand and supply, including elasticity, market efficiency, and consumer choice. Part 9, "Market Structures and Pricing" (Chapters 23 through 28), starts with a discussion of production and costs, setting the stage for an examination of alternative market structures, including the extremes of perfect competition and monopoly, as well as the middle ground of monopolistic competition and oligopoly. The last chapter in Part 9 discusses antitrust policy and deregulation. Part 10, "Externalities and Information" (Chapters 29 through 31), discusses the circumstances under which markets break down, including imperfect information, public goods, and environmental degradation.

Part 11, "The Labor Market and Income Distribution" (Chapter 32), explores the economic forces that determine wages, and also examines recent changes in the distribution of income and the effects of government programs on the income distribution.

## ▶ MyEconLab®

### Digital Features Located in MyEconLab

MyEconLab is a unique online course management, testing, and tutorial resource. It is included with the eText version of the book or as a supplement to the print book. Students and instructors will find the following online resources to accompany the ninth edition:

- **Concept Checks:** Each section of each learning objective concludes with an online Concept Check 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 of this digital resource is to help students assess their progress on a section-by-section basis, so they can be better prepared for homework, quizzes, and exams.
- **Animations:** Graphs are the backbone of introductory economics, but many students struggle to understand and work with them. Many of the numbered figures in the text a supporting animated version online. The goal of this digital resource is to help students understand shifts in curves, movements along curves, and changes in equilibrium values. 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. Our experience is that many students benefit from this type of online learning.
- **Graphs Updated with Real-Time Data from FRED:** Approximately 16 graphs are continuously updated online with the latest available data from FRED (Federal Reserve Economic Data), which is a comprehensive, up-to-date data set maintained by the Federal Reserve Bank of St. Louis.

  FRED® ECONOMIC DATA | ST. LOUIS FED

  Students can display a pop-up graph that shows new data plotted in the graph. The goal of this digital feature is to help students understand how to work with data and understand how including new data affects graphs.
- **Interactive Problems and Exercises Updated with Real-Time Data from FRED:** The end-of-chapter problems in select chapters include real-time data exercises that use the latest data from FRED. The book contains several of these specially-selected exercises. The goal of this digital feature is to help students become familiar with this key data source, learn how to locate data, and develop skills in interpreting data.

## ▶ INTEGRATED SUPPLEMENTS

The authors and Pearson Education have worked together to integrate the text and media resources to make teaching and learning easier.

### For the Instructor

Instructors can choose how much or how little time to spend setting up and using MyEconLab. Here is a snapshot of what instructors are saying about MyEconLab:

> MyEconLab offers [students] a way to practice every week. They receive immediate feedback and a feeling of personal attention. As a result, my teaching has become more targeted and efficient.
>
> —Kelly Blanchard, Purdue University

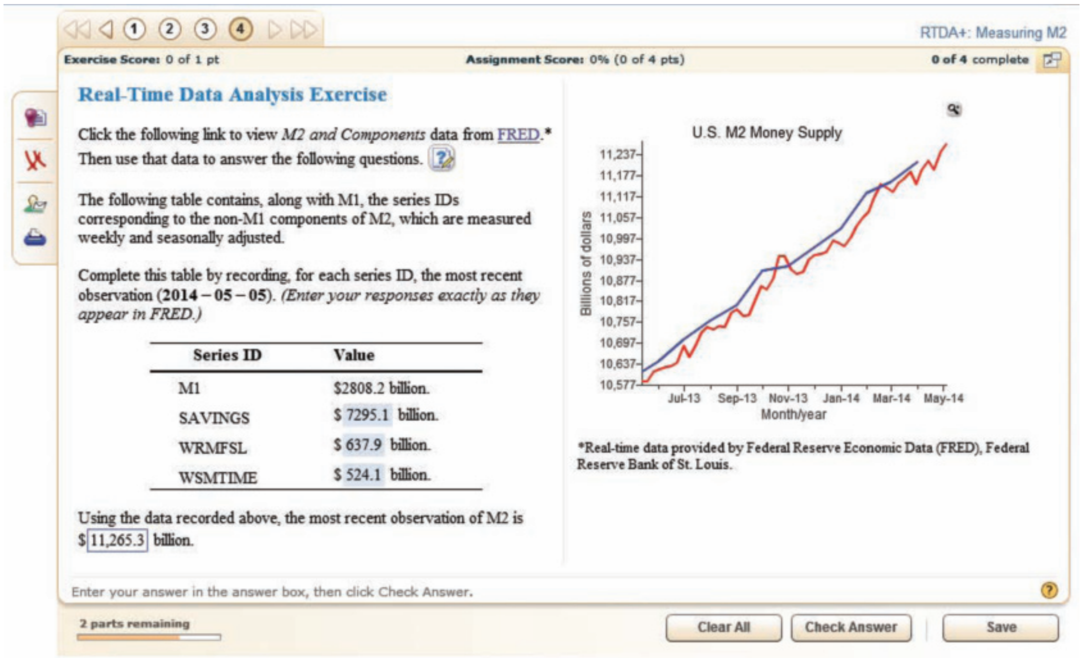
> Students tell me that offering them MyEconLab is almost like offering them individual tutors.
>
> —Jefferson Edwards, Cypress Fairbanks College

> MyEconLab's eText is great—particularly in that it helps offset the skyrocketing cost of textbooks. Naturally, students love that.
>
> —Doug Gehrke,
> Moraine Valley Community College

