

# MICROECONOMICS

ROGER A. ARNOLD

Thirteenth Edition

Dear Student,

Economics has a way of opening up our eyes to what we couldn't see before.

Although other subjects are capable of providing an understanding of the world, economics is special because so much of the everyday world in which you live, which includes buying and selling; getting a job and an income; paying your rent; taking out a mortgage; getting an education; and understanding economic growth, inflation, unemployment, and the ups and downs of the economy, becomes more clear once you know economics. Economics helps us to understand the everyday world. If there is such a thing as the "real world," then it is the real world to which economics addresses itself.

Economics also has the ability to answer many of our questions: What causes some nations to be rich and others poor? Why is a car's price \$35,000 instead of \$25,000? What is the efficient time to read, play tennis, or sleep? How do firms decide what quantity of a good to produce and what price to charge? What causes interest rates to rise or fall? What determines the prices you pay, the income you earn, or whether you are employed or unemployed?

Is it worth learning economics? Yes, without a doubt. But learning economics doesn't come without effort. First, you can't read an economics textbook the way you read a novel. You have to think and study while you read the text. To aid you in this endeavor, let's take a moment to tell you how this book is set up.

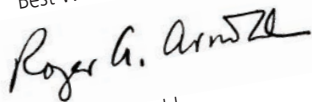
There are three major parts of the book that you should be aware of before you start to read and study. First, there is the main content of the book that includes the words and diagrams in each chapter. It is the "meat and potatoes" of the economics course. You need to read this material more than once. When it comes to learning the economics contained in the diagrams, go slowly. Look at a curve in the diagram and tell yourself what it says; each diagram tells a story. Learn to tell yourself this story as you go through each diagram.

Second, there are various boxed and stand-alone features in each chapter, such as *Economics 24/7*, *Thinking Like an Economist*, *Office Hours*, *Finding Economics*, *Hear What and How the Economist Thinks*, and *Does It Matter to You?* The features step away from the meat and potatoes of the text, and apply what has been learned. Applying what you know is an extremely important part of learning economics. Therefore, the boxed and stand-alone features are not peripheral to the main material and should not be ignored. The features are the material in different form.

Third, there are numerous instructional videos that go with this book. *Video Office Hours* takes the material in each chapter and goes over key topics, much the way your instructor might do in class. *Video Questions and Problems* addresses questions and solves problems step-by-step, and can be a valuable resource for you when working through similar assignments. *Working with Diagrams* builds, explains, and works with many of the exhibits in the text and can help you learn to tell the story of the diagram, frame by frame. *What Is Wrong With This Diagram?* helps you to learn the language of diagrams by asking you if you can figure out what is wrong with the way a particular diagram is specified.

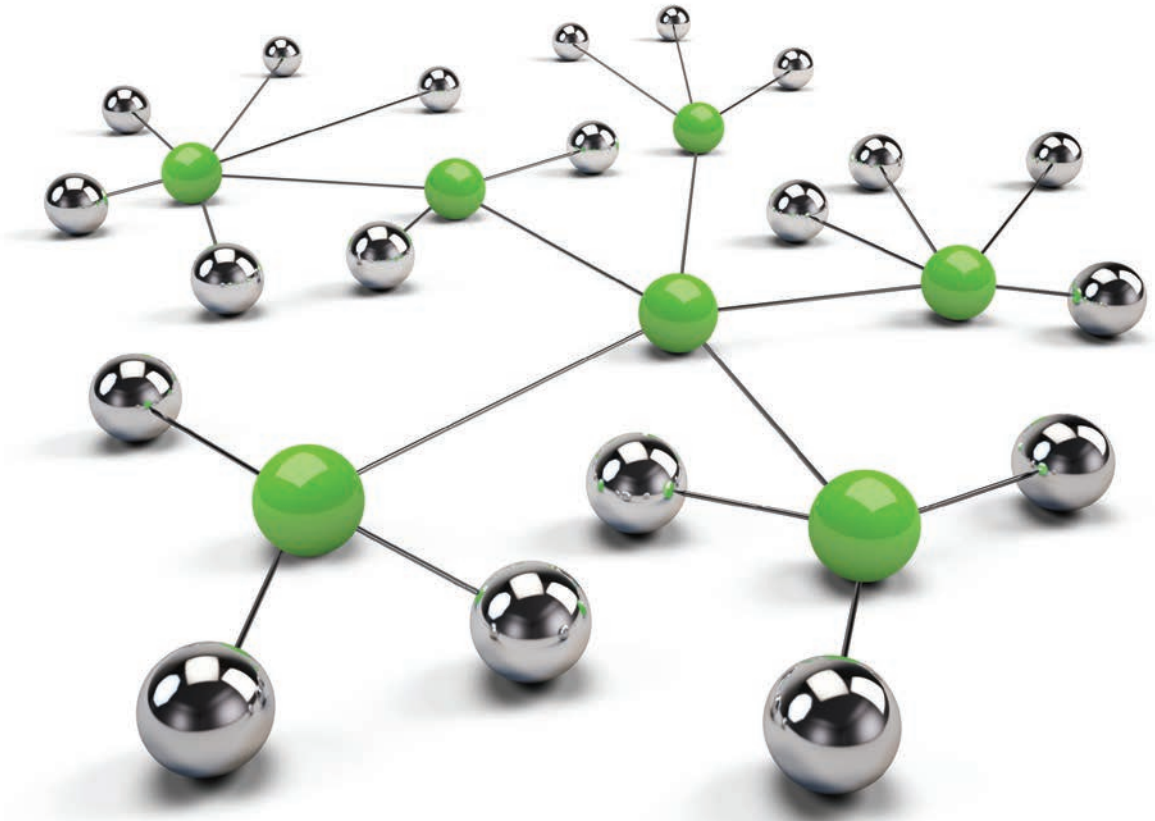
As you proceed on your economics journey, keep in mind that it takes sustained effort—and some dedicated patience—to learn economics. As you will soon find out, the effort is well worth it. The best of luck to you as you begin your study of economics.

Best Wishes,



Roger A. Arnold





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Thirteenth Edition

**Roger A. Arnold**

California State University  
San Marcos



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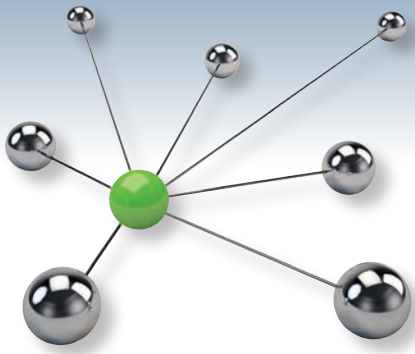
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*To Sheila, Daniel, and David*



# BRIEF CONTENTS

## AN INTRODUCTION TO ECONOMICS

### Part 1 Economics: The Science of Scarcity

- Chapter 1** What Economics is About 1
- Appendix A** Working with Diagrams 25
- Appendix B** Should You Major in Economics? 34
- Chapter 2** Production Possibilities Frontier Framework 41
- Chapter 3** Supply and Demand: Theory 59
- Chapter 4** Prices: Free, Controlled, and Relative 95
- Chapter 5** Supply, Demand, and Price: Applications 116

## MICROECONOMICS

### Part 2 Microeconomic Fundamentals

- Chapter 6** Elasticity 138
- Chapter 7** Consumer Choice: Maximizing Utility and Behavioral Economics 168
- Appendix C** Budget Constraint and Indifference Curve Analysis 192
- Chapter 8** Production and Costs 200

### Part 3 Product Markets and Policies

- Chapter 9** Perfect Competition 234
- Chapter 10** Monopoly 264
- Chapter 11** Monopolistic Competition, Oligopoly, and Game Theory 287
- Chapter 12** Government and Product Markets: Antitrust and Regulation 309

### Part 4 Factor Markets and Related Issues

- Chapter 13** Factor Markets: With Emphasis on the Labor Market 329
- Chapter 14** Wages, Unions, and Labor 354
- Chapter 15** The Distribution of Income and Poverty 371
- Chapter 16** Interest, Rent, and Profit 388

### Part 5 Market Failure, Public Choice, and Special-Interest Group Politics

- Chapter 17** Market Failure: Externalities, Public Goods, and Asymmetric Information 408
- Chapter 18** Public Choice and Special-Interest Group Politics 437

