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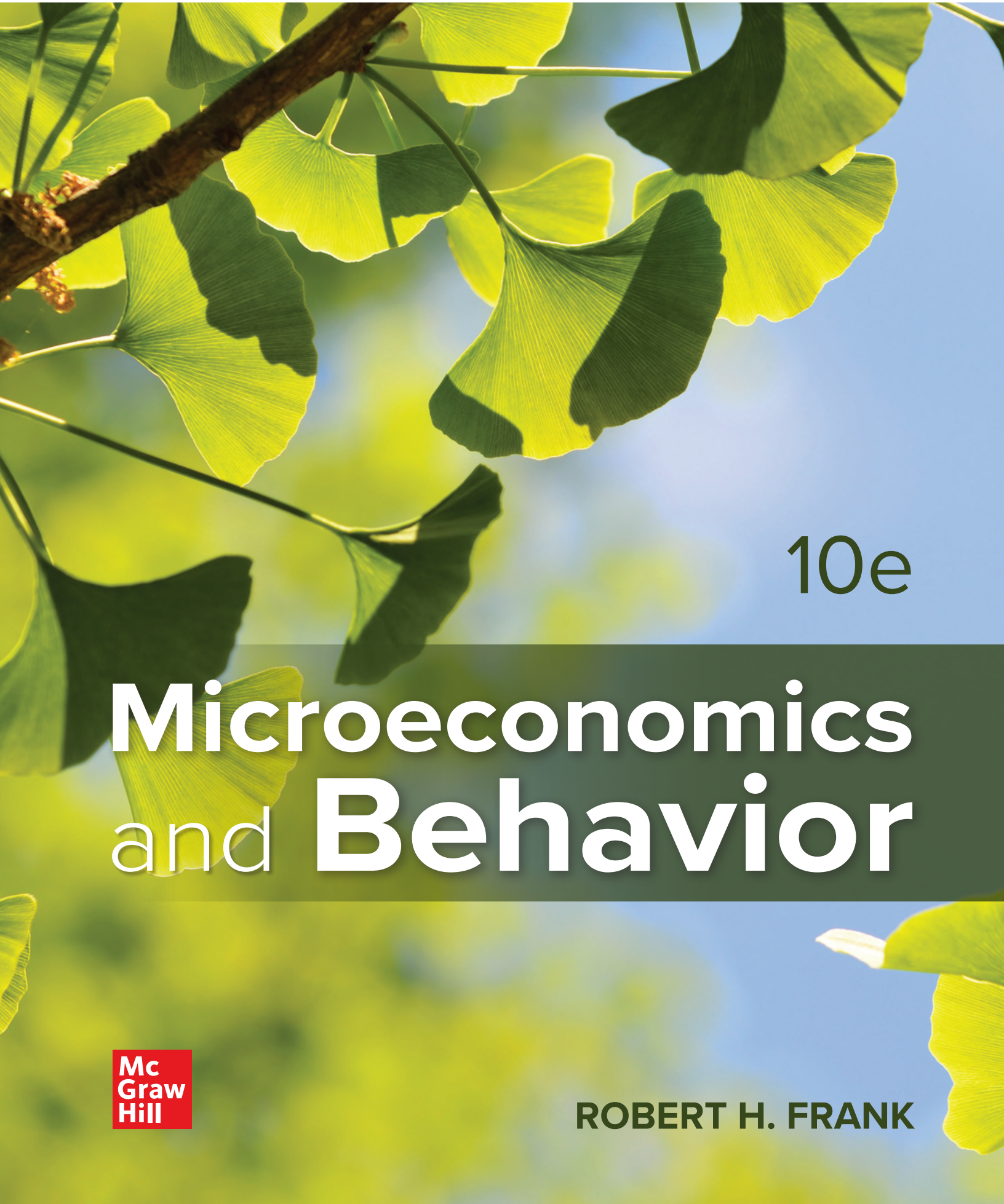

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Microeconomics and Behavior

Mc Graw Hill

ROBERT H. FRANK

TENTH EDITION

MICROECONOMICS
and Behavior

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TENTH EDITION

MICROECONOMICS
and Behavior

ROBERT H. FRANK

Cornell University

Mc Graw Hill

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DEDICATION

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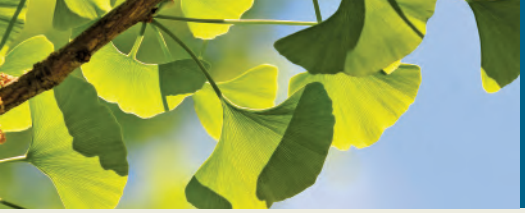

ABOUT THE AUTHOR

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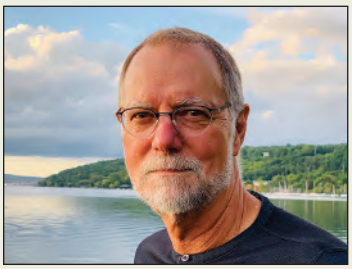

Robert H. Frank

Robert H. Frank is the H. J. Louis Professor of Management and Professor of Economics, emeritus, at Cornell's Johnson School of Management, where he taught from 1972 to 2020. After receiving his B.S. from Georgia Tech in 1966, he taught math and science for two years as a Peace Corps volunteer in rural Nepal. He received his M.A. in statistics in 1971 and his Ph.D. in economics in 1972 from the University of California at Berkeley. He also holds honorary doctorate degrees from the University of St. Gallen and Dalhousie University. During leaves of absence from Cornell, he has served as chief economist for the Civil Aeronautics Board (1978–1980), a Fellow at the Center for Advanced Study in the Behavioral Sciences (1992–1993), Professor of American Civilization at l'École des Hautes Études en Sciences Sociales in Paris (2000–2001), and the Peter and Charlotte Schoenfeld Visiting Faculty Fellow at the NYU Stern School of Business in 2008–2009. His papers have appeared in the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, and other leading professional journals and for more than two decades, his economics columns appeared regularly in *The New York Times*.

Professor Frank is the co-author of two best-selling principles of economics textbook—*Principles of Economics*, Eighth Edition, and *Principles of Economics: A Streamlined Approach*, Fourth Edition (McGraw Hill, 2021). His research has focused on rivalry and cooperation in economic and social behavior. His books on these themes include *Choosing the Right Pond* (Oxford, 1995), *Passions Within Reason* (W. W. Norton, 1988), *What Price the Moral High Ground?* (Princeton, 2004), *Falling Behind* (University of California Press, 2007), *The Economic Naturalist* (Basic Books, 2007), *The Economic Naturalist's Field Guide* (Basic Books, 2009), *The Darwin Economy* (Princeton, 2011), and *Success and Luck* (Princeton, 2016), and *Under the Influence* (Princeton, 2020), which have been translated into 24 languages. *The Winner-Take-All Society* (The Free Press, 1995), co-authored with Philip Cook, received a Critic's Choice Award, was named a Notable Book of the Year by *The New York Times*, and was included in *BusinessWeek's* list of the 10 best books of 1995. *Luxury Fever* (The Free Press, 1999) was named to the Knight-Ridder Best Books list for 1999.

Professor Frank is a co-recipient of the 2004 Leontief Prize for Advancing the Frontiers of Economic Thought. He was awarded the Johnson School's Stephen Russell Distinguished Teaching Award in 2004, 2010, 2012, and 2018, and the School's Apple Distinguished Teaching Award in 2005.

PREFACE

My goal in writing *Microeconomics and Behavior* was to produce an intellectually challenging text that would also be accessible and engaging to students. The more common approach in this market has been to emphasize one of these dimensions or the other. For example, some texts have done well by sacrificing rigor in the name of user-friendliness. But although such books sometimes keep students happy, they often fail to prepare them for upper-division courses in the major. Others texts have succeeded by sacrificing accessibility in the name of rigor, where rigor all too often means little more than mathematical density. These courses overwhelm many undergraduates, and even those few who become adept at solving well-posed mathematical optimization problems are often baffled by questions drawn from everyday contexts. I have always believed that a text could at once be rigorous *and* user-friendly. And to judge by the breadth of *Microeconomics and Behavior*'s adoption list, many of you apparently agree.

I wrote this book in the conviction that the teaching of intuition and the teaching of technical tools are complements, not substitutes. Students who learn only technical tools rarely seem to develop any real affection for our discipline; and even more rarely do they acquire that distinctive mindset we call "thinking like an economist." By contrast, students who develop economic intuition are stimulated to think more deeply about the technical tools they learn, and to find more interesting ways to apply them. Most important, they usually end up *liking* economics.

Microeconomics and Behavior develops the core analytical tools with patience and attention to detail. At the same time, it embeds these tools in a uniquely diverse collection of examples and applications to illuminate the power and versatility of the economic way of thinking.

ECONOMIC NATURALISM

In more than forty years of teaching, I have found no more effective device for developing intuition than to train students to become "Economic Naturalists." Studying biology enables people to observe and marvel at many details of life that would otherwise have escaped notice. In much the same way, studying microeconomics can enable students to see the mundane details of ordinary existence in a sharp new light. Throughout the text, I try to develop intuition by means of examples and applications drawn from everyday experience. *Microeconomics and Behavior* teaches students to see each feature of the manmade landscape as the reflection of an implicit or explicit cost-benefit calculation.