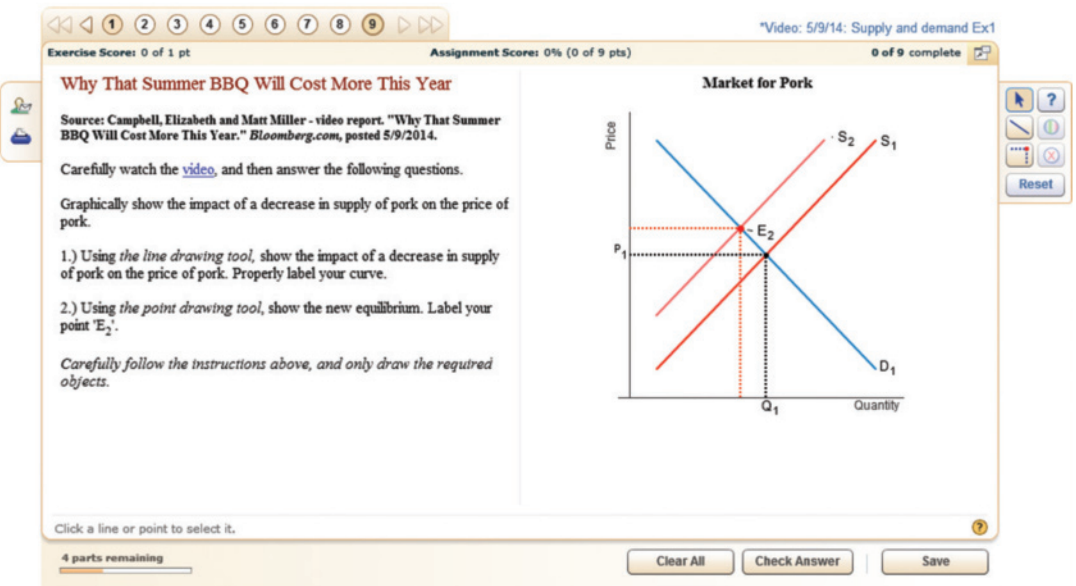
Each chapter contains two preloaded exercise sets that can be used to build an individualized study plan for each student. These study plan exercises contain tutorial resources, including instant feedback, links to the appropriate learning objective in the eText, pop-up definitions from the text, and step-by-step guided solutions, where appropriate. After the initial setup of the course by the instructor, student use of these materials requires no further instructor setup. The online grade book records each student's performance and time spent on the tests and study plan and generates reports by student or chapter.

Instructors can fully customize MyEconLab to match their course exactly, including reading assignments, homework assignments, video assignments, current news assignments, and quizzes and tests. Assignable resources include:

- Preloaded exercise assignments sets for each chapter that include the student tutorial resources mentioned earlier
- Preloaded quizzes for each chapter that are unique to the text and not repeated in the study plan or homework exercise sets
- Study plan problems that are similar to the end-of-chapter problems and numbered exactly like the book to make assigning homework easier
- Real-Time-Data Analysis Exercises, marked with , allow students and instructors to use the very latest data from FRED. By completing the exercises, students become familiar with a key data source, learn how to locate data, and develop skills in interpreting data.
- In the eText available in MyEconLab, select figures labeled MyEconLab Real-time data allow students to display a pop-up graph updated with real-time data from FRED.




- Current News Exercises provide a turnkey way to assign gradable news-based exercises in MyEconLab. Each week, Pearson scours the news, finds a current microeconomics and macroeconomics article, creates exercises around these news articles, and then automatically adds them to MyEconLab. Assigning and grading current news-based exercises that deal with the latest micro and macro events and policy issues has never been more convenient.
- Experiments in MyEconLab are a fun and engaging way to promote active learning and mastery of important economic concepts. Pearson's Experiments program is flexible, easy-to-assign, auto-graded, and available in Single and Multiplayer versions.
- Single-player experiments allow your students to play against virtual players from anywhere at any time so long as they have an Internet connection.
- Multiplayer experiments allow you to assign and manage a real-time experiment with your class.
- Pre- and post-questions for each experiment are available for assignment in MyEconLab.



For a complete list of available experiments, visit **http://www.myeconlab.com.**

- Test Item File questions that allow you to assign quizzes or homework that will look just like your exams
- Econ Exercise Builder, which allows you to build customized exercises

Exercises include multiple-choice, graph drawing, and free-response items, many of which are generated algorithmically so that each time a student works them, a different variation is presented.

MyEconLab grades every problem type except essays, even problems with graphs. When working homework exercises, students receive immediate feedback, with links to additional learning tools.

### Customization and Communication

MyEconLab in MyLab/Mastering provides additional optional customization and communication tools. Instructors who teach distance-learning courses or very large lecture sections find the MyLab/Mastering format useful because they can upload course documents and assignments, customize the order of chapters, and use communication features such as Document Sharing, Chat, ClassLive, and Discussion Board.

### For the Student

MyEconLab puts students in control of their learning through a collection of testing, practice, and study tools tied to the online, interactive version of the textbook and other media resources. Here is a snapshot of what students are saying about MyEconLab:

> It was very useful because it had EVERYTHING, from practice exams to exercises to reading. Very helpful.
>
> —student, Northern Illinois University
>
> I would recommend taking the quizzes on MyEconLab because it gives you a true account of whether or not you understand the material.
>
> —student, Montana Tech
>
> It made me look through the book to find answers, so I did more reading.
>
> —student, Northern Illinois University

Students can study on their own or can complete assignments created by their instructor. In MyEconLab's structured environment, students practice what they learn, test their understanding, and pursue a personalized study plan generated from their performance on sample tests and from quizzes created by their instructors. In Homework or Study Plan mode, students have access to a wealth of tutorial features, including:

- Instant feedback on exercises that helps students understand and apply the concepts
- Links to the eText to promote reading of the text just when the student needs to revisit a concept or an explanation
- Step-by-step guided solutions that force students to break down a problem in much the same way an instructor would do during office hours
- Pop-up key term definitions from the eText to help students master the vocabulary of economics
- A graphing tool that is integrated into the various exercises to enable students to build and manipulate graphs to better understand how concepts, numbers, and graphs connect.