### Part 6 Economic Theory-Building and Everyday Life

- Chapter 19** Building Theories to Explain Everyday Life: From Observations to Questions to Theories to Predictions 458

## THE GLOBAL ECONOMY

### Part 7 International Economics and Globalization

- Chapter 20** International Trade 484
- Chapter 21** International Finance 503

## WEB CHAPTERS

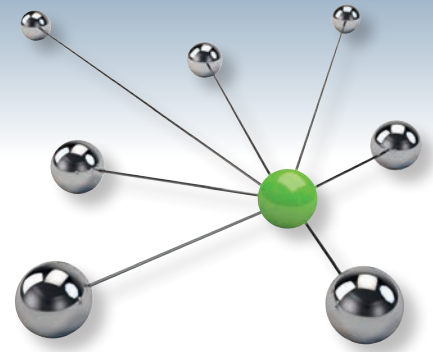
- Chapter 22** The Economic Case For and Against Government: Five Topics Considered 522
- Chapter 23** Stocks, Bonds, Futures, and Options 541

**Self-Test Appendix** 522

**Glossary** 540

**Index** 547

# CONTENTS



## AN INTRODUCTION TO ECONOMICS

### Part 1 Economics: The Science of Scarcity

#### ECONOMICS 24/7

Rationing Spots at Yale 5

When Is It Too Costly to Attend College? 8

Can Incentives Make You Smarter? 12

Why Didn't I Think of That? The Case of Uber and Airbnb 15



"I Don't Believe That Every Time a Person Does Something, He Compares the Marginal Benefits and Costs" 21

#### CHAPTER 1: WHAT ECONOMICS IS ABOUT 1

**Your Life, 2019–2029 1**

**A Definition of Economics 2**

Goods and Bads 2 Resources 2 Scarcity and a Definition of Economics 2

**Key Concepts in Economics 4**

Opportunity Cost 4 Opportunity Cost and Behavior 6 Benefits and Costs 6  
Decisions Made at the Margin 7 Efficiency 9

**Does It Matter to You . . . If You Are Efficient or Not? 11**

Economics Is About Incentives 12 Unintended Effects 13 Exchange 14

**Ceteris Paribus and Theory 16**

*Ceteris Paribus* Thinking 16 What Is a Theory? 17

**Hear What and How the Economist Thinks . . . About Theories 19**

**Economic Categories 20**

Positive Economics and Normative Economics 20 Microeconomics and  
Macroeconomics 20

**Chapter Summary 22**

**Key Terms and Concepts 23**

**Questions and Problems 23**

**Working with Numbers and Graphs 24**

#### APPENDIX A: WORKING WITH DIAGRAMS 25

**Slope of a Line 26**

**Slope of a Line Is Constant 27**

**Slope of a Curve 27**

**The 45-Degree Line 27**

**Pie Charts 29**

**Bar Graphs 29**

**Line Graphs 30**

**Appendix Summary 32**

**Key Terms and Concepts 32**

**Questions and Problems 32**



## ECONOMICS 24/7

Deducing Where Sherlock Holmes Was on His Production Possibilities Frontier? 46

Studying and Your PPF 50



“What Purpose Does the PPF Serve?” 55

## ECONOMICS 24/7

What Do the Following Have in Common? Losing One’s Temper, Arriving to Class Late, and Buying the Textbook for a Class 62

Are You Buying More Than You Want to Buy? 85

“Sorry, But This Flight Has Been Overbooked” 89



“I Thought Prices Equaled Costs Plus 10 Percent” 90

## APPENDIX B: SHOULD YOU MAJOR IN ECONOMICS? 34

Five Myths About Economics and Being an Economics Major 35

What Awaits You as an Economics Major? 37

What Do Economists Do? 38

Places to Find More Information 40

Concluding Remarks 40

## CHAPTER 2: PRODUCTION POSSIBILITIES FRONTIER FRAMEWORK 41

The Production Possibilities Frontier 41

The Straight-Line PPF: Constant Opportunity Costs 41 The Bowed-Outward (Concave-Downward) PPF: Increasing Opportunity Costs 42

Does It Matter to You . . . *If the Economy Is at One Point on the PPF Instead of Another?* 44

Law of Increasing Opportunity Costs 45 Economic Concepts in a *Production Possibilities Frontier* Framework 46

Specialization and Trade Can Move Us Beyond Our PPF 51

A Simple Two-Person PPF Model 51 On or Beyond the PPF? 52

Hear What and How the Economist Thinks . . . *About Manufacturing Jobs* 53

Chapter Summary 56

Key Terms and Concepts 57

Questions and Problems 57

Working with Numbers and Graphs 57

## CHAPTER 3: SUPPLY AND DEMAND: THEORY 59

What Is Demand? 59

The Law of Demand 60 Four Ways to Represent the Law of Demand 60 Why Does Quantity Demanded Go Down as Price Goes Up? 61 Individual Demand Curve and Market Demand Curve 62 A Change in Quantity Demanded Versus a Change in Demand 63 What Factors Cause the Demand Curve to Shift? 66 Movement Factors and Shift Factors 68

Supply 69

The Law of Supply 69 Why Most Supply Curves Are Upward Sloping 70 Changes in Supply Mean Shifts in Supply Curves 72 What Factors Cause the Supply Curve to Shift? 72 A Change in Supply Versus a Change in Quantity Supplied 74

The Market: Putting Supply and Demand Together 75

Supply and Demand at Work at an Auction 75 The Language of Supply and Demand: A Few Important Terms 76 Moving to Equilibrium: What Happens to Price When There Is a Surplus or a Shortage? 76 Speed of Moving to Equilibrium 76

Hear What and How the Economist Thinks . . . *About Higher Prices and Buying More* 78

Moving to Equilibrium: Maximum and Minimum Prices 79 The Connection Between Equilibrium and Predictions 80 Equilibrium in Terms of Consumers’ and Producers’ Surplus 81

Does It Matter to You . . . *If You Pay Equilibrium Prices or Not?* 83

What Can Change Equilibrium Price and Quantity? 83 It Is Important to Know Why the Price Changed: Back to Substitutes and Complements 86 Epilogue: Who Feeds Cleveland? 87

## ECONOMICS 24/7

A Price Ceiling in the  
Kidney Market 100

1973 and 1979 101

What Does Price Have to  
Do with Being Late to  
Class? 108

Obesity and a Soda  
Tax 111



"I Thought Price Ceilings  
Were Good for Consumers"  
113



"Doesn't High Demand  
Mean High Quantity  
Demanded?" 134

**Chapter Summary** 91  
**Key Terms and Concepts** 91  
**Questions and Problems** 92  
**Working with Numbers and Graphs** 93

## CHAPTER 4: PRICES: FREE, CONTROLLED, AND RELATIVE 95

### Price 95

Price as a Rationing Device 95 Price as a Transmitter of Information 96

### Price Controls 97

Price Ceiling 97

### Hear What and How the Economist Thinks . . . *About Price Ceilings and the Value of Money* 102

Price Floor: Definition and Effects 103

### Does It Matter to You . . . *If the Demand Curve for Unskilled Labor Is Steep or Not?* 105

### Two Prices: Absolute and Relative 109

Absolute (Money) Price and Relative Price 109 Taxes on Specific Goods and Relative Price Changes 110