Year in and year out, the most valuable assignments in my course are the two brief papers in which I ask students to report on their efforts to become economic naturalists. Their specific charge is to use microeconomic principles to answer a question prompted by a personal observation. In recent terms, students have grappled with questions like these: Why do the keypads of drive-up ATM machines have Braille dots? Why do top female models earn more than top male models? Why do brides spend so much money on wedding dresses, while grooms often rent cheap tuxedos (even though grooms could potentially wear their tuxedos on many other occasions and brides will never wear their dresses again)? Why are child safety seats required in cars but not for air travel? Why do airlines charge their highest prices to passengers who buy at the last minute, while the practice is exactly the reverse for Broadway theaters?

The beauty of this assignment is not only that most students enjoy writing these papers, but also that few manage to complete them without becoming life-long economic naturalists. For those who would like to learn more about the assignment, my lecture on it is posted in the Authors@google series here: www.youtube.com/watch?v=QalNVxeIKEE.

A host of Economic Naturalist examples are now available as short, engaging video vignettes available within Connect via the eBook or as assignable homework content. Available videos are denoted in the margin throughout the text.

FOCUS ON PROBLEM-SOLVING

Most economists agree that a critical step in learning price theory is to solve problems. More than any other text currently available in the marketplace, *Microeconomics and Behavior* prepares students for its end-of-chapter problems by taking them through a sequence of carefully crafted examples and self-test questions within each chapter. Because most of these examples and self-tests are drawn from familiar contexts, and because students engage more readily with the concrete than with the abstract, this approach has proven effectiveness. In the absence of such groundwork, many students would reach the end-of-chapter problems with little or no idea how to proceed.

OPTIMAL TOPIC COVERAGE

A guiding principle in the evolution of *Microeconomics and Behavior* has been that topics should be emphasized in proportion both to their importance and to the difficulty that students have in mastering them. Because the basic rational choice model is the building block for much of what comes later in the course, I have devoted considerably more attention to its development than competing texts do. I have also allocated extra space for elasticity and its applications in

demand theory, and for the average-marginal distinction in production theory.

As an additional means for discovering which topics are most difficult to master, I have used research in behavioral economics that identifies systematic departures from the prescriptions of the rational choice model. For example, whereas the model says that rational persons will ignore sunk costs, many people are in fact strongly influenced by them. (Someone who receives an expensive, but painfully tight, pair of shoes as a gift is much less likely to wear them than is someone who spent $400 out of his own pocket for those same shoes.) Especially in the chapters on consumer behavior, I call students' attention to situations in which they themselves are likely to make irrational choices. Because student resources are limited, it makes sense to focus on precisely those issues for which knowing price theory is most likely to be helpful.

It may seem natural to wonder whether discussing examples of irrational choices might confuse students who are struggling to master the details of the rational choice model. It's a reasonable question, but my experience has been exactly to the contrary. Such examples actually underscore the normative message of the traditional theory. Students who are exposed to them invariably gain a deeper understanding of the basic theoretical principles at issue. Indeed, they often seem to take an almost conspiratorial pride in being able to see through the errors of judgment that many consumers make. For instructors who want to pursue how cognitive limitations affect consumer behavior in greater detail, there is an entire chapter devoted to this topic. When the first edition of *Microeconomics and Behavior* appeared in 1990, many in the economics profession were skeptical about then emerging field of behavioral economics. But as evidenced by U.C. Berkeley economist Matthew Rabin's receipt of the John Bates Clark Award in 2000 (the honor bestowed every two years by the American Economics Association on the most outstanding American economist under the age of 40) and by the receipt of the Nobel Prize in Economics, first by Daniel Kahneman in 2002 and then by Richard Thaler in 2017, the behavioral approach is now part of the microeconomics mainstream.

A BROADER CONCEPTION OF SELF-INTEREST

Another of my goals has been to incorporate a broader conception of preferences into models of individual choice. Most texts mention at the outset that the rational choice model takes people's tastes as given. They may be altruists, sadists, or masochists; or they may be concerned solely with advancing their narrow material interests. But having said that, most texts then proceed to ignore all motives other than narrow self-interest. It is easy to see why, because economic research has scored its most impressive gains on the strength of this portrayal of human motivation. It tells us, for example, why Ford discontinued production of its 7,500-pound Excursion SUV in the wake of gasoline price increases; and why thermostats are generally set lower in apartments that have separately metered utilities.

And yet, as students are keenly aware, our *Homo economicus* caricature is patently at odds with much of what we know about human behavior. People vote in presidential elections. They give anonymously to public television stations and private charities. They donate bone marrow to strangers with leukemia. They endure great trouble and expense to see justice done, even when it will not undo the original injury. At great risk to themselves, they pull people from burning buildings, and jump into icy rivers to rescue people who are about to drown. Soldiers throw their bodies atop live grenades to save their comrades. Seen through the lens of the self-interest theory emphasized in most textbooks, such behavior is the human equivalent of planets traveling in square orbits. Indeed, many students are strongly alienated by our self-interest model, which they perceive as narrow and mean-spirited.

Microeconomics and Behavior freely concedes the importance of the self-interest motive in many contexts. But it also highlights the role of unselfish motives in social and economic transactions. Employing elementary game theory, Chapter 12 identifies circumstances in which people who hold such motives have a competitive advantage over pure opportunists. It shows, for example, that people known to have cooperative predispositions can often solve prisoner's dilemmas and other commitment problems in ways that purely self-interested persons cannot.

Our theoretical models of human nature are important, not least because they mold our expectations about how others will behave. Economics is the social science most closely identified with the self-interest model of human behavior. Does this model color our expectations of others, and perhaps even our own behavior? When Cornell psychologists Tom Gilovich, Dennis Regan, and I investigated this question, we found numerous indications that economists are much more likely than others to behave opportunistically in social dilemmas.[1] For example, academic economists were more than twice as likely as the members of any other discipline we surveyed to report that they give

[1]See R. H. Frank, T. D. Gilovich, and D. T. Regan, "Does Studying Economics Inhibit Cooperation?" *Journal of Economics Perspectives,* Spring 1993.

no money at all to any private charity. In an experiment, we also found that economics majors were more than twice as likely as nonmajors to defect when playing one-shot prisoner's dilemmas with strangers.

This difference was not merely a reflection of the fact that people who chose to major in economics were more opportunistic to begin with. We found, for example, that the difference in defection rates grew larger the longer a student had studied economics. Questionnaire responses also indicated that freshmen in their first microeconomics course were more likely at the end of the term to expect opportunistic behavior from others than they were at the beginning.

There are thus at least some grounds for concern that, by stressing only the narrow self-interest motive, economists may have undermined our students' propensities for cooperative behavior. The irony is that the internal logic of the economic model never predicted such narrowly self-interested behavior in the first place.

ADDITIONAL PEDAGOGICAL FEATURES

Unlike most intermediate texts, *Microeconomics and Behavior* contains no boxed applications, which tend to distract students from the thread of argument being developed. Instead, applications and examples are integrated fully into the text. Many of these have the added advantage of being drawn from experiences to which students can personally relate.

The chapter introductions and summaries are another innovative feature of *Microeconomics and Behavior.* Most chapters begin with an anecdote that poses a problem or question that the material developed in the chapter will enable the student to answer. These introductions have proved especially helpful for the many students who find that getting started is often the hardest step. The chapter summaries in most current texts consist of brief annotated lists of the topics covered. The chapter summaries in *Microeconomics and Behavior,* by contrast, are written in a narrative form that carefully synthesizes the material covered in the chapters.

Each chapter concludes with a selection of problems that range in difficulty from routine to highly challenging. These problems have all been class-tested to assure their accuracy and effectiveness in helping students master the most important concepts in the chapters.

Answers to all in-text self-test questions appear at the end of the chapter in which they occur. Variations and extensions of these self-tests are echoed in the end-of-chapter problems, which enable students to approach these problem sets with greater confidence. Detailed answers to all end-of-chapter problems are included in the solutions manual.

CHANGES IN THE TENTH EDITION

Beyond the usual updating of time-sensitive numerical examples, I have also tried to achieve a **simpler and more unified design** look throughout the text. The design has been refreshed, the Examples and Concept Checks (now named Self-Tests) from the previous edition are emphasized to provide clarity and to facilitate understanding of concepts. Data has been updated accordingly throughout.

A more robust offering of course content in McGraw Hill Connect is now available for this edition. In addition to the test bank, which was available previously in Connect, the end-of-chapter questions have now been added as assignable, automatically graded, content. **Refinements to the SmartBook offer** have also been made. For more information about the assets available to you, refer to the Connect Economics pages that follow.