### Additional MyEconLab Tools

MyEconLab includes the following additional features:

- **Enhanced eText**—Students actively read and learn, and with more engagement than ever before, through embedded and auto-graded practice, real-time data-graph updates, animations, author videos, and more.
- **Print upgrade**—For students who wish to complete assignments in MyEconLab but read in print, Pearson offers registered MyEconLab users a loose-leaf version of the print text at a significant discount.
- **Glossary flashcards**—Every key term is available as a flashcard, allowing students to quiz themselves on vocabulary from one or more chapters at a time.
- **MySearchLab**—MySearchLab provides extensive help on the research process and four exclusive databases of credible and reliable source material, including the *New York Times*, the *Financial Times*, and peer-reviewed journals.

MyEconLab content has been created through the efforts of Chris Annala, State University of New York–Geneseo; Charles Baum, Middle Tennessee State University; Peggy Dalton, Frostburg State University; Carol Dole, Jacksonville University; David Foti, Lone Star College; Sarah Ghosh, University of Scranton; Satyajit Ghosh, Universtity of Scranton; Melissa Honig, Pearson Education; Woo Jung, University of Colorado; Courtney Kamauf, Pearson Education; Chris Kauffman, University of Tennessee–Knoxville; Russell Kellogg, University of Colorado–Denver; Noel Lotz, Pearson Education; Katherine McCann, University of Delaware; Daniel Mizak, Frostburg State University; Christine Polek, University of Massachusetts–Boston; Mark Scanlan, Stephen F. Austin State University; Leonie L. Stone, State University of New York–Geneseo; and Bert G. Wheeler, Cedarville University.

## ▶ OTHER RESOURCES FOR THE INSTRUCTOR

### Instructor's Manuals

Jeff Phillips of Colby-Sawyer College revised the *Instructor's Manuals* for Microeconomics and Macroeconomics for the ninth edition. The *Instructor's Manuals* are designed to help the instructor incorporate applicable elements of the supplement package. Each Instructor's Manual contains the following resources for each chapter:

- Chapter Summary: a bulleted list of key topics in the chapter
- Learning Objectives
- Approaching the Material; student-friendly examples to introduce the chapter
- Chapter Outline: summary of definitions and concepts
- Teaching Tips on how to encourage class participation
- Summary and discussion points for the Applications in the main text
- New Applications and discussion questions
- Solutions to all end-of-chapter exercises.

The *Instructor's Manuals* are available for download from the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**). The solutions to the end-of-chapter review questions and problems were prepared by the authors and Jeff Phillips.

## Two Test Item Files

Jeff Phillips of Colby-Sawyer College prepared the *Test Item Files* for Microeconomics and Macroeconomics. Each *Test Item File* includes approximately 6,000 multiple-choice, true/false, short-answer, and graphing questions. There are questions to support each key feature in the book. The *Test Item Files* are available for download from the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**). Test questions are annotated with the following information:

- **Difficulty:** 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** (see description that follows)
- **Page number** in the text.

**The Association to Advance Collegiate Schools of Business (AACSB)** The Test Item File author has connected select questions to the general knowledge and skill guidelines found in the AACSB Assurance of Learning Standards.

**What Is the AACSB?** AACSB is a not-for-profit corporation of educational institutions, corporations, and other organizations devoted to the promotion and improvement of higher education in business administration and accounting. A collegiate institution offering degrees in business administration or accounting may volunteer for AACSB accreditation review. The AACSB makes initial accreditation decisions and conducts periodic reviews to promote continuous quality improvement in management education. Pearson Education is a proud member of the AACSB and is pleased to provide advice to help you apply AACSB Assurance of Learning Standards.

**What Are AACSB Assurance of Learning Standards?** One of the criteria for AACSB accreditation is the quality of curricula. Although no specific courses are required, the AACSB expects a curriculum to include learning experiences in the following categories of Assurance of Learning Standards:

- Written and Oral Communication
- Ethical Understanding and Reasoning
- Analytical Thinking Skills
- Information Technology
- Diverse and Multicultural Work
- Reflective Thinking
- Application of Knowledge.

Questions that test skills relevant to these standards are tagged with the appropriate standard. For example, a question testing the moral questions associated with externalities would receive the Ethical Understanding and Reasoning tag.

**How Can Instructors Use the AACSB Tags?** Tagged questions help you measure whether students are grasping the course content that aligns with the AACSB guidelines noted earlier. This in turn may suggest enrichment activities or other educational experiences to help students achieve these skills.

## TestGen

The computerized TestGen package allows instructors to customize, save, and generate classroom tests. The test program permits instructors to edit, add, or delete questions from the Test Item Files; analyze test results; and organize a database of tests and student results. This software allows for extensive flexibility and ease of use. It provides many options for organizing and displaying tests, along with search and sort features. The software and the Test Item Files can be downloaded from the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**).