### Does It Matter to You . . . *If Something You Buy Is Taxed or Subsidized?* 112

### Chapter Summary 114

### Key Terms and Concepts 114

### Questions and Problems 114

### Working with Numbers and Graphs 115

## CHAPTER 5: SUPPLY, DEMAND, AND PRICE: APPLICATIONS 116

### Application 1: U-Haul Rates and Demand 116

### Application 2: Subsidizing the Consumption of Anything Can Raise its Price 117

### Application 3: 10 a.m. Classes in College 119

### Application 4: Why Do Colleges Use GPAs, ACTs, and SATs for Purposes of Admission? 121

### Application 5: Why is Medical Care So Expensive? 122

### Application 6: Do You Pay for Good Weather? 124

### Application 7: The Price of an Aisle Seat 126

### Application 8: College Superathletes 127

### Application 9: Easier-to-Obtain Loans and Higher Housing Prices 129

### Application 10: Speculators, Price Variability, and Patterns 130

### Application 11: Supply and Demand on a Freeway 131

### Application 12: Are Renters Better Off? 132

### Chapter Summary 135

### Questions and Problems 136

### Working with Numbers and Graphs 137

# MICROECONOMICS

## Part 2 Microeconomic Fundamentals

### ECONOMICS 24/7

Drug Busts and Crime 145

Elasticity and the Issue of  
"How Much" 147

When Is a Half-Packed  
Auditorium Better Than a  
Packed One? 148

Price Elasticity of Demand  
and Health Care 151

Tuition Hikes at the College  
or University 152

House Prices and the  
Elasticity of Supply 159



### OFFICE HOURS

"What Is the Relationship  
Between Different Price  
Elasticities of Demand  
and Total Revenue?" 164

### ECONOMICS 24/7

The Gym and Diminishing  
Marginal Utility 172

How You Pay for Good  
Weather 176

\$800 for Sure or \$1,000  
with a Probability of 85  
percent? An Experiment 179

\$40 and Two People: The  
Ultimatum Game 185



### OFFICE HOURS

"Is There an Indirect  
Way of Proving the Law  
of Diminishing Marginal  
Utility?" 188

## CHAPTER 6: ELASTICITY 138

### Elasticity: Part 1 138

Price Elasticity of Demand 138 Elasticity Is Not Slope 140 From Perfectly Elastic to  
Perfectly Inelastic Demand 140 Price Elasticity of Demand and Total Revenue (Total  
Expenditure) 143 Elastic Demand and Total Revenue 144

### Elasticity: Part 2 149

Price Elasticity of Demand Along a Straight-Line Demand Curve 149 Determinants of  
Price Elasticity of Demand 150

### Hear What and How the Economist Thinks . . . *About the Prevalence of Elasticity* 153

#### Other Elasticity Concepts 154

Cross Elasticity of Demand 154 Income Elasticity of Demand 155 Price Elasticity  
of Supply 156 Price Elasticity of Supply and Time 157

#### The Relationship Between Taxes and Elasticity 160

Who Pays the Tax? 160 Elasticity and the Tax 161

#### Does It Matter to You . . . *If There Are Few or Many Substitutes for the Goods You Buy?* 162

Degree of Elasticity and Tax Revenue 163

#### Chapter Summary 165

#### Key Terms and Concepts 166

#### Questions and Problems 166

#### Working with Numbers and Graphs 167

## CHAPTER 7: CONSUMER CHOICE: MAXIMIZING UTILITY AND BEHAVIORAL ECONOMICS 168

### Utility Theory 168

Utility: Total and Marginal 168 Law of Diminishing Marginal Utility 169 The Solution  
to the Diamond–Water Paradox 171

### Consumer Equilibrium and Demand 173

Equating Marginal Utilities per Dollar 173 Maximizing Utility and the Law of  
Demand 175 Should the Government Provide the Necessities of Life for Free? 175

### Hear What and How the Economist Thinks . . . *About Towns, Pollution Standards, and Making the Invisible, Visible* 177

#### Behavioral Economics 178

Are People Willing to Reduce Others' Incomes? 178 Is One Dollar Always One  
Dollar? 179 Coffee Mugs and the Endowment Effect 180 Does the Endowment Effect  
Hold Only for New Traders? 182

#### Does It Matter to You . . . *If You Are Subject to the Endowment Effect?* 182

The Ultimatum Game—and Facebook, YouTube, and Wikipedia 183 Framing 186  
Neuroeconomics 187

#### Chapter Summary 189

#### Key Terms and Concepts 190

#### Questions and Problems 190

#### Working with Numbers and Graphs 191

## ECONOMICS 24/7

“He Never Showed Up” 202

High School Students, Staying Out Late, and More 213

Social Media and Marginal Cost 222

Producing a Grade in a College Course 223



“What Is the Difference Between the Law of Diminishing Marginal Returns and Diseconomies of Scale?” 230

## APPENDIX C: BUDGET CONSTRAINT AND INDIFFERENCE CURVE ANALYSIS 192

### The Budget Constraint 192

Slope of the Budget Constraint 192

### What Will Change the Budget Constraint? 192

### Indifference Curves 193

### Constructing an Indifference Curve 194

Characteristics of Indifference Curves 194

### The Indifference Map and the Budget Constraint Come Together 197

### From Indifference Curves to a Demand Curve 198

### Appendix Summary 199

### Key Terms and Concepts 199

### Questions and Problems 199

## CHAPTER 8: PRODUCTION AND COSTS 200

### Why Firms Exist 200

The Market and the Firm: Invisible Hand Versus Visible Hand 200 The Alchian-and-Demsetz Answer 201 Shirking on a Team 201 Ronald Coase on Why Firms Exist 202 Markets: Outside and Inside the Firm 203

### Two Sides to Every Business Firm 203

More on Total Cost 204 Accounting Profit Versus Economic Profit 204

### Does It Matter to You . . . If You Think in Terms of Only Accounting Profit? 205

Zero Economic Profit Is Not as Bad as It Sounds 206

### Hear What and How the Economist Thinks . . . About Maximizing Revenue and Profit 207

### Production 208

Common Misconception About the Short Run and Long Run 208 Production in the Short Run 208 Whose Marginal Productivity Are We Talking About? 210 Marginal Physical Product and Marginal Cost 210 Average Productivity 213

### Costs of Production: Total, Average, Marginal 214

The *AVC* and *ATC* Curves in Relation to the *MC* Curve 217 Tying Short-Run Production to Costs 220 One More Cost Concept: Sunk Cost 221

### Production and Costs in the Long Run 225

Long-Run Average Total Cost Curve 226 Economies of Scale, Diseconomies of Scale, and Constant Returns to Scale 227 Why Economies of Scale? 228 Why Diseconomies of Scale? 228 Minimum Efficient Scale and Number of Firms in an Industry 228

### Shifts In Cost Curves 229

Taxes 229 Input Prices 229 Technology 229

### Chapter Summary 230

### Key Terms and Concepts 231

### Questions and Problems 232

### Working with Numbers and Graphs 233

## Part 3 Product Markets and Policies

### ECONOMICS 24/7

The Digital Revolution, Price, and Marginal Cost 246

How Is High-Quality Land Like a Genius Software Engineer? 257



“Do You Have to Know the  $MR = MC$  Condition in Order to Be Successful in Business?” 259

### ECONOMICS 24/7

Monopoly and the Boston Tea Party 266

Religion and Monopoly 277

One for \$40 or Two for \$70 279

Do Colleges and Universities Price Discriminate? 281

Buying a Computer and Getting a Printer for \$100 Less Than the Retail Price 283

## CHAPTER 9: PERFECT COMPETITION 234

### The Theory of Perfect Competition 234

A Perfectly Competitive Firm Is a Price Taker 235 The Demand Curve for a Perfectly Competitive Firm Is Horizontal 235 Common Misconceptions about Demand Curves 236 The Marginal Revenue Curve of a Perfectly Competitive Firm Is the Same as Its Demand Curve 237 Theory and Real-World Markets 238

### Perfect Competition in the Short Run 239

What Level of Output Does the Profit-Maximizing Firm Produce? 239 The Perfectly Competitive Firm and Resource Allocative Efficiency 239 To Produce or Not to Produce: That Is the Question 240 Common Misconceptions over the Shutdown Decision 243 The Perfectly Competitive Firm's Short-Run Supply Curve 244 From Firm Supply Curve to Market (Industry) Supply Curve 244 Why Is the Market Supply Curve Upward Sloping? 247

### Perfect Competition in the Long Run 247

The Conditions of Long-Run Competitive Equilibrium 248 The Perfectly Competitive Firm and Productive Efficiency 249 Industry Adjustment to an Increase in Demand 250 Profit from Two Perspectives 253

### Does It Matter to You . . . *If There Is Easy Entry into a Market?* 254

Industry Adjustment to a Decrease in Demand 255 Differences in Costs, Differences in Profits: Now You See It, Now You Don't 255