Economic Naturalism, as described earlier, has long been a central focus of this book. But it is a feature, not a bug, of specific pithy examples involving manual transmissions or Nepalese stone crushers that they reflect a moment in time. In this edition, we have revisited many of Economic Naturalist examples and have found sometimes that new facts lead to different conclusions. New to this edition, a selection of **Economic Naturalist examples have been developed into short video vignettes**, detailing how economics can help you answer a host of interesting questions from everyday experiences. Applicable videos are denoted in the margin throughout the text, as in the margin here. The videos are available within Connect via the eBook, and as assignable homework content with accompanying questions.

▶ Visit your instructor's Connect© course and access your eBook to view this video.

Why do real estate agents often show clients two nearly identical houses, even though one is both cheaper and in better condition than the other?

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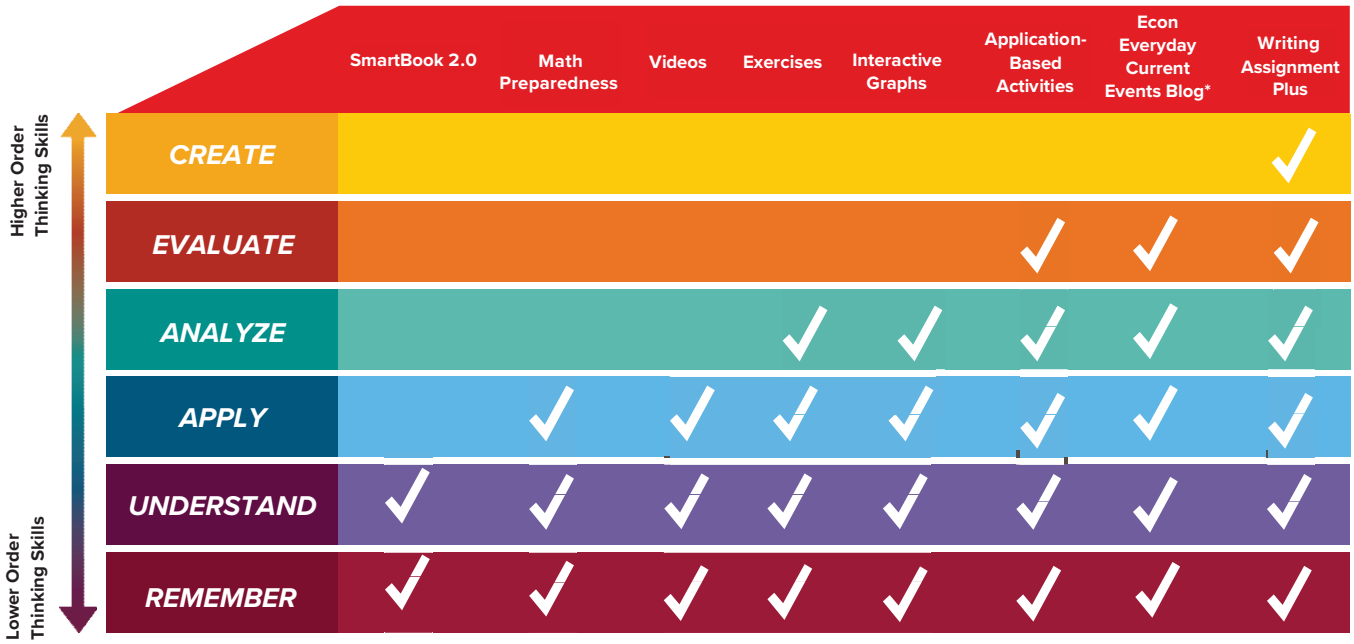
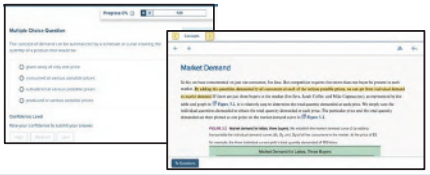
The chart below shows a few of the key assignable economics assets with *McGraw Hill Connect* aligned with Bloom's Taxonomy. Take your students higher by assigning a variety of applications, moving them from simple memorization to concept application.



* Outside of Connect.

SmartBook 2.0

Adaptively aids students to study more efficiently by highlighting where in the chapter to focus, asking review questions and pointing them to passages in the text until they understand. Assignable and assessable.



Math Preparedness

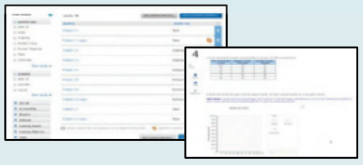
Math preparedness assignments help students refresh important prerequisite topics necessary to be successful in economics. Tutorial videos are included to help illustrate math concepts to students visually.

Videos

Select Economic Naturalist examples have been developed into videos that show how to employ basic economic principles to understand and explain what you observe in the world around you. All videos are closed captioned and are assignable with assessment questions for improved retention.

Exercises

Exercises with algorithmic variations provide ample opportunities for students to practice and hone quantitative skills. Graphing Exercises provide opportunities for students to draw, interact with, manipulate, and analyze graphs.

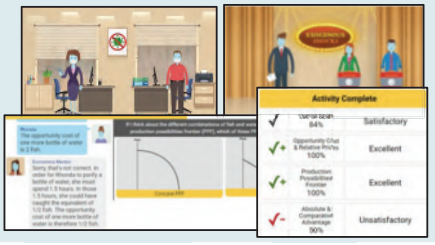


Interactive Graphs

Interactive Graphs provide visual displays of real data and economic concepts for students to manipulate. All graphs are accompanied by assignable Assessment questions and feedback to guide students through the experience of learning to read and interpret graphs and data.

Application-Based Activities

Immersive real-life scenarios engage students and put them in the role of everyday economists. Students practice their economic thinking and problem-solving skills as they apply course concepts and see the implications of their decisions as they go. Each activity is designed as a 15-minute experience, unless students eagerly replay for a better outcome.



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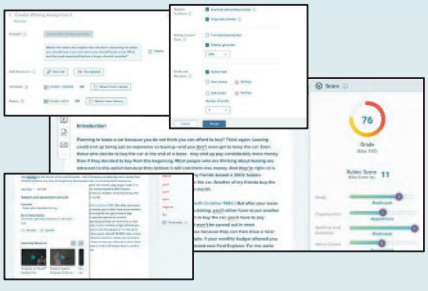

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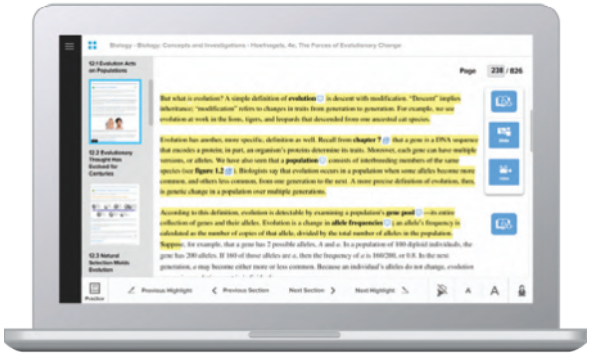

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> ***"I really liked this app—it made it easy to study when you don't have your textbook in front of you."***
>
> - Jordan Cunningham, Eastern Washington University

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Changes to this edition emphasize updates to content rather than to organization of the text. Significant new material relating to the economics of climate change have been introduced in Chapters 5, 6, 7, and 17. Chapter 10 begins with a mostly new introduction to the theory of perfect competition. Chapter 18 is streamlined and refocused, with the closing "Income Distribution" section updated to reflect the contemporary discussion around basic income and jobs guarantee proposals.

SUPPLEMENTS FOR THE INSTRUCTOR

The following ancillaries are available for quick download and convenient access via the instructor resource site available through McGraw Hill Connect. Instructor resources are password protected for security. The supplements package, which has been revised and improved, consists of the following:

Instructor's Manual: Each chapter contains a Chapter Summary, a Chapter Outline, Teaching Suggestions, a list of Stumbling Blocks for Students, and Additional Problem Suggestions with accompanying solutions.

Solutions Manual: Answers to end-of-chapter Review Questions and Problems have been extracted from the Instructor's Manual and are available here for quick access.

Test Bank: Hundreds of multiple choice and essay questions test students' knowledge of key terms and concepts. All questions have been accuracy checked and are tagged with the corresponding learning objective, level of difficulty, topic, AACSB learning category, and Bloom's taxonomy for easy filtering.

Test Builder in Connect: Available within Connect, Test Builder is a cloud-based tool that enables instructors to format tests that can be printed or administered within an LMS. Test Builder offers a modern, streamlined interface for easy content configuration that matches course needs, without requiring a download.

Test Builder allows you to:

- Access all test bank content from a particular title.
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Test Builder provides a secure interface for better protection of content and allows for just-in-time updates to flow directly into assessments.

PowerPoints: The PowerPoints contain a detailed, chapter-by-chapter review of the important concepts and figures presented in the textbook. You can print, or rearrange the slides to fit the needs of your course.