## PowerPoint Lecture Presentation

Two sets of PowerPoint slides, prepared by Brock Williams of Metropolitan Community College, are available:

1. A comprehensive set of PowerPoint slides can be used by instructors for class presentations or by students for lecture preview or review. These slides include all the graphs, tables, and equations in the textbook. Two versions are available—step-by-step mode, in which you can build graphs as you would on a blackboard, and automated mode, in which you use a single click

per slide. Instructors can download these PowerPoint presentations from the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**).

2. A student version of the PowerPoint slides is available as .pdf files. This version allows students to print the slides and bring them to class for note taking. Instructors can download these PowerPoint presentations from the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**).

### Learning Catalytics™

Learning Catalytics is a "bring your own device" Web-based student engagement, assessment, and classroom intelligence system. This system generates classroom discussion, guides lectures, and promotes peer-to-peer learning with real-time analytics. Students can use any device to interact in the classroom, engage with content, and even draw and share graphs.

To learn more, ask your local Pearson representative or visit **https://www.learningcatalytics.com**.

### Digital Interactives

Focused on a single core topic and organized in progressive levels, each interactive immerses students in an assignable and auto-graded activity. Digital Interactives are also engaging lecture tools for traditional, online, and hybrid courses, many incorporating real-time data, data displays, and analysis tools for rich classroom discussions.

## ▶ OTHER RESOURCES FOR THE STUDENT

In addition to MyEconLab, Pearson provides the following resources.

### Dynamic Study Modules

With a focus on key topics, these modules work by continuously assessing student performance and activity in real time and, using data and analytics, provide personalized content to reinforce concepts that target each student's particular strengths and weaknesses.

### PowerPoint Slides

For student use as a study aid or note-taking guide, PowerPoint slides, prepared by Brock Williams of Metropolitan Community College, can be downloaded from MyEconLab or the Instructor's Resource Center (**http://www.pearsonhighered.com/osullivan**) and made available to students. The slides include:

- All graphs, tables, and equations in the text
- Figures in step-by-step mode and automated modes, using a single click per graph curve
- End-of-chapter key terms with hyperlinks to relevant slides

## ▶ REVIEWERS OF PREVIOUS EDITIONS

A long road exists between the initial vision of an innovative principles text and the final product. Along our journey we participated in a structured process to reach our goal. We wish to acknowledge the assistance of the many people who participated in this process.

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CHAPTER

# 1

# Introduction: What Is Economics?

**Economics is the science of choice, exploring the choices made by individuals and organizations.**

Over the last few centuries, these choices have led to substantial gains in the standard of living around the globe. In the United States, the typical person today has roughly seven times the income and purchasing power of a person 100 years ago. Our prosperity is the result of choices made by all sorts of people, including inventors, workers, entrepreneurs, and the people who saved money and loaned it to others to invest in machines and other tools of production. One reason we have prospered is greater efficiency: We have discovered better ways to use our resources—raw materials, time, and energy—to produce the goods and services we value.

As an illustration of changes in the standard of living and our growing prosperity, let's compare the way people listened to music in 1891 with how we listen today. You can buy an iPod shuffle® for $49 and fill it with 500 songs at $0.99 each. If you earn a wage of $15 per hour, it would take you about 36 hours of work to purchase and then fill an iPod. Back in 1891, the latest technological marvel was Thomas Edison's cylinder phonograph, which played music recorded on 4-inch cylinders. Imagine that you lived back then and wanted to get just as much music as you could fit on an iPod. Given the wages and prices in 1891, it would take you roughly 800 hours of work to earn enough money to buy the phonograph and all the cylinders. And if you wanted to keep your music with you, you would need 14 backpacks to carry the cylinders.

Although prosperity and efficiency are widespread, they are not universal. In some parts of the world, many people live in poverty. For example, in sub-Saharan Africa 388 million people—about half the population—live on less than $1.25 per day. And in all nations of the world, inefficiencies still exist, with valuable resources being wasted. For example, each year the typical urban commuter in the United States wastes more than 47 hours and $84 worth of gasoline stuck in rush-hour traffic.

## CHAPTER OUTLINE AND LEARNING OBJECTIVES


**1.1** What Is Economics?, page 2

List the three key economic questions.

**1.2** Economic Analysis and Modern Problems, page 5

Discuss the insights from economics for a real-world problem such as congestion.

**1.3** The Economic Way of Thinking, page 6

List the four elements of the economic way of thinking.

**1.4** Preview of Coming Attractions: Macroeconomics, page 10

List three ways to use macroeconomics.

**1.5** Preview of Coming Attractions: Microeconomics, page 11

List three ways to use microeconomics.


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MyEconLab helps you master each objective and study more efficiently.

*Economics* provides a framework to diagnose all sorts of problems faced by society and then helps create and evaluate various proposals to solve them. Economics can help us develop strategies to replace poverty with prosperity, and to replace waste with efficiency. In this chapter, we explain what economics is and how we all can use economic analysis to think about practical problems and solutions.

## What Is Economics?

**Learning Objective 1.1**

List the three key economic questions.

***scarcity***

The resources we use to produce goods and services are limited.

**economics**

The study of choices when there is scarcity.

Economists use the word ***scarcity*** to convey the idea that resources—the things we use to produce goods and services—are limited, while human wants are unlimited. Therefore, we cannot produce everything that everyone wants. As the old saying goes, you can't always get what you want. **Economics** studies the choices we make when there is scarcity; it is all about trade-offs. Here are some examples of scarcity and the trade-offs associated with making choices:

- You have a limited amount of time. If you take a part-time job, each hour on the job means one fewer hour for study or play.
- A city has a limited amount of land. If the city uses an acre of land for a park, it has one fewer acre for housing, retail, or industry.
- You have limited income this year. If you spend $17 on a music CD, that's $17 fewer you have to spend on other products or to save.