### Hear What and How the Economist Thinks . . . *About Buyers and Sellers* 256

Profit and Discrimination 257

### Topics for Analysis in the Theory of Perfect Competition 258

Do Higher Costs Mean Higher Prices? 258 Will the Perfectly Competitive Firm Advertise? 258 Supplier-Set Price Versus Market-Determined Price: Collusion or Competition? 259

### Chapter Summary 260

### Key Terms and Concepts 261

### Questions and Problems 261

### Working with Numbers and Graphs 262

## CHAPTER 10: MONOPOLY 264

### The Theory of Monopoly 264

Barriers to Entry: A Key to Understanding Monopoly 265 What Is the Difference Between a Government Monopoly and a Market Monopoly? 265

### Monopoly Pricing and Output Decisions 266

The Monopolist's Demand and Marginal Revenue 267 The Monopolist's Demand Curve and Marginal Revenue Curve Are Not the Same 268 Price and Output for a Profit-Maximizing Monopolist 268 Comparing the Demand Curve in Perfect Competition with the Demand Curve in Monopoly 270 If a Firm Maximizes Revenue, Does It Automatically Maximize Profit Too? 270

### Perfect Competition and Monopoly 271

Price, Marginal Revenue, and Marginal Cost 271 Monopoly, Perfect Competition, and Consumers' Surplus 271 Monopoly or Nothing? 273



“Does the Single-Price Monopolist Lower Price Only on the Additional Unit?” 284

## ECONOMICS 24/7

The People Wear Prada 291

How Is a New Year’s Resolution Like a Cartel Agreement? 296



“Are Firms (as Sellers) Price Takers or Price Searchers?” 306

## ECONOMICS 24/7

Thomas Edison and Hollywood 311

Why It May Be Hard to Dislodge People from Facebook 316

High-Priced Ink Cartridges and Expensive Minibars 317

### The Case Against Monopoly 274

The Deadweight Loss of Monopoly 274

### Does It Matter to You . . . If There Is a Deadweight Loss of Monopoly Triangle? 275

Rent Seeking 275 X-Inefficiency 276

### Price Discrimination 277

Types of Price Discrimination 278 Why a Monopolist Wants to Price Discriminate 278  
Conditions of Price Discrimination 278

### Hear What and How the Economist Thinks . . . About Price Discrimination 279

Moving to  $P = MC$  Through Price Discrimination 280 Coupons and Price Discrimination 282

### Chapter Summary 284

### Key Terms and Concepts 285

### Questions and Problems 285

### Working with Numbers and Graphs 286

## CHAPTER 11: MONOPOLISTIC COMPETITION, OLIGOPOLY, AND GAME THEORY 287

### The Theory of Monopolistic Competition 287

The Monopolistic Competitor’s Demand Curve 288 The Relationship between Price and Marginal Revenue for a Monopolistic Competitor 288 Output, Price, and Marginal Cost for the Monopolistic Competitor 288 Will There Be Profits in the Long Run? 288 Excess Capacity: What Is It, and Is It “Good” or “Bad”? 289 The Monopolistic Competitor and Two Types of Efficiency 291

### Oligopoly: Assumptions and Real-World Behavior 292

The Concentration Ratio 292

### Price and Output Under the Cartel Theory 293

The Cartel Theory 293

### Game Theory, Oligopoly, and Contestable Markets 296

Prisoner’s Dilemma 297 Oligopoly Firms’ Cartels and the Prisoner’s Dilemma 299  
Are Markets Contestable? 300 Necessary and Sufficient Conditions and Efficiency 301

### A Review of Market Structures 301

### Applications of Game Theory 302

Grades and Partying 302

### Hear What and How the Economist Thinks . . . About Grade Inflation 304

The Arms Race 305 Speed Limit Laws 305

### Chapter Summary 307

### Key Terms and Concepts 308

### Questions and Problems 308

### Working with Numbers and Graphs 308

## CHAPTER 12: GOVERNMENT AND PRODUCT MARKETS: ANTITRUST AND REGULATION 309

### Antitrust 309

Antitrust Acts 310 Unsettled Points in Antitrust Policy 312 Antitrust and Mergers 314  
Common Misconceptions about Antitrust Policy 315 Network Monopolies 315



“What Is the Advantage of the Herfindahl Index?” 325

### Regulation 318

The Case of Natural Monopoly 318 Regulating the Natural Monopoly 320 Regulating Industries That are Not Natural Monopolies 322 Theories of Regulation 322

### Hear What and How the Economist Thinks . . . *About Regulation* 323

The Costs and Benefits of Regulation 324

### Does It Matter to You . . . *If People Are Aware of Both the Costs and the Benefits of Regulation?* 324

### Chapter Summary 326

### Key Terms and Concepts 327

### Questions and Problems 327

### Working with Numbers and Graphs 328

## Part 4 Factor Markets and Related Issues

### ECONOMICS 24/7

Why Jobs Don't Always Move to a Low-Wage Country 337

Adam Smith's Philosopher and Street Porter 343

Who Pays the Social Security Tax? 348



“Why Do Economists Think in Twos?” 351

## CHAPTER 13: FACTOR MARKETS: WITH EMPHASIS ON THE LABOR MARKET 329

### Factor Markets 329

The Demand for a Factor 329 Marginal Revenue Product: Two Ways to Calculate It 330 The *MRP* Curve Is the Firm's Factor Demand Curve 330 Value Marginal Product 331 An Important Question: Is  $MRP = VMP$ ? 332 Marginal Factor Cost: The Firm's Factor Supply Curve 333 How Many Units of a Factor Should a Firm Buy? 334 When There Is More Than One Factor, How Much of Each Factor Should the Firm Buy? 334

### The Labor Market 336

Shifts in a Firm's *MRP*, or Factor Demand, Curve 336 Market Demand for Labor 338 The Elasticity of Demand for Labor 339

### Hear What and How the Economist Thinks . . . *About the Debate Over the Minimum Wage* 339

### Does It Matter to You . . . *If the Elasticity of Demand for the Good or Service You Produce Is High or Low?* 341

Market Supply of Labor 341 An Individual's Supply of Labor 342 Shifts in the Labor Supply Curve 343 Putting Supply and Demand Together 344 Why Do Wage Rates Differ? 345 Why Demand and Supply Differ among Labor Markets 346 Why Did You Choose Your Major? 346 Marginal Productivity Theory 347

### Labor Markets and Information 349

Screening Potential Employees 349 Promoting from Within 350 Discrimination or an Information Problem? 350

### Chapter Summary 351

### Key Terms and Concepts 352

### Questions and Problems 352

### Working with Numbers and Graphs 353

## CHAPTER 14: WAGES, UNIONS, AND LABOR 354

### Objectives of Labor Unions 354

Employment for All Members 354 Maximizing the Total Wage Bill 355 Maximizing Income for a Limited Number of Union Members 355 Wage–Employment Trade-Off 355

**ECONOMICS** 24/7

Technology, the Price of Competing Factors, and Displaced Workers 360

Are You Ready for Some Football? 366



"Don't Higher Wages Reduce Profits?" 368

**ECONOMICS** 24/7

Statistics Can Mislead If You Don't Know How They Are Made 375



"Are the Number of Persons in Each Fifth the Same?" 385

**ECONOMICS** 24/7

Is the Car Worth Buying? 394

Investment, Present Value, and Interest Rates 394

Grain Prices and Land Rent 396

**Practices of Labor Unions 356**

Affecting the Elasticity of Demand for Union Labor 356

**Hear What and How the Economist Thinks . . . About Unions and Wages 357**

Affecting the Demand for Union Labor 358 Affecting the Supply of Union Labor 358  
Affecting Wages Directly: Collective Bargaining 359 Strikes 361

**Effects of Labor Unions 361**

The Case of Monopsony 361 Unions' Effects on Wages 363

**Does It Matter to You . . . If Things Are Different in the Short-Run Than in the Long Run? 365**

Unions' Effects on Prices 365 Unions' Effects on Productivity and Efficiency: Two Views 365

**Chapter Summary 368****Key Terms and Concepts 369****Questions and Problems 369****Working with Numbers and Graphs 370****CHAPTER 15: THE DISTRIBUTION OF INCOME AND POVERTY 371****Some Facts About Income Distribution 371**