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BRIEF CONTENTS

PART 1 Introduction

Chapter 1 Thinking Like an Economist 1

Chapter 2 Supply and Demand 23

PART 2 The Theory of Consumer Behavior

Chapter 3 Rational Consumer Choice 51

Chapter 4 Individual and Market Demand 87

Chapter 5 Applications of Rational Choice and Demand Theories 129

Chapter 6 The Economics of Information and Choice under Uncertainty 161

Chapter 7 Departures from Standard Rational Choice Models (With and Without Regret) 203

PART 3 The Theory of Firm and Market Structure

Chapter 8 Production 235

Chapter 9 Costs 265

Chapter 10 Perfect Competition 299

Chapter 11 Monopoly 335

Chapter 12 A Game-Theoretic Approach to Strategic Behavior 373

Chapter 13 Oligopoly and Monopolistic Competition 401

PART 4 Factor Markets

Chapter 14 Labor 431

Chapter 15 Capital 473

PART 5 General Equilibrium and Welfare

Chapter 16 Externalities, Property Rights, and the Coase Theorem 499

Chapter 17 General Equilibrium and Market Efficiency 529

Chapter 18 Government 551

Mc Graw Hill 501-1111

CONTENTS

PART 1 Introduction

Chapter 1 Thinking Like an Economist 1

The Cost-Benefit Approach to Decisions 2

The Role of Economic Theory 3

Common Pitfalls in Decision Making 4

- Pitfall 1. Ignoring Implicit Costs 4
- Pitfall 2. Failing to Ignore Sunk Costs 6
- Pitfall 3. Measuring Costs and Benefits as Proportions Rather Than Absolute Dollar Amounts 9
- Pitfall 4. Failure to Understand the Average-Marginal Distinction 10

Using Marginal Benefit and Marginal Cost Graphically 12

The Invisible Hand 13

Self-Interest and *Homo Economicus* 14

The Economic Naturalist 15

ECONOMIC NATURALIST 1.1 16

ECONOMIC NATURALIST 1.2 16

Should You Think Like an Economist? 17

Microeconomics and Macroeconomics 17

Summary 18 • *Key Terms* 18 • *Review Questions* 18 • *Problems* 19 • *Answers to Self-Texts* 21

Chapter 2 Supply and Demand 23

Chapter Preview 23

Supply and Demand Curves 24

Equilibrium Quantity and Price 27

Adjustment to Equilibrium 28

Some Welfare Properties of Equilibrium 29

Free Markets and The Poor 30

- Rent Controls 32
- Price Supports 34
- The Rationing and Allocative Functions of Prices 35

Determinants of Supply and Demand 36

- Determinants of Demand 36
- Determinants of Supply 37
- Changes in Demand versus Changes in the Quantity Demanded 38
- Predicting and Explaining Changes in Price and Quantity 39

ECONOMIC NATURALIST 2.1 39

The Algebra of Supply and Demand 40

Summary 41 • *Key Terms* 42 • *Review Questions* 42 • *Problems* 43 • *Answers to Self-Tests* 44 • **APPENDIX: How do Taxes Affect Equilibrium Prices and Quantities?** 45 • *Problems* 48 • *Answers to Appendix Self-Tests* 50

PART 2 The Theory of Consumer Behavior

Chapter 3 Rational Consumer Choice 51

Chapter Preview 52

The Opportunity Set or Budget Constraint 52

Budget Shifts Due to Price or Income Changes 54

- Budgets Involving More Than Two Goods 56
- Kinked Budget Constraints 57
- If the Budget Constraint Is the Same, the Decision Should be the Same 58

Consumer Preferences 59

- Indifference Curves 61
- Trade-offs between Goods 64
- Using Indifference Curves to Describe Preferences 65

The Best Feasible Bundle 65

- Corner Solutions 67
- Indifference Curves When There Are More Than Two Goods 69
- An Application of the Rational Choice Model 69

ECONOMIC NATURALIST 3.1 71

Summary 72 • *Key Terms* 72 • *Review Questions* 73 • *Problems* 73 • *Answers to Self-Tests* 75 • **APPENDIX: The Utility Function Approach to the Consumer Budgeting Problem** 77

The Utility Function Approach to Consumer Choice 77

Cardinal Versus Ordinal Utility 81

Generating Indifference Curves Algebraically 83

- Using Calculus to Maximize Utility 83
- The Method of Lagrangian Multipliers 83
- An Alternative Method 85
- A Simplifying Technique 85

Problems 86

Chapter 4 Individual and Market Demand 87

Chapter Preview 87

The Effects of Changes in Price 88

- The Price-Consumption Curve 88
- The Individual Consumer's Demand Curve 89

The Effects of Changes in Income 90
The Income-Consumption Curve 90
The Engel Curve 90
Normal and Inferior Goods 91
The Income and Substitution Effects of a Price Change 92
Giffen Goods 94
Consumer Responsiveness to Changes in Price 97
Market Demand: Aggregating Individual Demand Curves 100
Price Elasticity of Demand 103
A Geometric Interpretation of Price Elasticity 103
The Unit-Free Property of Elasticity 105
Some Representative Elasticity Estimates 105
Elasticity and Total Expenditure 107
Determinants of Price Elasticity of Demand 110
The Dependence of Market Demand on Income 112
ECONOMIC NATURALIST 4.1 115
Application: Forecasting Economic Trends 116
Cross-Price Elasticities of Demand 116
Summary 117 • *Key Terms* 118 • *Review Questions* 119 • *Problems* 119 • *Answers to Self-Tests* 121 • **APPENDIX: Additional Topics in Demand Theory** 123
The Constant Elasticity Demand Curve 123
Segment-Ratio Method 124
The Income-Compensated Demand Curve 126
Answers to Appendix Self-Tests 127

Chapter 5 Applications of Rational Choice and Demand Theories 129

Chapter Preview 129
Using the Rational Choice Model to Answer Policy Questions 130
Application: A Gasoline Tax and Rebate Policy 130
Application: School Vouchers 132
Consumer Surplus 134
Using Demand Curves to Measure Consumer Surplus 134
Application: Two-Part Pricing 136
ECONOMIC NATURALIST 5.1 136
ECONOMIC NATURALIST 5.2 137
Overall Welfare Comparisons 138
Application: The Welfare Effects of Changes in Housing Prices 139
Application: A Bias in the Consumer Price Index 140
Quality Change: Another Bias in the CPI? 142
Using Price Elasticity of Demand 143
Application: The MARTA Fare Increase 143
Application: The Price Elasticity of Demand for Alcohol 144
The Intertemporal Choice Model 145
Intertemporal Consumption Bundles 145
The Intertemporal Budget Constraint 146
Intertemporal Indifference Curves 147
Application: The Permanent Income and Life-Cycle Hypotheses 150
Application: The Social Cost of Carbon 151
Factors Accounting for Differences in Time Preference 154
Summary 155 • *Key Terms* 156 • *Review Questions* 156 • *Problems* 156 • *Answers to Self-Tests* 158

Chapter 6 The Economics of Information and Choice under Uncertainty 161

Chapter Preview 161
The Economics of Information 162
Communication between Potential Adversaries 162
The Costly-to-Fake Principle 163
Product Quality Assurance 163
Choosing a Trustworthy Employee 164
Choosing a Hard-Working, Smart Employee 165
Choosing a Relationship 165
ECONOMIC NATURALIST 6.1 165
Conspicuous Consumption as Ability Signaling 166
ECONOMIC NATURALIST 6.2 166
The Full-Disclosure Principle 167
Product Warranties 168
Regulating the Employment Interviewer 168
The Lemons Principle 169
ECONOMIC NATURALIST 6.3 169
The Stigma of the Newcomer 170
Choice Under Uncertainty 170
Probability and Expected Value 170
The Von Neumann–Morgenstern Expected Utility Model 172
Are Entrepreneurs Risk-Seeking? 179
Insuring Against Bad Outcomes 180
Risk Pooling 180
Adverse Selection 182
ECONOMIC NATURALIST 6.4 183
Moral Hazard 184
Statistical Discrimination 185
Application: Always Self-Insure against Small Losses 186
Can We Insure against Climate Catastrophe 187
Summary 188 • *Key Terms* 188 • *Review Questions* 189 • *Problems* 189 • *Answers to Self-Tests* 191 • **APPENDIX: Search Theory and the Winner's Curse** 193
The Search for High Wages and Low Prices 193
The Winner's Curse 197
Some Pitfalls for the Expected Utility Maximizer 200
Problems 202 • *Answers to Appendix Self-Tests* 202

Chapter 7 Departures from Standard Rational Choice Models (With and Without Regret) 203

Chapter Preview 204
Present Aim and Self-Interest Standards of Rationality 204
An Application of the Present-Aim Standard: Altruistic Preferences 205
The Strategic Role of Preferences 207
How Strategic Preferences Can Help Solve Commitment Problems 208
A Simple Thought Experiment 210
Tastes Not Only *Can* Differ, They *Must* Differ 211
ECONOMIC NATURALIST 7.1 212
Application: Predicting Variations in Voter Turnout 212
Application: Concerns about Fairness 213
The Importance of Tastes 215
Departures from Traditional Rational Choice Models (With Regret) 216
Bounded Rationality 217
The Asymmetric Value Function 218
Sunk Costs 220
Out-of-Pocket Costs Versus Implicit Costs 220
Affective Forecasting Errors 221
Judgmental Heuristics and Biases 223
Availability 223
Representativeness 224
ECONOMIC NATURALIST 7.2 225
Anchoring and Adjustment 226
The Psychophysics of Perception 227
The Difficulty of Actually Deciding 227
ECONOMIC NATURALIST 7.3 229
The Self-Control Pitfall 229
Cognitive Illusions and Public Policy 230
Summary 231 • *Key Term* 232 • *Review Questions* 233 • *Problems* 233 • *Answers to Self-Tests* 234