**factors of production**

The resources used to produce goods and services; also known as *production inputs* or *resources*.

**natural resources**

Resources provided by nature and used to produce goods and services.

**labor**

Human effort, including both physical and mental effort, used to produce goods and services.

**physical capital**

The stock of equipment, machines, structures, and infrastructure that is used to produce goods and services.

**human capital**

The knowledge and skills acquired by a worker through education and experience and used to produce goods and services.

**entrepreneurship**

The effort used to coordinate the factors of production—natural resources, labor, physical capital, and human capital—to produce and sell products.

People produce goods (music CDs, houses, and parks) and services (the advice of physicians and lawyers) by using one or more of the following five **factors of production**, also called *production inputs* or simply *resources*:

- **Natural resources** are provided by nature. Some examples are fertile land, mineral deposits, oil and gas deposits, and water. Some economists refer to all types of natural resources as *land*.
- **Labor** is the physical and mental effort people use to produce goods and services.
- **Physical capital** is the stock of equipment, machines, structures, and infrastructure that is used to produce goods and services. Some examples are forklifts, machine tools, computers, factories, airports, roads, and fiber-optic cables.
- **Human capital** is the knowledge and skills acquired by a worker through education and experience. Every job requires some human capital: To be a surgeon, you must learn anatomy and acquire surgical skills. To be an accountant, you must learn the rules of accounting and acquire computer skills. To be a musician, you must learn to play an instrument.
- **Entrepreneurship** is the effort used to coordinate the factors of production—natural resources, labor, physical capital, and human capital—to produce and sell products. An entrepreneur comes up with an idea for a product, decides how to produce it, and raises the funds to bring it to the market. Some examples of entrepreneurs are Bill Gates of Microsoft, Steve Jobs of Apple Computer, Howard Schultz of Starbucks, and Ray Kroc of McDonald's.

Given our limited resources, we make our choices in a variety of ways. Sometimes we make our decisions as individuals, and other times we participate in collective decision making, allowing the government and other organizations to choose for us. Many of our choices happen within *markets*, institutions or arrangements that enable us to buy and sell things. For example, most of us participate in the labor market, exchanging our time for money, and we all participate in consumer markets, exchanging money for food and clothing. But we make other choices outside markets—from our personal decisions about everyday life to our political choices about matters that concern society as a whole. What unites all these decisions is the notion of scarcity: We can't have it all; there are trade-offs.

Economists are always reminding us that there is scarcity—there are trade-offs in everything we do. Suppose that in a conversation with your economics instructor you share your enthusiasm about an upcoming launch of the space shuttle. The economist may tell you that the resources used for the shuttle could have been used instead for an unmanned mission to Mars.

By introducing the notion of scarcity into your conversation, your instructor is simply reminding you that there are trade-offs, that one thing (a Mars mission) is sacrificed for another (a shuttle mission). Talking about alternatives is the first step in a process that can help us make better choices about how to use our resources. For example, we could compare the scientific benefits of a shuttle mission to the benefits of a Mars mission and choose the mission with the greater benefit.

## Positive versus Normative Analysis

Economics doesn't tell us what to choose—shuttle mission or Mars mission—but simply helps us to understand the trade-offs. President Harry S. Truman once remarked,

> All my economists say, "On the one hand, . . .; On the other hand, . . .?." Give me a one-handed economist!

An economist might say, "On the one hand, we could use a shuttle mission to do more experiments in the gravity-free environment of Earth's orbit; on the other hand, we could use a Mars mission to explore the possibility of life on other planets." In using both hands, the economist is not being evasive, but simply doing economics, discussing the alternative uses of our resources. The ultimate decision about how to use our resources—shuttle mission or Mars exploration—is the responsibility of citizens or their elected officials.

Most modern economics is based on **positive analysis**, which predicts the consequences of alternative actions by answering the question "What *is*?" or "What *will be*?" A second type of economic reasoning is normative in nature. **Normative analysis** answers the question "What *ought to be*?"

**positive analysis**
Answers the question "What *is*?" or "What *will be*?"

**normative analysis**
Answers the question "What *ought to be*?"

In Table 1.1, we compare positive questions to normative questions. Normative questions lie at the heart of policy debates. Economists contribute to policy debates by conducting positive analyses of the consequences of alternative actions. For example, an economist could predict the effects of an increase in the minimum wage on the number of people employed nationwide, the income of families with minimum-wage workers, and consumer prices. Armed with the conclusions of the economist's positive analysis, citizens and policymakers could then make a normative decision about whether to increase the minimum wage. Similarly, an economist could study the projects that could be funded with $1 billion in foreign aid, predicting the effects of each project on the income per person in an African country. Armed with this positive analysis, policymakers could then decide which projects to support.