Who Are the Rich and How Rich Are They? 371 The Effect of Age on the Income Distribution 372 A Simple Equation 374

**Does It Matter to You . . . What Your Educational Attainment Level Is? 376****Measuring Income Equality 376**

The Lorenz Curve 376 The Gini Coefficient 378 A Limitation of the Gini Coefficient 379 Common Misconceptions about Income Inequality 379

**Why Income Inequality Exists 380**

Factors Contributing to Income Inequality 381 Income Differences: Some are Voluntary, Some are Not 382

**Poverty 383**

What Is Poverty? 383 Limitations of the Official Poverty Income Statistics 383  
Who Are the Poor? 384 What Is the Justification for Government Redistributing Income? 384

**Chapter Summary 386****Key Terms and Concepts 387****Questions and Problems 387****Working with Numbers and Graphs 387****CHAPTER 16: INTEREST, RENT, AND PROFIT 388****Interest 388**

Loanable Funds: Demand and Supply 388 The Price for Loanable Funds and the Return on Capital Goods Tend to Equality 390 Why Do Interest Rates Differ? 391  
Nominal and Real Interest Rates 391 Present Value: What Is Something Tomorrow Worth Today? 392

**Rent 395**

David Ricardo, the Price of Grain, and Land Rent 395 The Supply Curve of Land Can be Upward Sloping 397 Economic Rent and Other Factors of Production 398 Economic Rent and Baseball Players: Perspective Matters 398 Competing for Artificial and Real Rents 399





“How Is Present Value Used in the Courtroom?” 405

**Does It Matter to You . . . If People Compete for Artificial Rents as Opposed to Real Rents?** 399

**Profit** 400

Theories of Profit 400 Profit and Loss as Signals 401

**Hear What and How the Economist Thinks . . . About Profit** 402

**The Entrepreneur** 403

A Market 403 How Can the Entrepreneur Increase Trade? 403 Turning Potential Trades into Actual Trades 404 A Necessary Condition: Turn Potential Trades into Actual Trades in a Way Acceptable to Consumers 404 Can Increasing Trades in One Area Reduce Trades in Another? 404 Uncertainty and the Entrepreneur 404

**Chapter Summary** 406

**Key Terms and Concepts** 406

**Questions and Problems** 407

**Working with Numbers and Graphs** 407

## Part 5 Market Failure, Public Choice, and Special-Interest Group Politics

### ECONOMICS 24/7

An Unintended Effect of Social Media 412

Tribes, Transaction Costs, and Social Media 418

“They Paved Paradise and Put Up a Parking Lot” 426

Arriving Late to Class, Grading on a Curve, and Studying Together for the Midterm 431



“Doesn’t It Seem Wrong to Let Some Business Firms Pay to Pollute?” 432

### CHAPTER 17: MARKET FAILURE: EXTERNALITIES, PUBLIC GOODS, AND ASYMMETRIC INFORMATION 408

**Externalities** 408

Costs and Benefits of Activities 408 Marginal Costs and Benefits of Activities 409 Social Optimality, or Efficiency, Conditions 410 Three Categories of Activities 410 Externalities in Consumption and in Production 410 Diagram of a Negative Externality 410 Diagram of a Positive Externality 413

**Internalizing Externalities** 414

Persuasion 414 Taxes and Subsidies 415 Assigning Property Rights 415

**Hear What and How the Economist Thinks . . . About Coming to Class Late** 416

Voluntary Agreements 416 Combining Property Rights Assignments and Voluntary Agreements 417 Beyond Internalizing: Setting Regulations 418

**Environmental Policy** 419

Method 1: Government Regulation, or Command and Control 420 Method 2: Emission Taxes 420 Method 3: Tradable Pollution Permits (Cap and Trade) 421 Similarities and Differences Between Emission Taxes and Tradable Pollution Permits 422

**Public Goods: Excludable and Nonexcludable** 423

Goods 423 The Free Rider 424

**Does It Matter to You . . . If There Is a Free-Rider Problem?** 425

Nonexcludable Versus Nonrivalrous 425

**Asymmetric Information** 427

Asymmetric Information in a Product Market 427 Asymmetric Information in a Factor Market 428 Is There Market Failure? 428 Adverse Selection 429 Moral Hazard 430

**Chapter Summary** 433

**Key Terms and Concepts** 434

**Questions and Problems** 435

**Working with Numbers and Graphs** 436

**ECONOMICS** 24/7

A Simple-Majority Voting Rule:  
The Case of the Statue in the  
Public Square 440

Economic Illiteracy  
and Democracy 444



“Doesn’t Public Choice Paint  
a Bleak Picture of Politics  
and Government?” 454

**CHAPTER 18: PUBLIC CHOICE AND SPECIAL-INTEREST  
GROUP POLITICS 437****Public Choice Theory 437****The Political Market 438**

Moving Toward the Middle: The Median Voter Model 438 What Does the Theory  
Predict? 439

**Voters and Rational Ignorance 442**

The Costs and Benefits of Voting 442

**Does It Matter to You . . . If You Do Not Vote? 443**

Rational Ignorance 443

**Hear What and How the Economist Thinks . . . About Rational Ignorance 445****More About Voting 446**

Example 1: Voting for a Nonexcludable Public Good 446 Example 2: Voting  
and Efficiency 447

**Special-Interest Groups 448**

Information and Lobbying 448 Congressional Districts as Special-Interest Groups 449  
Public-Interest Talk, Special-Interest Legislation 449 Rent Seeking 450 Bringing About  
Transfers 451 Information, Rational Ignorance, and Seeking Transfers 451

**Constitutional Economics 453****Chapter Summary 455****Key Terms and Concepts 456****Questions and Problems 456****Working with Numbers and Graphs 457****Part 6 Economic Theory-Building and Everyday Life****ECONOMICS** 24/7

Can Social Media Affect  
Whom a Person Dates?  
464

Talking on a Cell Phone  
in Public 473



“Can Anyone Build  
a Theory?” 481

**CHAPTER 19: BUILDING THEORIES TO EXPLAIN EVERYDAY LIFE: FROM  
OBSERVATIONS TO QUESTIONS TO THEORIES TO PREDICTIONS 458****A Different Kind of Chapter 458****The Process 459****Observation/Thought 1: The Birthrates in Various Countries are Different 460**

The Question 460 The Theory 460 The Predictions 460 A Detour: The Issue  
of Falsifiability (Refutability) 461

**Hear What and How the Economist Thinks . . . About Theories 461****Observation/Thought 2: The Ethical Code of People Who Live in a Small Town is  
Different from that of People Who Live in a Large City 462**

The Question 463 The Theory 463 The Predictions 463

**Observation/Thought 3: The Closer the Dollar Tuition the Student Pays is to the Equilibrium  
Tuition, the More on Time and Responsive University Instructors Will Be for Office Hours 465**

The Question 465 The Theory 465 The Predictions 467

**Observation/Thought 4: Criminals are Not Rational 467**

The Question 467 The Theory 467 The Predictions 468 A Detour: Does Evidence  
Prove a Theory Correct? 468 Another Detour: After You Have One Theory That Explains  
and Predicts, Search for Another 469 A Final Detour: Why Prediction Is So Important, or  
Why Good-Sounding Stories are Not Enough 470

**Observation/Thought 5: More Students Wear Baseball Caps in Class on Exam Days Than on Other Days 471**

The Question 471 The Theory 471 The Predictions 472

**Observation/Thought 6: Houses in “Good” School Districts are Often More Expensive than Comparable Houses in “Bad” School Districts 474**

The Question 474 The Theory 474 The Predictions 474

**Observation/Thought 7: Are People Better Off With or Without Health Care Vouchers? 475**

The Question 475 The Theory 475 The Predictions 476

**Observation/Thought 8: People Who Give to Others Often Complain That They End Up Giving Too Much 476**

The Question 476 The Theory 477 The Predictions 479

**Does It Matter to You . . . *If and How You Are in Someone Else’s Utility Function?* 480**

**Chapter Summary 481**

**Questions and Problems 483**

**Working with Numbers and Graphs 483**

## THE GLOBAL ECONOMY

### Part 7 International Economics and Globalization

#### ECONOMICS 24/7

Dividing the Work 489

Offshore Outsourcing,  
or Offshoring 497



OFFICE  
HOURS

“Should We Impose Tariffs if  
They Impose Tariffs?” 499

#### ECONOMICS 24/7

The U.S. Dollar as the Primary  
Reserve Currency 509

Chinese Imports and the  
U.S. Economy 512

#### CHAPTER 20: INTERNATIONAL TRADE 484

**International Trade Theory 484**

How Countries Know What to Trade 485

**Does It Matter to You . . . *If There Is Always Someone Who Can Do Something Better Than You?* 487**

A Common Misconception about How Much We Can Consume 488 How Countries Know When They Have a Comparative Advantage 488