PART 3 The Theory of Firm and Market Structure

Chapter 8 Production 235

Chapter Preview 235
The Input-Output Relationship, or Production Function 236
Intermediate Products 237
Fixed and Variable Inputs 237
Production in the Short Run 238
ECONOMIC NATURALIST 8.1 239
Total, Marginal, and Average Products 241
The Relationships among Total, Marginal, and Average Product Curves 242
The Practical Significance of the Average-Marginal Distinction 244
Production in the Long Run 247
The Marginal Rate of Technical Substitution 248
Returns to Scale 250
ECONOMIC NATURALIST 8.2 251
Showing Returns to Scale on the Isoquant Map 251
The Distinction between Diminishing Returns and Decreasing Returns to Scale 252
The Logical Puzzle of Decreasing Returns to Scale 252
Summary 253 • *Key Terms* 253 • *Review Questions* 254 • *Problems* 254 • *Answers to Self-Tests* 255 • **APPENDIX: Mathematical Extensions of Production Theory** 257
Application: The Average-Marginal Distinction 257
Isoquant Maps and the Production Mountain 260
Some Examples of Production Functions 261
The Cobb-Douglas Production Function 261
The Leontief, or Fixed-Proportions, Production Function 262
A Mathematical Definition of Returns to Scale 263
Problems 264 • *Answers to Appendix Self-Tests* 264

Chapter 9 Costs 265

Chapter Preview 265
Costs in the Short Run 266
Graphing the Total, Variable, and Fixed Cost Curves 268
Other Short-Run Costs 270
Graphing the Short-Run Average and Marginal Cost Curves 271
Allocating Production Between Two Processes 275
The Relationship Among MP, AP, MC, and AVC 276
Costs in the Long Run 278
Choosing the Optimal Input Combination 278
ECONOMIC NATURALIST 9.1 280
ECONOMIC NATURALIST 9.2 282
ECONOMIC NATURALIST 9.3 283
The Relationship between Optimal Input Choice and Long-Run Costs 283
Long-Run Costs and the Structure of Industry 286
The Relationship between Long-Run and Short-Run Cost Curves 287
Summary 288 • *Key Terms* 289 • *Review Questions* 289 • *Problems* 290 • *Answers to Self-Tests* 291 • **APPENDIX: Mathematical Extensions of the Theory of Costs** 293
The Relationship Between Long-Run and Short-Run Cost Curves 293
The Calculus Approach to Cost Minimization 296
Problems 297 • *Answers to Appendix Self-Test* 298

Chapter 10 Perfect Competition 299

Chapter Preview 299
The Goal of Profit Maximization 300
The Four Conditions for Perfect Competition 303
The Short-Run Condition for Profit Maximization 305
The Shutdown Condition 307
The Short-Run Competitive Industry Supply 308
Short-Run Competitive Equilibrium 310
The Efficiency of Short-Run Competitive Equilibrium 312
Producer Surplus 312
Adjustments in the Long Run 316
The Invisible Hand 318
Application: The Cost of Extraordinary Inputs 319
The Long-Run Competitive Industry Supply Curve 321
Long-Run Supply Curve with U-Shaped LAC Curves 321
Industry Supply when Each LAC Curve is Horizontal 322
How Changing Input Prices Affect Long-Run Supply 322
ECONOMIC NATURALIST 10.1 324
The Elasticity of Supply 325
Applying the Competitive Model 326
Price Supports as a Device for Saving Family Farms 326
The Illusory Attraction of Taxing Business 328
The Adoption of Cost-Saving Innovations 329
ECONOMIC NATURALIST 10.2 330
Summary 330 • *Key Terms* 331 • *Review Questions* 331 • *Problems* 332 • *Answers to Self-Tests* 333

Chapter 11 Monopoly 335

Chapter Preview 335
Defining Monopoly 336
Five Sources of Monopoly 337
Information as a Growing Source of Economies of Scale 340
The Profit-Maximizing Monopolist 341
The Monopolist's Total Revenue Curve 341
Marginal Revenue 343
Marginal Revenue and Elasticity 345
Graphing Marginal Revenue 346
Graphical Interpretation of the Short-Run Profit Maximization Condition 347
A Profit-Maximizing Monopolist Will Never Produce on the Inelastic Portion of the Demand Curve 349
The Profit-Maximizing Markup 349
The Monopolist's Shutdown Condition 349
A Monopolist has No Supply Curve 351
Adjustments in the Long Run 351
Price Discrimination 352
Sale in Different Markets 352
ECONOMIC NATURALIST 11.1 354
ECONOMIC NATURALIST 11.2 355
The Perfectly Discriminating Monopolist 355
Second-Degree Price Discrimination 357
The Hurdle Model of Price Discrimination 357
The Efficiency Loss From Monopoly 359
Public Policy Toward Natural Monopoly 360
1. State Ownership and Management 361
2. State Regulation of Private Monopolies 362
3. Exclusive Contracting for Natural Monopoly 364
4. Vigorous Enforcement of Antitrust Laws 364
5. A Laissez-Faire Policy toward Natural Monopoly 365

Does Monopoly Suppress Innovation? 368
Summary 369 • *Key Terms* 369 • *Review Questions* 369 • *Problems* 370 • *Answers to Self-Tests* 371

Chapter 12 A Game-Theoretic Approach to Strategic Behavior 373

Chapter Preview 373
The Prisoner's Dilemma: An Introduction to the Theory of Games 374
ECONOMIC NATURALIST 12.1 376
The Nash Equilibrium Concept 378
The Maximin Strategy 379
Strategies for Repeated Play in Prisoner's Dilemmas 380
Sequential Games 382
ECONOMIC NATURALIST 12.2 384
ECONOMIC NATURALIST 12.3 386
The Evolution of Strategic Preferences 386
A Parable of Hawks and Doves 386
The Commitment Problem 389
Illustration: The Cheating Problem 390
Summary 395 • *Key Terms* 396 • *Review Questions* 396 • *Problems* 396 • *Answers to Self-Tests* 398

Chapter 13 Oligopoly and Monopolistic Competition 401

Chapter Preview 402
Some Specific Oligopoly Models 402
The Cournot Model 402
The Bertrand Model 405
The Stackelberg Model 406
Comparison of Outcomes 408
Competition When There are Increasing Returns to Scale 409
Monopolistic Competition 411
The Chamberlin Model 411
Chamberlinian Equilibrium in the Short Run 412
Chamberlinian Equilibrium in the Long Run 413
Perfect Competition versus Chamberlinian Monopolistic Competition 414
Criticisms of the Chamberlin Model 415

A Spatial Interpretation of Monopolistic Competition 415
The Optimal Number of Locations 417
ECONOMIC NATURALIST 13.1 420
The Analogy to Product Characteristics 421
Paying for Variety 421
Historical Note: Hotelling's Hot Dog Vendors 424
Which Model Applies? 425
Consumer Preferences and Advertising 425
Summary 426 • *Key Terms* 427 • *Review Questions* 427 • *Problems* 427 • *Answers to Self-Tests* 428

PART 4 Factor Markets

Chapter 14 Labor 431

Chapter Preview 432
The Perfectly Competitive Firm's Demand for Labor 432
Short-Run Demand 432
Long-Run Demand for Labor 433
The Market Demand Curve for Labor 434
An Imperfect Competitor's Demand for Labor 435
The Supply of Labor 436
ECONOMIC NATURALIST 14.1 439
Is Leisure a Giffen Good? 441
The Noneconomist's Reaction to the Labor Supply Model 442
The Market Supply Curve 442
Monopsony 444
Minimum Wage Laws 448
Labor Unions 450
Discrimination in the Labor Market 452
Statistical Discrimination 454
The Internal Wage Structure 457
Winner-Take-All Markets 460
Summary 461 • *Key Terms* 461 • *Review Questions* 462 • *Problems* 462 • *Answers to Self-Tests* 464 • **APPENDIX: The Economics of Workplace Safety** 467
Compensating Wage Differentials: The Case of Safety 467
Safety Choices and Relative Income 471
Problem 472