TABLE 1.1 Comparing Positive and Normative Questions

| Positive Questions | Normative Questions |
|---|---|
| • If the government increases the minimum wage, how many workers will lose their jobs? | • Should the government increase the minimum wage? |
| • If two office-supply firms merge, will the price of office supplies increase? | • Should the government block the merger of two office-supply firms? |
| • How does a college education affect a person's productivity and earnings? | • Should the government subsidize a college education? |
| • How do consumers respond to a cut in income taxes? | • Should the government cut taxes to stimulate the economy? |
| • If a nation restricts shoe imports, who benefits and who bears the cost? | • Should the government restrict imports? |

Economists don't always reach the same conclusions in their positive analyses. The disagreements often concern the magnitude of a particular effect. For example, most economists agree that an increase in the minimum wage will cause unemployment, but disagree about how many people would lose their jobs. Similarly, economists agree that spending money to improve the education system in Africa will increase productivity and income, but disagree about the size of the increase in income. MyEconLab Concept Check

## The Three Key Economic Questions: What, How, and Who?

We make economic decisions at every level in society. Individuals decide what products to buy, what occupations to pursue, and how much money to save. Firms decide what goods and services to produce and how to produce them. Governments decide what projects and programs to complete and how to pay for them. The choices of individuals, firms, and governments answer three questions:

1. *What products do we produce?* Trade-offs exist: If a hospital uses its resources to perform more heart transplants, it has fewer resources to care for premature infants.
2. *How do we produce the products?* Alternative means of production are available: Power companies can produce electricity with coal, natural gas, or wind power. Professors can teach in large lecture halls or small classrooms.
3. *Who consumes the products?* We must decide how to distribute the products of society. If some people earn more money than others, should they consume more goods? How much money should the government take from the rich and give to the poor?

As we'll see later in the book, most of these decisions are made in markets, where prices play a key role in determining what products we produce, how we produce them, and who gets the products. In Chapter 3, we examine the role of markets in modern economies and the role of government in market-based economies. MyEconLab Concept Check

## Economic Models

Economists use *economic models* to explore the choices people make and the consequences of those choices. An economic model is a simplified representation of an economic environment, with all but the essential features of the environment eliminated. An **economic model** is an abstraction from reality that enables us to focus our attention on what really matters. As we'll see throughout the book, most economic models use graphs to represent the economic environment.

**economic model**
A simplified representation of an economic environment, often employing a graph.

To see the rationale for economic modeling, consider an architectural model. An architect builds a scale model of a new building and uses the model to show how the building will fit on a plot of land and blend with nearby buildings. The model shows the exterior features of the building, but not the interior features. We can ignore the interior features because they are unimportant for the task at hand—seeing how the building will fit into the local environment.

Economists build models to explore decision making by individuals, firms, and other organizations. For example, we can use a model of a profit-maximizing firm to predict how a firm will respond to increased competition. If a new car stereo store opens up in your town, will the old firms be passive and simply accept smaller market shares, or will they aggressively cut their prices to try to drive the new rival out of business? The model of the firm includes the monetary benefits and costs of doing business, and assumes that firms want to make as much money as possible. Although there may be other motives in the business world—to have fun or to help the world—the economic model ignores these other motives. The model focuses our attention on the profit motive and how it affects a firm's response to increased competition. MyEconLab Concept Check

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## Economic Analysis and Modern Problems

**Learning Objective 1.2**

Discuss the insights from economics for a real-world problem such as congestion.

Economic analysis provides important insights into real-world problems. To explain how we can use economic analysis in problem solving, we provide three examples. You'll see these examples again in more detail later in the book.

### Economic View of Traffic Congestion

Consider first the problem of traffic congestion. According to the Texas Transportation Institute, the typical U.S. commuter wastes about 47 hours per year because of traffic congestion.[1] In some cities, the time wasted is much greater: 93 hours in Los Angeles, 72 hours in San Francisco, and 63 hours in Houston. In addition to time lost, we also waste 2.3 billion gallons of gasoline and diesel fuel each year.

To an economist, the diagnosis of the congestion problem is straightforward. When you drive onto a busy highway during rush hour, your car takes up space and decreases the distance between the vehicles on the highway. A driver's normal reaction to a shorter distance between moving cars is to slow down. So when you enter the highway, you force other commuters to slow down and thus spend more time on the highway. If each of your 900 fellow commuters spends just two extra seconds on the highway, you will increase the total travel time by 30 minutes. In deciding whether to use the highway, you will presumably ignore these costs you impose on others. Similarly, your fellow commuters ignore the cost they impose on you and others when they enter the highway. Because no single commuter pays the full cost (30 minutes), too many people use the highway, and everyone wastes time.

One possible solution to the congestion problem is to force people to pay for using the road, just as they pay for gasoline and tires. The government could impose a congestion tax of $8 per trip on rush-hour commuters and use a debit card system to collect the tax: Every time a car passes a checkpoint, a transponder would charge the commuter's card. Traffic volume during rush hours would then decrease as travelers (a) shift their travel to off-peak times, (b) switch to ride-sharing and mass transit, and (c) shift their travel to less congested routes. The job for the economist is to compute the appropriate congestion tax and predict the consequences of imposing it.

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### Economic View of Poverty in Africa

Consider next the issue of poverty in Africa. In the final two decades of the twentieth century, the world economy grew rapidly, and the average per capita income (income per person) increased by about 35 percent. In contrast, the economies of poverty-stricken sub-Saharan Africa shrank, and per capita income *decreased* by about 6 percent. Africa is the world's second-largest continent in both area and population and accounts for more than 12 percent of the world's human population. Figure 1.1 shows a map of Africa. The countries of sub-Saharan Africa are highlighted in orange.

Economists have found that as a nation's economy grows, its poorest households share in the general prosperity.[2] Therefore, one way to reduce poverty in sub-Saharan Africa is to increase economic growth. Economic growth occurs when a country expands its production facilities (machinery and factories), improves its public infrastructure (highways and water systems), widens educational opportunities, and adopts new technology.