**Hear What and How the Economist Thinks . . . *About Common Sense* 490**

**Trade Restrictions 490**

The Distributional Effects of International Trade 491 Consumers’ and Producers’ Surpluses 491 The Benefits and Costs of Trade Restrictions 492 Why Nations Sometimes Restrict Trade 496

**Chapter Summary 500**

**Key Terms and Concepts 501**

**Questions and Problems 501**

**Working with Numbers and Graphs 502**

#### CHAPTER 21: INTERNATIONAL FINANCE 503

**The Foreign Exchange Market 503**

The Demand for Goods 504 The Demand for, and Supply of, Currencies 504

**Flexible Exchange Rates 505**

The Equilibrium Exchange Rate 505



"Why Is the Depreciation of One Currency Tied to the Appreciation of Another?" 518

**Does It Matter to You . . . If the Dollar Depreciates? 506**

Changes in the Equilibrium Exchange Rate 506

Factors That Affect the Equilibrium Exchange Rate 507

**Fixed Exchange Rates 510**

Fixed Exchange Rates and Overvalued or Undervalued Currency 511 What Is So

Bad about an Overvalued Dollar? 513 Government Involvement in a Fixed Exchange

Rate System 514 Options Under a Fixed Exchange Rate System 514

**Fixed Exchange Rates Versus Flexible Exchange Rates 516**

Promoting International Trade 516 Optimal Currency Areas 516

**Chapter Summary 519**

**Key Terms and Concepts 520**

**Questions and Problems 520**

**Working with Numbers and Graphs 521**

## WEB CHAPTERS

### ECONOMICS 24/7

Culture as a Public Good 529



"I'm No Longer Sure What I Think" 538

### CHAPTER 22: THE ECONOMIC CASE FOR AND AGAINST GOVERNMENT: FIVE TOPICS CONSIDERED 522

**Economics and Government 522**

**The Economic Case for Government 523**

Government Can Remove Individuals from a Prisoner's Dilemma Setting 523

Externalities 527 Nonexcludable Public Goods 528 The Case for Smaller or Larger Government 530

**The Economic Case Against Government 531**

Unintended Effects of Government Actions 531 Government as Transfer Mechanism

532 Economic Growth Versus Transfers 534 Following the Leader in Pushing for

Transfers 535 Divisive Society: A Nonexcludable Public Bad 537

**Chapter Summary 538**

**Key Terms and Concepts 539**

**Questions and Problems 539**

**Working with Numbers and Graphs 540**

### ECONOMICS 24/7

Are Some Economists Poor Investors? 546

\$1.3 Quadrillion 551

### CHAPTER 23: STOCKS, BONDS, FUTURES, AND OPTIONS 541

**Financial Markets 541**

**Stocks 542**

Where are Stocks Bought and Sold? 542 The Dow Jones Industrial Average (DJIA) 543

How the Stock Market Works 544 Why Do People Buy Stock? 545 How to Buy

and Sell Stock 545 Buying Stocks or Buying the Market 546 How to Read the Stock Market Page 547



"I Have Three Questions."  
557

**Bonds 549**

The Components of a Bond 549 Bond Ratings 550 Bond Prices and Yields  
(or Interest Rates) 550 Common Misconceptions about the Coupon Rate and Yield (Interest  
Rate) 551 Types of Bonds 552 How to Read the Bond Market Page 552 Risk and  
Return 554

**Futures and Options 554**

Futures 554 Options 555

**Chapter Summary 558**

**Key Terms and Concepts 558**

**Questions and Problems 558**

**Working with Numbers and Graphs 559**

**Self-Test Appendix 522**

**Glossary 540**

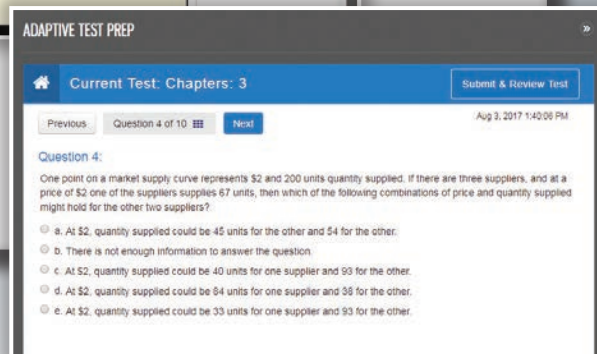
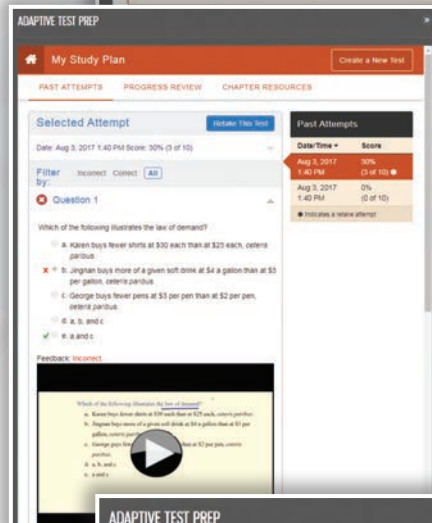
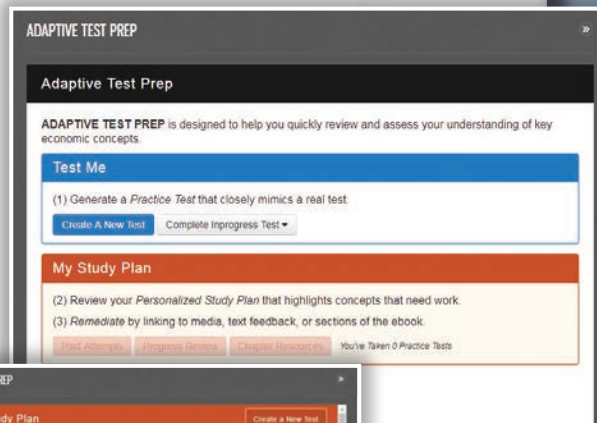
**Index 547**

Roger Arnold's **MICROECONOMICS** opens up the world of economic analysis. Substantive content, detailed diagrams, popular economic features, and innovative pedagogy are just the beginning. **MICROECONOMICS** continues to blaze the trail for constantly updated content and applications balanced with unequalled media and study assets, including the new Adaptive Test Prep app.

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helps students prepare for test success by allowing them to generate multiple practice tests across chapters. Once a practice test is complete, the student is presented with a personalized Study Plan featuring a series of highly targeted remediation resources, including “Teachable Moment” videos created by author, Roger Arnold.