Chapter 15 Capital 473

Chapter Preview 473
Financial Capital and Real Capital 474
The Demand for Real Capital 474
The Relationship Between the Rental Rate and the Interest Rate 475
The Criterion for Buying a Capital Good 475
Interest Rate Determination 476
Real Versus Nominal Interest Rates 477
The Market for Stocks and Bonds 478
The Efficient Markets Hypothesis 480
ECONOMIC NATURALIST 15.1 482
The Anomaly of the Investment Newsletter 482
Tax Policy and the Capital Market 484
Economic Rent 485
Peak-Load Pricing 486
Exhaustible Resources as Inputs in Production 487
Summary 489 • *Key Terms* 489 • *Review Questions* 490 • *Problems* 490 • *Answers to Self-Tests* 490 • **APPENDIX: A More Detailed Look at Exhaustible Resource Allocation** 491
Natural Resources as Inputs in Production 491
Renewable Resources 491
More on Exhaustible Resources 493
Summary 496 • *Review Question* 496 • *Problems* 496 • *Answer to Appendix Self-Test* 497

PART 5 General Equilibrium and Welfare

Chapter 16 Externalities, Property Rights, and the Coase Theorem 499

Chapter Preview 499
The Reciprocal Nature of Externalities 500
Application: External Effects from Nuclear Power Plants 506
Property Rights 507
Private Property Laws and Their Exceptions 507
ECONOMIC NATURALIST 16.1 507
ECONOMIC NATURALIST 16.2 508
ECONOMIC NATURALIST 16.3 509
ECONOMIC NATURALIST 16.4 510
The Tragedy of the Commons 512
Externalities, Efficiency, and Free Speech 514
Positive Externalities 515
Positional Externalities 516
Limiting the Workweek 517
Savings 518
Workplace Safety 518
Taxing Externalities 519
Carbon Tax or Direct Restrictions on Emissions? 520
Taxing Positional Externalities 522
Summary 523 • *Review Questions* 524 • *Problems* 524 • *Answers to Self-Tests* 528

Chapter 17 General Equilibrium and Market Efficiency 529

Chapter Preview 529
A Simple Exchange Economy 530
Only Relative Prices Are Determined 536

The Invisible Hand Theorem 536
Efficiency in Production 537
Efficiency in Product Mix 539
Gains From International Trade 542
Taxes in General Equilibrium 544
Other Sources of Inefficiency 545
Monopoly 545
Externalities 546
Taxes as a Solution to Externalities and Monopoly 546
Public Goods 546
Summary 547 • *Key Terms* 547 • *Review Questions* 548 • *Problems* 548 • *Answers to Self-Tests* 549

Chapter 18 Government 551
Chapter Preview 552
Public Goods 552
Optimal Quantity of Public Good 553
Paying for Q* 554
Private Provision of Public Goods 555
Funding by Donation 555
Sale of By-Products 556
Development of New Means to Exclude Nonpayers 557
Private Contracts 557
The Economics of Clubs 557
Public Choice 559
Majority Voting 559
Cost-Benefit Analysis 561
Rent Seeking 563
Income Distribution 564
The Rawlsian Critique 565
Reasons for Redistribution 566
Fairness and Efficiency 567
Methods of Redistribution 568
Reprise: Thinking Like an Economist 575
Summary 576 • *Key Terms* 577 • *Review Questions* 577 • *Problems* 577 • *Answers to Self-Tests* 579

Index 581

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1

Thinking Like an Economist

Much of microeconomics entails the study of how people choose under conditions of scarcity. Many people react to this description by saying that the subject is of little real relevance in developed countries, where material scarcity is largely a thing of the past.

This reaction, however, takes too narrow a view of the Greek shipping magnate scarcity, for there are *always* important resources in short supply. At his death, Aristotle Onassis was worth several billion dollars. He had more money than he could possibly spend and used it for such things as finely crafted whale ivory footrests for the barstools on his yacht. And yet he confronted the problem of scarcity much more than most of us will ever have to. Onassis was the victim of *myasthenia gravis,* a debilitating and progressive neurological disease. For him, the scarcity that mattered was not money but time, energy, and the physical skill needed to carry out ordinary activities.

Time is a scarce resource for everyone, not just the terminally ill. In deciding which movies to see, for example, it is time, not the price of admission, that constrains most of us. With only a few free nights available each month, seeing one movie means not being able to see another, or not being able to have dinner with friends.

Time and money are not the only important scarce resources. Consider the economic choice you confront when a friend invites you to a buffet brunch. You must decide how to fill your plate. Even if you are not rich, money would be no object, since you can eat as much as you want for free. Nor is time an obstacle, since you have all afternoon and would enjoy spending it in the company of your friend. The important scarce resource here is the capacity of your stomach. A smorgasbord of your favorite foods lies before you, and you must decide which to eat and in what quantities. Eating another waffle necessarily means having less room for more scrambled eggs. The fact that no money changes hands here does not make your choice any less an economic one.

Every choice involves important elements of scarcity. Sometimes the most relevant scarcity will involve money, but not always. Coping with scarcity is the essence of the human condition. Indeed, were it not for the problem of scarcity, life would be stripped of much of its intensity. For someone with an infinite lifetime and limitless material

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- **LO1** Explain and apply the cost-benefit principle.
- **LO2** Explain the uses and limitations of economic models.
- **LO3** Describe the four common decision pitfalls.
- **LO4** Translate quantitative information about costs and benefits into graphical form.
- **LO5** Describe Adam Smith's invisible hand theory.
- **LO6** Give several clear examples of how basic economic principles can be used to explain patterns of behavior observed in everyday life.
- **LO7** Explain the difference between positive and normative theories.
- **LO8** Explain the difference between microeconomics and macroeconomics.

resources, hardly a single decision would ever matter. If you made a bad decision today, you could always start with a clean slate tomorrow.

In this chapter we examine some basic principles of microeconomic theory and see how an economist might apply them to a wide variety of choices involving scarcity. Later chapters more formally develop the theory. For now, our only goal is to get an intuitive feel for that distinctive mindset known as "thinking like an economist." And the best way to do that is to work through a series of problems familiar from actual experience.

THE COST-BENEFIT APPROACH TO DECISIONS

If the benefit of an activity exceeds its cost, do it.

Many of the choices economists study can be posed as the following question:

Should I do activity x?

For the choice confronting a moviegoer, ". . . do activity x?" might be, for example, ". . . see the new *Star Wars* movie tonight?" For the person attending a buffet brunch, it might be ". . . eat another waffle?" Economists answer such questions by comparing the costs and benefits of doing the activity in question. The decision rule we use is disarmingly simple. If $C(x)$ denotes the costs of doing x and $B(x)$ denotes the benefits, it is:

If $B(x) > C(x)$, do x; otherwise don't.

To apply this rule, we must define and measure costs and benefits. Monetary values are a useful common denominator for this purpose, even when the activity has nothing directly to do with money. We define $B(x)$ as the maximum dollar amount you would be willing to pay to do x. Often $B(x)$ will be a hypothetical magnitude, the amount you would be willing to pay if you had to, even though no money will change hands. $C(x)$, in turn, is the value of all the resources you must give up in order to do x. Here too $C(x)$ need not involve an explicit transfer of money.

For most decisions, at least some of the benefits or costs will not be readily available in monetary terms. To see how we proceed in such cases, consider the following simple decision.

EXAMPLE 1.1 Comparing Costs and Benefits

Should I turn down my stereo?

You have settled into your chair and are listening to a vinyl reissue from your favorite punk rock band when you realize that the next two tracks on the record are ones you dislike. If you had a working remote, you could turn down your stereo for the next two songs. But you don't, and so you must decide whether to get up and turn the music down or stay put and wait it out.

The benefit of turning it down is not having the songs you don't like blare away at you. The cost, in turn, is the inconvenience of getting out of your chair. If you are extremely comfortable and the music is only mildly annoying, you will probably stay put. But if you haven't been settled for long or if the music is really bothersome, you are more likely to get up.

Even for simple decisions like this one, it is possible to translate the relevant costs and benefits into a monetary framework. Consider first the cost of getting out of your chair. If someone offered you 1 cent to get up out of a comfortable chair and there were no reason other than the penny to do it, would you take the offer? Most people would not. But if someone offered you $1,000, you would be on your feet in an instant. Somewhere between 1 cent and $1,000 lies your **reservation price,** the minimum amount it would take to get you out of the chair.

reservation price of activity *x* the price at which a person would be indifferent between doing x and not doing x.

To see where the threshold lies, imagine a mental auction with yourself in which you keep boosting the offer by small increments from 1 cent until you reach the

point at which it is barely worthwhile to get up. Where this point occurs will obviously depend on circumstance. If you are rich, it will tend to be higher than if you are poor, because a given amount of money will seem less important; if you feel energetic, it will be lower than if you feel tired; and so on. For the sake of discussion, suppose your reservation price for getting out of the chair turns out to be $1. You can conduct a similar mental auction to determine the maximum sum you would be willing to pay someone to turn the music down. This reservation price measures the benefits of turning the music down; let's suppose it turns out to be 75 cents.

In terms of our formal decision rule, we then have x = "turn my stereo down," with $B(x) = \$0.75 < C(x) = \$1$, which means that you should remain in your chair. Listening to the next two songs will be unpleasant, but less so than getting up would be. A reversal of these cost and benefit figures would imply a decision to get up and turn the music down. If $B(x)$ and $C(x)$ happened to be equal, you would be indifferent between the two alternatives.