The recent experience of sub-Saharan Africa is somewhat puzzling because in the last few decades the region has expanded educational opportunities and received large amounts of foreign aid. Some recent work by economists on the sources of growth suggests that institutions such as the legal system and the regulatory environment also play key roles in economic growth.[3] In sub-Saharan Africa, a simple legal dispute about a small debt takes about 30 months to resolve, compared to 5 months in the United States. In Mozambique, it takes 174 days to complete the procedures required to set up a business, compared to just 2 days in Canada. In many cases, institutions impede


▲ **FIGURE 1.1** Map of Africa

Africa is the world's second-largest continent in both area and population, and accounts for more than 12 percent of the world's human population. The countries of sub-Saharan Africa are highlighted in green.

rather than encourage the sort of investment and risk-taking—called *entrepreneurship*—that causes economic growth and reduces poverty. As a consequence, economists and policymakers are exploring ways to reform the region's institutions. They are also challenged with choosing among development projects that will generate the biggest economic boost per dollar spent—the biggest bang per buck. MyEconLab Concept Check

## Economic View of the Current World Recession

Over the last several decades, the U.S. economy has performed well and has raised our standard of living. The general consensus was that our policymakers had learned to manage the economy effectively. Although the economy faltered at times, policymakers seemed to know how to restore growth and prosperity.

That is why the financial crisis and the recession that began in late 2007 has so shaken the confidence of people in the United States and around the world. The problems started innocently enough, with a booming market for homes that was fueled by easy credit from financial institutions. But we later discovered that many purchasers of homes and properties could not really afford them, and when many homeowners had trouble making their mortgage payments, the trouble spread to banks and other financial institutions. As a result, businesses found it increasingly difficult to borrow money for everyday use and investment, and economic activity around the world began to contract.

The major countries of the world have implemented aggressive policies to try to halt this downturn. Policymakers want to avoid the catastrophes that hit the global economy in the 1930s. Fortunately, they can draw on many years of experience in economic policy to guide the economy during this difficult time. MyEconLab Concept Check

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**Learning Objective 1.3**

List the four elements of the economic way of thinking.

## The Economic Way of Thinking

How do economists think about problems and decision making? The economic way of thinking is best summarized by British economist John Maynard Keynes (1883–1946):[4]

> The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking which helps its possessor draw correct conclusions.

Let's look at the four elements of the economic way of thinking.

## Use Assumptions to Simplify

Economists use assumptions to make things simpler and focus attention on what really matters. If you use a road map to plan a car trip from Seattle to San Francisco, you make two unrealistic assumptions to simplify your planning:

- The earth is flat: The flat road map doesn't show the curvature of the earth.
- The roads are flat: The standard road map doesn't show hills and valleys.

Instead of a map, you could use a globe that shows all the topographical features between Seattle and San Francisco, but you don't need those details to plan your trip. A map, with its unrealistic assumptions, will suffice because the curvature of the earth and the topography of the highways are irrelevant to your trip. Although your analysis is based on two unrealistic assumptions, that does not mean your analysis is invalid. Similarly, if economic analysis is based on unrealistic assumptions, that doesn't mean the analysis is faulty.

What if you decide to travel by bike instead of by automobile? Now the assumption of flat roads really matters, unless of course you are eager to pedal up and down mountains. If you use a standard map, and thus assume there are no mountains between the two cities, you may inadvertently pick a mountainous route instead of a flat one. In this case, the simplifying assumption makes a difference. The lesson is that we must think carefully about whether a simplifying assumption is truly harmless. MyEconLab Concept Check

## Isolate Variables—*Ceteris Paribus*

Economic analysis often involves variables and how they affect one another. A **variable** is a measure of something that can take on different values, for example, your grade point average. Economists are interested in exploring relationships between two variables—like the relationship between the price of apples and the quantity of apples consumers purchase. Of course, the quantity of apples purchased depends on many other variables, including the consumer's income. To explore the relationship between the quantity and price of apples, we must assume that the consumer's income—and anything else that influences apple purchases—doesn't change during the time period we're considering.

**variable**
A measure of something that can take on different values.

Alfred Marshall (1842–1924) was a British economist who refined the economic model of supply and demand and provided a label for this process.[5] He picked one variable that affected apple purchases (price) and threw the other variable (income) into what he called the "pound" (in Marshall's time, the "pound" was an enclosure for holding stray cattle; nowadays, a pound is for stray dogs). That variable waited in the pound while Marshall examined the influence of the first variable. Marshall labeled the pound ***ceteris paribus***, the Latin expression meaning that other variables are held fixed:

***ceteris paribus***
The Latin expression meaning that other variables are held fixed.

> . . . the existence of other tendencies is not denied, but their disturbing effect is neglected for a time. The more the issue is narrowed, the more exactly can it be handled.

This text contains many statements about the relationship between two variables. For example, the quantity of computers produced by Dell depends on the price of computers, the wage of computer workers, and the cost of microchips. When we say, "An increase in the price of computers increases the quantity of computers produced," we are assuming that the other two variables—the wage and the cost of microchips—do not change. That is, we apply the *ceteris paribus* assumption. MyEconLab Concept Check

## Think at the Margin

Economists often consider how a small change in one variable affects another variable and what impact that has on people's decision making. In other words, if circumstances change only slightly, how will people respond? A small, one-unit change in value is called a **marginal change**. The key feature of marginal change is that the first variable

**marginal change**
A small, one-unit change in value.

changes by only one unit. For example, you might ask, "If I study just one more hour, by how much will my exam score increase?" Economists call this process "thinking at the margin." Thinking at the margin is like thinking on the edge. You will encounter marginal thinking throughout this text. Here are some other marginal questions:

- If I keep my barber shop open one more hour, by how much will my revenue increase?
- If I stay in school and earn another degree, by how much will my lifetime earnings increase?
- If a car dealer hires one more sales associate, how many more cars will the dealer sell?