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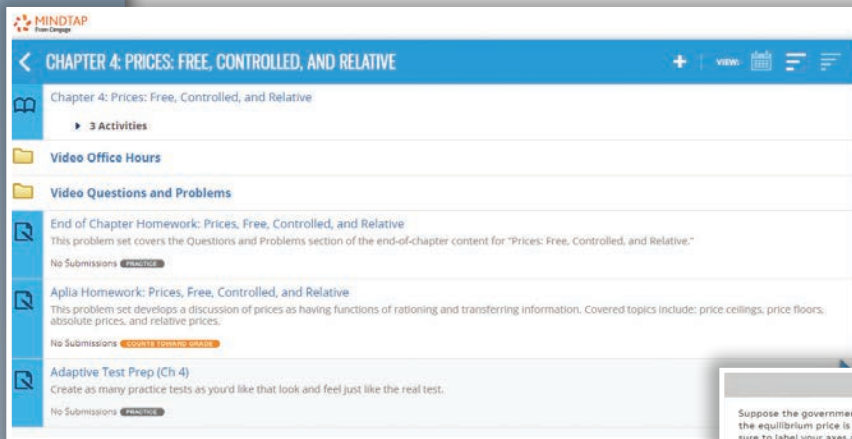




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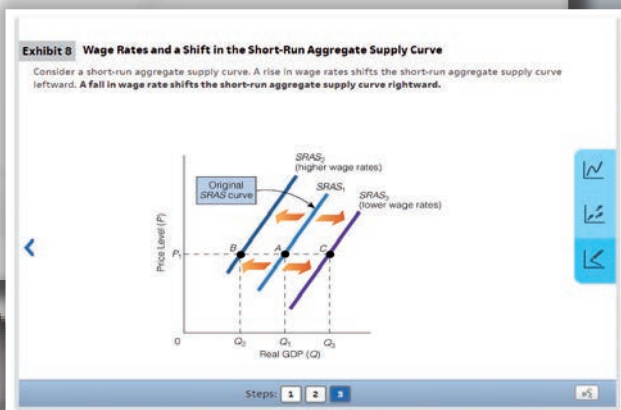
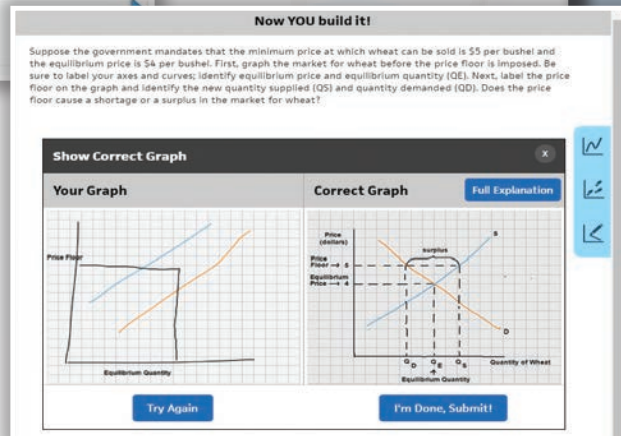
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videos, End-of-Chapter practice problems, the new Adaptive Test Prep App, new Graph Builders in the eReader, ConceptClip videos, Aplia, and much more.



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Available in MindTap. Many economic graphs have been digitally enhanced in Arnold's eReader using our new Graph Builder technology. This feature allows students to work at their own pace in order to see a complex graph being built step-by-step. Progression Graphs decompose each graphical exhibit into several layers while still maintaining a rich, economic pedagogy.





**Aplia** is the most successful and widely used homework solution in the Economics market, with over 1 billion answers entered. Online interactive problem sets, analyses, tutorials, experiments, and critical-thinking exercises give students hands-on application without adding to instructors' workload. Based on discovery learning, Aplia requires

students to take an active role in the learning process—helping them improve their economic understanding and ability to relate to the economic concepts presented. Instructors can assign homework that is automatically graded and recorded.

Embedded in the Aplia product for Arnold's 13th Edition is the fully interactive, media rich eReader. Combining the functionality you and your students are coming to expect from a modern eReader (text search, highlighting, note-taking) with our exclusive embedded media—Video Questions and Problems, and ConceptClips—this robust reading experience is just a click away as students work through their Aplia problem sets.

**Aplia Homework: Prices, Free, Controlled, and Relative**

1. Price as a rationing device

Suppose that there are three beachfront parcels of land available for sale in Aollomar, and six people who would each like to purchase one parcel. Assume that the parcels are essentially identical and that the minimum selling price of each is \$595,000. The following table states each person's willingness and ability to purchase a parcel.

Willingness and Ability to Purchase (Dollars)	
Andrew	540,000
Beth	530,000
Lorenzo	750,000
Neha	660,000
Sam	620,000
Teresa	570,000

Which of these people will buy one of the three beachfront parcels? Check all that apply.

- Andrew
- Beth
- Lorenzo
- Neha
- Sam
- Teresa

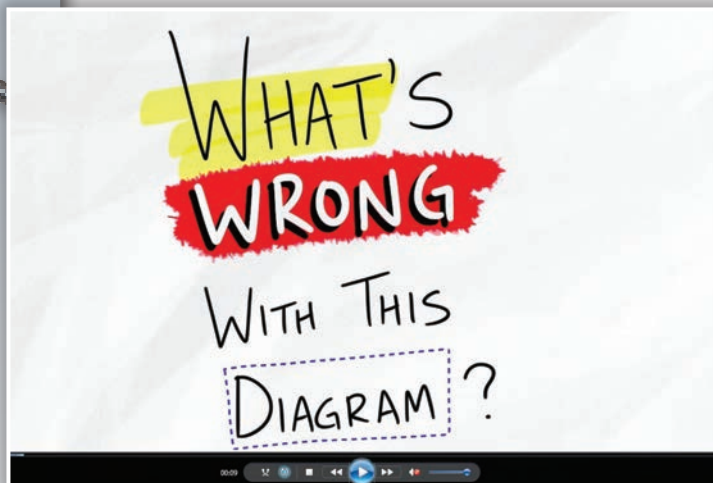
Points: 0 / 1

Explanation: [Close Explanation](#)

Lorenzo, Neha, and Sam will purchase the parcels because they are the only ones willing and able to meet the minimum selling price of \$595,000. One or more of the other three people might have the ability but not the willingness to pay the required price. Moreover, perhaps Teresa, Andrew, and Beth have a strong desire to own beachfront land in Aollomar, but they do not have the ability to pay the selling price.

**“What’s Wrong With This Diagram?”** assignable video quizzing walks students through the creation of a diagram, then stops the video and provides

assessment that is focused on what is wrong with the newly created diagram. Once answered, the video continues to play and provides remediation and explanation. These activities are available in MindTap.





Because cultivating an economic way of thinking requires building on a foundation of theory and its application to real-world examples, **MICROECONOMICS, 13e** continues to set the standard for thoroughly updated content. In this edition, “Here What and How the Economist Thinks” and “Does It Matter to You If . . .?” are two new features included in every chapter. The first feature gives insight into just how economists go about thinking about various topics. The second feature ties what students read in an economics principles book—on such subjects as market structures, interest rates, regulation and antitrust—directly to how each affects them. Does It Matter To You If You are Efficient or Not? or If the Economy is at One Point on the PPF Instead of Another? or If Something You Buy Is Taxed or Subsidized? It certainly does.

## ECONOMICS 24/7

### Obesity and a Soda Tax

The percentage of the U.S. population that is deemed obese today is higher than it was 20 years ago. Obesity is a health problem, so we often hear proposals directed at trying to reduce the obesity rate in the country. One proposal is to place a tax on high-fat, high-calorie so-called junk food. A similar proposal is to place a tax on soda.

We now know that a tax placed on one good (but not on another) will change the relative prices of the two goods. Placing a tax on good X, but not on good Y, will make good X relatively more expensive and Y relatively cheaper, prompting consumers to purchase relatively less X and relatively more Y.

Consider a tax placed on soda. We would expect the absolute (money) price of soda to rise. And if the tax is placed only on soda, its relative price will rise too. As soda becomes relatively more expensive, we would expect fewer sodas to be consumed and obesity to decline. Right? Well, fewer sodas might be purchased and consumed, but whether obesity will decline is not so clear. Consider soda and sugared iced tea. Both soda and sugared iced tea are sweet drinks. They might even be substitutes. With this idea in mind, suppose the absolute price of a soda is \$1 and the absolute price of an iced tea (with sugar) is 50¢. It follows that the relative prices are

$$\begin{aligned} 1 \text{ soda} &= 2 \text{ sugared iced teas} \\ 1 \text{ sugared iced tea} &= \frac{1}{2} \text{ soda} \end{aligned}$$

Now let's place a tax on soda that drives its price up to \$2. The new relative prices for soda and iced tea are

$$\begin{aligned} 1 \text{ soda} &= 4 \text{ sugared iced teas} \\ 1 \text{ sugared iced tea} &= \frac{1}{4} \text{ soda} \end{aligned}$$

As a result of the tax on soda, its relative price has risen, but the relative price of sugared iced tea has fallen. We would thus expect people to consume relatively less soda and relatively more sugared iced tea.