Claudia Veja/Moment Select/Getty Images

Is it worth the trouble to turn down your stereo?

THE ROLE OF ECONOMIC THEORY

The idea that anyone might actually calculate the costs and benefits of turning down a stereo may sound absurd. Economists have been criticized for making unrealistic assumptions about how people behave, and outsiders are quick to wonder what purpose is served by the image of a person trying to decide how much he would pay to avoid getting up from his chair.

There are two responses to this criticism. The first is that economists don't assume that people make such calculations explicitly. Rather, many economists argue, we can make useful predictions by assuming people act *as if* they made such calculations. This view was forcefully expressed by Nobel laureate Milton Friedman, who illustrated his point by looking at the techniques expert pool players use.[1] He argued that the shots they choose, and the specific ways they attempt to make them, can be predicted extremely well by assuming that players take careful account of all the relevant laws of Newtonian physics. Of course, few expert pool players have had formal training in physics, and hardly any can recite such laws as "the angle of incidence equals the angle of reflection." Nor

[1]Milton Friedman, "The Methodology of Positive Economics," *Essays in Positive Economics,* Chicago: University of Chicago Press, 1953.

People don't always behave as predicted by economic models, but the models provide useful insights about how to achieve important goals.

are they likely to know the definitions of "elastic collisions" and "angular momentum." Even so, Friedman argued, they would never have become expert players in the first place *unless* they played as dictated by the laws of physics. Our theory of pool player behavior assumes, unrealistically, that players know the laws of physics. Friedman urged us to judge this theory not by how accurate its central assumption is but by how well it predicts behavior. And on this score, it performs very well indeed.

Like pool players, we must also develop skills for coping with our environments. Many economists, Friedman among them, believe that useful insights into our behavior can be gained by assuming that we act as if governed by the rules of rational decision making. By trial and error we eventually absorb these rules, just as pool players absorb the laws of physics.

A second response to the charge that economists make unrealistic assumptions is to concede that behavior does often differ from the predictions of economic models. Thus, as economist Richard Thaler puts it, we often behave more like novice than expert pool players—ignoring bank shots and having no idea about putting the proper spin on the cue ball to position it for the next shot. Considerable evidence supports this second view.

Taka Wu/Alamy Stock Photo

Professional pool champion Shane Van Boening may not know all the formal laws of Newtonian physics, but the quality of his play suggests that he has a deep understanding of them.

But even where economic models fail on descriptive grounds, they often provide useful guidance for decisions. That is, even if they don't always predict how we *do* behave, they may often give useful insights into how to achieve our goals more efficiently. If novice pool players have not yet internalized the relevant physical laws, they may nonetheless consult those laws for guidance about how to improve. Economic models often play an analogous role with respect to ordinary consumer and business decisions. Indeed, this role alone provides a compelling reason for learning economics.

COMMON PITFALLS IN DECISION MAKING

Some economists are embarrassed if an outsider points out that much of what they do boils down to an application of the principle that we should perform an action if and only if its benefits exceed its costs. That just doesn't sound like enough to keep a person with a PhD busy all day! There is more to it, however, than meets the eye. People who study economics quickly discover that measuring costs and benefits is as much an art as a science. Some costs seem almost deliberately hidden from view. Others may seem relevant but, on a closer look, turn out not to be.

Economics teaches us how to identify the costs and benefits that really matter. An important goal of this book is to teach you to become a better decision maker. A good starting point is to examine some common pitfalls in decision making. The relevant economic principles are simple and commonsensical, but many people ignore them.

Pitfall 1. Ignoring Implicit Costs

opportunity cost of activity the value of all that must be sacrificed to do the activity.

One pitfall is to overlook costs that are not explicit. If doing activity x means not being able to do activity y, then the value to you of doing y (had you done it) is an **opportunity cost** of doing x. Many people make bad decisions because they tend to ignore the value of such forgone opportunities. This insight suggests that it will almost always be instructive to translate questions such as "Should I do x?" into ones such as "Should I do x or y?" In the latter question, y is simply the most highly valued alternative to doing x. Example 1.2 helps drive this important point home.

EXAMPLE 1.2 Implicit Cost

Should I go skiing today or work as a research assistant?

There is a ski area near your campus. From experience you know that a day on the slopes is worth $60 to you. The charge for the day is $40 (which includes bus fare, lift ticket, and equipment). However, this is not the only cost of going skiing. You

must also take into account the value of the most attractive alternative you will forgo by heading for the slopes. Suppose the best alternative is your new job as a professor's research assistant. The job pays $45 per day, and you like it just well enough to be willing to do it for free. The question you face is, "Should I go skiing or work as a research assistant?"

Here the cost of skiing is not just the explicit cost of the ski package ($40) but also the opportunity cost of the lost earnings ($45). The total costs are therefore $85, which exceeds the benefits of $60. Since $C(x) > B(x)$, you should stay on campus and work for your professor. Someone who ignored the opportunity cost of the forgone earnings would decide incorrectly to go skiing.

The fact that you liked the research job just well enough to have been willing to do it for free is another way of saying there were no psychic costs associated with doing it. This is important because it means that by not doing the job you would not have been escaping something unpleasant. Of course, not all jobs fall into this category. Suppose instead that your job is to scrape plates in the dining hall for the same pay, $45/day, and that the job is so unpleasant that you would be unwilling to do it for less than $30/day. Assuming your manager at the dining hall permits you to take a day off whenever you want, let's now reconsider your decision about whether to go skiing.

EXAMPLE 1.3 Costs and Benefits Are Reciprocal

Should I go skiing today or scrape plates?

There are two equivalent ways of looking at this decision. One is to say that one benefit of going skiing is not having to scrape plates. Since you would never be willing to scrape plates for less than $30/day, avoiding that task is worth that amount to you. Going skiing thus carries the indirect benefit of not scraping plates. When we add that indirect benefit to the $60 direct benefit of the skiing, we get $B(x) = \$90$. In this view of the problem, $C(x)$ is the same as before, namely, the $40 ski charge plus the $45 opportunity cost of the lost earnings, or $85. So now $B(x) > C(x)$, which means you should go skiing.

Alternatively, we could have viewed the unpleasantness of the plate-scraping job as an offset against its salary. By this approach, we would subtract $30/day from your $45/day earnings and say that the opportunity cost of not working is only $15/day. Then $C(x) = \$40 + \$15 = \$55 < B(x) = \$60$, and again the conclusion is that you should go skiing.

It makes no difference in which of these two ways you handle the valuation of the unpleasantness of scraping plates. It is critically important, however, that you do it either one way or the other. Don't count it twice!

As Example 1.3 makes clear, costs and benefits are reciprocal. Not incurring a cost is the same as getting a benefit. By the same token, not getting a benefit is the same as incurring a cost.

Obvious as this sounds, it is often overlooked. A case in point was a foreign graduate student who got her degree some years ago and was about to return to her home country. The trade regulations of her nation permitted people returning from abroad to bring back a new automobile without having to pay the normal 50 percent tariff. The student's father-in-law asked her to bring him back a new $20,000 Chevrolet and sent her a check for exactly that amount. This put the student in a quandary. She had been planning to bring back a Chevrolet and sell it in her home country. Because, as noted, new cars normally face a 50 percent import tax, such a car would sell at a dealership there for $30,000. The

EXAMPLE 1.4 Opportunity Cost

Why do most students start college right after finishing high school?

Should I work first or go to college first?

College costs are not limited to tuition, fees, supplies, housing, food—or their equivalent in future loan payments. They also include the opportunity cost of earnings forgone while studying. Earnings increase with experience. Thus the more experience you have, the more income you must forgo to attend college. This opportunity cost is therefore lowest when you are right out of high school.

On the benefit side, one big gain of a college education is sharply higher earnings. The sooner you graduate, the longer you will reap this benefit. Another benefit is the pleasantness of going to college as opposed to working. In general, the kinds of jobs people hold tend to be less unpleasant (or more pleasant) the more education they have. By going to college right away, you thus avoid having to work at the least pleasant jobs. For most people, then, it makes sense to go to college first and work afterward. Certainly it makes more sense to attend college at age 20 than at age 50.

A common exception involves people who are too immature right out of high school to reap the benefits of college work, who often do better by working a year or two before college.

student estimated that she could easily sell it privately for $28,000, which would net her an $8,000 gain. Thus the opportunity cost of giving the car to her father-in-law for $20,000 was going to be $8,000! Not getting this big benefit was a big cost. In the end, it was one the student elected to bear because she valued keeping peace in the family even more. As the cost-benefit principle makes clear, the best decision is not always the one that leaves you with the most money in your pocket.

Example 1.4 is a perfect illustration of Friedman's argument about how to evaluate a theory. High school seniors don't decide when to attend college on the basis of sophisticated calculations involving opportunity costs. On the contrary, most start right out of high school simply because that is what most of their peers do. It is the thing to do.