As we'll see in the next chapter, economists use the answer to a marginal question as a first step in deciding whether to do more or less of something, for example, whether to keep your barber shop open one more hour. MyEconLab Concept Check

## Rational People Respond to Incentives

A key assumption of most economic analysis is that people act rationally, meaning they act in their own self-interest. Scottish philosopher Adam Smith (1723–1790), who is also considered the founder of economics, wrote that he discovered within humankind[6]

> a desire of bettering our condition, a desire which, though generally calm and dispassionate, comes with us from the womb, and never leaves us until we go to the grave.

Smith didn't say people are motivated exclusively by self-interest, but rather that self-interest is more powerful than kindness or altruism. In this text, we will assume that people act in their own self-interest. Rational people respond to incentives. When the payoff, or benefit, from doing something changes, people change their behavior to get the benefit. MyEconLab Concept Check

## Application 1

### INCENTIVES TO BUY HYBRID VEHICLES

**APPLYING THE CONCEPTS #1: How do people respond to incentives?**

Consider the incentives to buy a hybrid vehicle, which is more fuel efficient but more expensive than a gas-powered vehicle. Between 2000 and 2007, the number of hybrid vehicles increased from fewer than 10,000 vehicles to more than 340,000 vehicles. Over this period, the price of gasoline increased significantly, and the higher price of gasoline was responsible for roughly one-third of the hybrid vehicles purchased in 2007. An additional factor in hybrid purchases was a federal subsidy of up to $3,400 per hybrid vehicle. The subsidy was responsible for roughly one-fifth of the hybrid vehicles purchased in 2007. The increase in the number of hybrid vehicles decreased the emission of the greenhouse gas carbon dioxide ($CO_2$).

How efficient is the hybrid subsidy in reducing $CO_2$? On average, the cost of abating one ton of $CO_2$ through the hybrid subsidy is $177. There are less costly ways to reduce $CO_2$ emissions, including building insulation, energy-efficient lighting, reforestation, and switching to electric power systems that use fuels that generate less $CO_2$. For example, a switch from coal to natural gas in power plants reduces $CO_2$ emissions at less than one-third the cost associated with the hybrid subsidy. **Related to Exercise 3.4**.

SOURCES: (1) Arie Beresteanu and Shanjun Li, "Gasoline Prices, Government Support, and the Demand for Hybrid Vehicles in the United States," *International Economic Review* 52 (2011), pp. 161–182. (2) Jackie Calmes, "President Pushes to Add More Credits for Hybrids," *New York Times*, March 8, 2012.

### Example: London Addresses Its Congestion Problem

To illustrate the economic way of thinking, let's consider again how an economist would approach the problem of traffic congestion. Recall that each driver on the highway slows down other drivers but ignores these time costs when deciding whether to use the highway. If the government imposes a congestion tax to reduce traffic during rush hour, the economist is faced with a question: How high should the tax be?

To determine the appropriate congestion tax, an economist would assume that people respond to incentives and use the three other elements of the economic way of thinking:

- **Use assumptions to simplify.** To simplify the problem, we would assume that every car has the same effect on the travel time of other cars. Of course, this is unrealistic because people drive cars of different sizes in different ways. But the alternative—looking at the effects of each car on travel speeds—would needlessly complicate the analysis.
- **Isolate variables—use *ceteris paribus*.** To focus attention on the effects of a congestion tax on the number of cars using the highway, we would make the *ceteris paribus* assumption that everything else that affects travel behavior—the price of gasoline, bus fares, and consumer income—remains fixed.
- **Think at the margin.** To think at the margin, we would estimate the effects of adding one more car to the highway. Now consider the marginal question: If we add one more car to the highway, by how much does the total travel time for commuters increase? Once we answer this question, we can determine the cost imposed by the marginal driver. If the marginal driver forces each of the 900 commuters to spend two extra seconds on the highway, total travel time increases by 30 minutes. If the value of time is, say, $16 per hour, the appropriate congestion tax would be $8 (equal to $16 × 1/2 hour).

## Application 2

### HOUSING PRICES IN CUBA

**APPLYING THE CONCEPTS #2: What is the role of prices in allocating resources?**

As an illustration of the role of prices in an economy, consider the experience of Cuba without housing prices. In 1960, the government confiscated most housing and outlawed its sale and rental. Tenants who paid monthly rent to the government for 20 years became homeowners of sorts—they officially owned the dwelling, but could not sell it or rent it to others. The impossibility of resale and rental meant that homeowners had less incentive to repair and maintain their property. As a result, a large fraction of the housing stock is in mediocre or poor condition (30 percent in 2013). In addition, few new dwellings were built in the last 50 years, leading to a large housing deficit (roughly 1 million dwellings in 2013).

Housing reforms in 2011 restored prices to the Cuban housing market. The reforms authorize the sale and purchase of homes for Cuban citizens at prices chosen by sellers and buyers. Economists expect these reforms to provide homeowners with greater incentives to repair and maintain their dwellings, and to increase housing construction. **Related to Exercise 3.5.**

SOURCES: (1) Carmelo Mesa-Lago, *Institutional Changes of Cuba's Economic Social Reforms: State and Market Roles, Progress, Hurdles, Comparisons, Monitoring and Effects* (Washington, DC: Brookings, 2014). (2) Damien Cave, "Cuba to Allow Buying and Selling of Property, With Few Restrictions," *New York Times*, November 3, 2011.