But this begs the question of how it got to *be* the thing to do. Customs do not originate out of thin air. A host of different societies have had centuries to experiment with this decision. If there were a significantly better way of arranging the learning and working periods of life, some society should have long since discovered it. Our current custom has survived because it is efficient. People may not make explicit calculations about the opportunity cost of forgone earnings, but they often behave *as if* they do.[2]

As simple as the opportunity cost concept is, it is one of the most important in microeconomics. The art in applying the concept correctly lies in being able to recognize the most valuable alternative that is sacrificed by the pursuit of a given activity.

Pitfall 2. Failing to Ignore Sunk Costs

An opportunity cost may not seem to be a relevant cost when in reality it is. On the other hand, sometimes an expenditure may seem relevant when in reality it is not. Such is often the case with *sunk costs,* costs that are beyond recovery at the moment a decision is made.

[2]This does not mean that all customs necessarily promote efficiency. For example, circumstances may have changed in such a way that a custom that promoted efficiency in the past no longer does so. In time, such a custom might change. Yet many habits and customs, once firmly entrenched, are very slow to change.

EXAMPLE 1.5 Sunk Cost (Part 1)

Should I drive to Boston or take the bus?

You are planning a 250-mile trip to Boston. Except for the cost, you are completely indifferent between driving and taking the bus. Bus fare is $100. You don't know how much it would cost to drive your car, so you call Budget for an estimate. Budget tells you that for your make of car the costs of a typical 10,000-mile driving year are as follows:

Insurance	$1,000
Interest	2,000
Fuel & Oil	1,000
Maintenance	1,000
Total	$5,000

If a cost has already been incurred and cannot be recovered, it is irrelevant for all decisions about the future.

Suppose you calculate that these costs come to $0.50/mile and use this figure to compute that the 250-mile trip will cost you $125 by car. And since this is more than the $100 bus fare, you decide to take the bus.

If you decide in this fashion, you fall victim to the sunk cost pitfall. Insurance and interest payments do not vary with the number of miles you drive each year. Both are sunk costs and will be the same whether or not you drive to Boston. Of the costs listed, fuel and oil and maintenance are the only ones that vary with miles driven. These come to $2,000 for each 10,000 miles you drive, or $0.20/mile. At $0.20/mile, it costs you only $50 to drive to Boston, and since this is less than the bus fare, you should drive.

Unlike opportunity costs, these costs *should be* ignored. Not ignoring them is a second pitfall in decision making. The principle of ignoring sunk costs emerges clearly in the following example.

In Example 1.5, note the role of the assumption that, costs aside, you are indifferent between the two modes of transport. If you had preferred one mode to the other, we would also have had to weigh that preference. For example, if you were willing to pay $60 to avoid the hassle of driving, the real cost of driving would be $110, not $50, and you should take the bus.

Self-Test questions, such as the one below, are sprinkled throughout the text to help you make sure that you understand important analytical concepts. You will master microeconomics more effectively if you do these exercises as you go along.

SELF-TEST 1.1

How, if at all, would your answer to the question in Example 1.5 be different if the worth of avoiding the hassle of driving is $20 and you average one $28 traffic ticket for every 200 miles you drive?

As a check, the answers to the in-chapter self-test questions are at the end of each chapter. Naturally, the self-tests will be much more useful if you work through them before consulting the answers.

Although our cost-benefit decision rule fails the test of prediction in this experiment, its message for the rational decision maker stands unchallenged. The two groups logically *should* have behaved the same. The only difference between them, after all, is that patrons in the refund group have lifetime incomes that are $5 higher than the others'. Such a

EXAMPLE 1.6 Sunk Cost (Part 2)

The pizza experiment.

A local pizza parlor offers an all-you-can-eat lunch for $5. You pay at the door, then the waiter brings you as many slices of pizza as you like. A former colleague performed this experiment: An assistant served as the waiter for one group of tables.[3] The "waiter" selected half the tables at random and gave everyone at those tables a $5 refund before taking orders. Diners at the remaining tables got no refund. He then kept careful count of the number of slices of pizza each diner ate. What difference, if any, do you predict in the amounts eaten by these two groups?

Eating additional food just to get your money's worth is not a sensible decision strategy.

Diners in each group confront the question "Should I eat another slice of pizza?" Here, the activity x consists of eating one more slice. For both groups, $C(x)$ is exactly zero: Even members of the group that did not get a refund can get as many additional slices as they want at no extra charge. Because the refund group was chosen at random, there is no reason to suppose that its members like pizza any more or less than the others. For everyone, the decision rule says keep eating until there is no longer any extra pleasure in eating another slice. Thus, $B(x)$ should be the same for each group, and people from both groups should keep eating until $B(x)$ falls to zero.

By this reasoning, the two groups should eat the same amount of pizza, on the average. The $5 admission fee is a sunk cost and should have no influence on the amount of pizza one eats. *In fact, however, the group that did not get the refund consumed substantially more pizza.*

trivial difference should have no effect on pizza consumption. Members of the no-refund group seemed to want to make sure they "got their money's worth." In all likelihood, however, this motive merely led them to overeat.[4]

What's wrong with being motivated to "get your money's worth"? Absolutely nothing, as long as the force of this motive operates *before* you enter into transactions. Thus it makes perfectly good sense to be led by this motive to choose one restaurant over an otherwise identical competitor that happens to cost more. Once the price of your lunch has been determined, however, the get-your-money's-worth motive should be abandoned. The satisfaction you get from eating another slice of pizza should then depend only on how hungry you are and on how much you like pizza, not on how much you paid. Yet people often seem not to behave in this fashion. The difficulty may be that we are not creatures of complete flexibility. Perhaps motives that make sense in one context are not easily abandoned in another.

SELF-TEST 1.2

Jim wins a ticket from a radio station to see a jazz band perform at an outdoor concert. Mike has paid $18 for a ticket to the same concert. On the evening of the concert there is a tremendous thunderstorm. If Jim and Mike have the same tastes, which of them will be more likely to attend the concert, assuming that each decides on the basis of a standard cost-benefit comparison?

[3]See Richard Thaler, "Toward a Positive Theory of Consumer Choice," *Journal of Economic Behavior and Organization* 1, 1980.

[4]An alternative to the "get-your-money's-worth" explanation is that $5 is a significant fraction of the amount of cash many diners have available to spend *in the short run.* Thus members of the refund group might have held back in order to save room for the dessert they could now afford to buy. To test this alternative explanation, the experimenter could give members of the no-refund group a $5 cash gift earlier in the day and then see if the amount of pizza consumed by the two groups still differed.

Pitfall 3. Measuring Costs and Benefits as Proportions Rather Than Absolute Dollar Amounts

When a boy asks his mother "Are we almost there yet?" how will she answer if they are 10 miles from their destination? Without some knowledge of the context of their journey, we cannot say. If they are near the end of a 300-mile journey, her answer will almost surely be yes. But if they have just embarked on a 12-mile journey, she will say no.

Contextual clues are important for a variety of ordinary judgments. Thinking about distance as a percentage of the total amount to be traveled is natural and informative. Many also find it natural to think in percentage terms when comparing costs and benefits. But as the following pair of simple examples illustrates, this tendency often causes trouble.

EXAMPLE 1.7 Comparing Costs and Benefits (Part 1)

Should you drive to Walmart to save $10 on a $40 upgrade to your stereo?

You are about to spend $40 for a Bluetooth adapter for your vintage stereo at the nearby campus store when a friend tells you that the very same adapter is on sale at Walmart for only $20. If Walmart is a 15-minute drive away, where would you buy the adapter? (No matter where you bought it, you must send it to the manufacturer for repairs, if it fails under warranty.)

EXAMPLE 1.8 Comparing Costs and Benefits (Part 2)

Should you drive downtown to save $20 on a $1,000 smart TV?

You are about to buy a new TV with the latest wireless interface at the nearby campus store for $1,020 when a friend tells you that the very same set is on sale at Walmart for only $1,000. If Walmart is a 15-minute drive away, where would you buy the television? (Again, repairs under warranty would entail sending the set to the manufacturer in each case.)

There is no uniquely correct answer to either of these questions, both of which ask whether the benefit of driving to Walmart is worth the cost. Most people say the trip would definitely be worth making for the Bluetooth adapter, but definitely not worth making for the TV. When pressed to explain, they say driving yields a 50 percent savings on the adapter but only a 2-percent savings on the TV.

These percentages, however, are irrelevant. In each case the benefit of driving to Walmart is exactly the $20 savings from the lower purchase price. What's the cost of driving to Walmart? Some might be willing to make the drive for as little as $5, while others might not be willing to do it for less than $50. But whatever the number, it should be the same in both cases. So your answers to the questions just posed should be the same. If you would be willing to make the drive for, say, $8, then you should buy both the adapter and TV at Walmart. But if your reservation price for making the drive is, say, $25, then you should buy both appliances at the nearby campus store.

When comparing costs and benefits, always use absolute dollar amounts, not proportions.

When using the cost-benefit test, you should express costs and benefits in absolute dollar terms. Comparing percentages is not a fruitful way to think about decisions like these.