Obesity is lessened by ingesting fewer calories, not the same number or more calories. Simply put, the soda tax might reduce the consumption of sodas, but it doesn't necessarily reduce obesity. Although the soda tax makes soda relatively more expensive, it makes soda substitutes (such as sugared iced tea) relatively less expensive and thus makes a rise in the consumption of sugared iced tea more likely.



Peter Macconelli / Alamy Stock Photo

# IN APPRECIATION

Many colleagues have contributed to the success of this text over the last twelve editions. Their feedback continues to influence and enhance the text and ancillary package and I'm grateful for their efforts. Now into our 13th edition, space dictates that we can no longer list the names of all reviewers for each past edition; we are including here instructors who contributed to the development of the 13th edition, but continue to be grateful for the improvements suggested by all of the reviewers and contributors to this product over the years.

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My deepest debt of gratitude goes to my wife, Sheila, and to my two sons, David and Daniel. They continue to make all my days happy ones.

Roger A. Arnold

## WHAT ECONOMICS IS ABOUT



## INTRODUCTION

You are about to begin your study of economics. Before discussing particular topics in economics, we think it best to give you an overview of what economics is and of some of the key concepts. The key concepts can be compared to musical notes: Just as musical notes are repeated in any song (you hear the musical note G over and over again), so are the key concepts in economics repeated. Some of these concepts are scarcity, opportunity cost, efficiency, marginal decision making, incentives, and exchange.

## 1-1 YOUR LIFE, 2019–2029

What will your life be like during the years 2019–2029? What kind of work will you do after college? How much will you earn in that first job after college? Where will you be living and who will your friends be? How many friends will you have? Will you buy a house in the next few years? If so, how much will you pay for the house? And, perhaps most importantly, will you be happy?

The specific answers to these questions and many more have to do with economics. For example, the salary you will earn has to do with the economic concept of *opportunity cost*. What you will do in your first job after college has to do with the *state of the economy* when you graduate. The price you pay for a house has to do with the state of the *housing market*. How many friends you have has to do with the economic concept of *scarcity*. Whether you are happy will depend on such things as the *net benefits* you receive in various activities, the *utility* you gain by doing certain things, and more.

In this chapter, we begin our study of economics. As you read the chapter (and those which follow), ask yourself how much of what you are reading is relevant to your life today and tomorrow. Ask: What does what I am reading have to do with *my* life? Our guess is that after answering this question a few dozen times, you will be convinced that economics explains much about your present and future.

## 1-2 A DEFINITION OF ECONOMICS

In this section, we discuss a few key economic concepts; then we incorporate knowledge of these concepts into a definition of economics.

### 1-2a Goods and Bads

Economists talk about *goods* and *bads*. A **good** is anything that gives a person **utility**, or satisfaction. Here is a partial list of some goods: a computer, a car, a watch, a television set, friendship, and love. You will notice from our list that a good can be either tangible or intangible. A computer is a tangible good; friendship is an intangible good. Simply put, for something to be a good (whether tangible or intangible), it only has to give someone utility or satisfaction.

A **bad** is something that gives a person **disutility** or dissatisfaction. If the flu gives you disutility or dissatisfaction, then it is a bad. If the constant nagging of an acquaintance is something that gives you disutility or dissatisfaction, then it is a bad.

People want goods, and they do not want bads. In fact, they will pay to get goods (“Here is \$1,000 for the computer”), and they will pay to get rid of bads (“I’d be willing to pay you, doctor, if you can prescribe something that will shorten the time I have the flu”).

Can something be a *good* for one person and a *bad* for another person? Smoking cigarettes gives some people utility; it gives others disutility. We conclude that smoking cigarettes can be a *good* for some people and a *bad* for others. This must be why the wife tells her husband, “If you want to smoke, you should do it outside.” In other words, “Get those *bads* away from me.”

### 1-2b Resources

Goods do not just appear before us when we snap our fingers. It takes resources to produce goods. (Sometimes *resources* are referred to as *inputs* or *factors of production*.)

Generally, economists divide resources into four broad categories: *land*, *labor*, *capital*, and *entrepreneurship*.

- **Land** includes natural resources, such as minerals, forests, water, and unimproved land. For example, oil, wood, and animals fall into this category. (Sometimes economists refer to the category simply as *natural resources*.)
- **Labor** consists of the physical and mental talents that people contribute to the production process. For example, a person building a house is using his or her own labor.
- **Capital** consists of produced goods that can be used as inputs for further production. Factories, machinery, tools, computers, and buildings are examples of capital. One country might have more capital than another; that is, it has more factories, machinery, tools, and the like.
- **Entrepreneurship** refers to the talent that some people have for organizing the resources of land, labor, and capital to produce goods, seek new business opportunities, and develop new ways of doing things.

### 1-2c Scarcity and a Definition of Economics

We are now ready to define a key concept in economics: *scarcity*. **Scarcity** is the condition in which our wants (for goods) are greater than the limited resources (land, labor, capital, and entrepreneurship) available to satisfy those wants. In other words, we want goods, but not enough resources are available to provide us with all the goods we want.

Look at it this way: Our wants (for goods) are infinite, but our resources (which we need to produce the goods) are finite. Scarcity is the result of our infinite wants hitting up against finite resources.

#### Good

Anything from which individuals receive utility or satisfaction.

#### Utility

The satisfaction one receives from a good.

#### Bad

Anything from which individuals receive disutility or dissatisfaction.

#### Disutility

The dissatisfaction one receives from a bad.

#### Land

All natural resources, such as minerals, forests, water, and unimproved land.

#### Labor

The work brought about by the physical and mental talents that people contribute to the production process.

#### Capital

Produced goods, such as factories, machinery, tools, computers, and buildings that can be used as inputs for further production.

#### Entrepreneurship

The talent that some people have for organizing the resources of land, labor, and capital to produce goods, seek new business opportunities, and develop new ways of doing things.

#### Scarcity

The condition in which our wants are greater than the limited resources available to satisfy those wants.

Many economists say that if scarcity didn't exist, neither would economics. In other words, if our wants weren't greater than the limited resources available to satisfy them, there would be no field of study called economics. This is similar to saying that if matter and motion didn't exist, neither would physics or that if living things didn't exist, neither would biology. For this reason, we define **economics** in this text as the science of scarcity. More completely, *economics is the science of how individuals and societies deal with the fact that wants are greater than the limited resources available to satisfy those wants.*

### Economics

The science of scarcity; the science of how individuals and societies deal with the fact that wants are greater than the limited resources available to satisfy those wants.

## THINKING LIKE AN ECONOMIST

**Scarcity Affects Everyone** Everyone in the world—even a billionaire—has to face scarcity. Billionaires may be able to satisfy more of their wants for tangible goods (houses, cars) than most people, but they still may not have the resources to satisfy all their wants. Their wants might include more time with their children, more friendship, no disease in the world, peace, and a hundred other things that they don't have the resources to "produce."

**Thinking in Terms of Scarcity's Effects** Scarcity has effects. Here are three: (1) the need to make choices, (2) the need for a rationing device, and (3) competition.

**Choices** People have to make choices because of scarcity. Because our unlimited wants are greater than our limited resources, some wants must go unsatisfied. We must choose which wants we will satisfy and which we will not. Jeremy asks, "Do I go to Hawaii or do I pay off my car loan earlier?" Ellen asks, "Do I buy the new sweater or two new shirts?"

**Need for a Rationing Device** A **rationing device** is a means of deciding who gets what of available resources and goods. Scarcity implies the need for a rationing device. If people have infinite wants for goods and if only limited resources are available to produce the goods, then a rationing device is needed to decide who gets the available quantity of goods. Dollar price is a rationing device. For instance, 100 cars are on the lot, and everyone wants a new car. How do we decide who gets what quantity of the new cars? The answer is to use the rationing device called *dollar price*. The people who pay the dollar price for a new car end up with one.

### Rationing Device

A means for deciding who gets what of available resources and goods.

**Scarcity and Competition** Do you see competition in the world? Are people competing for jobs? Are states and cities competing for businesses? Are students competing for grades? The answer to all these questions is yes. The economist wants to know why this competition exists and what form it takes. First, the economist concludes, competition exists because of scarcity. If there were enough resources to satisfy all our seemingly unlimited wants, people would not have to compete for the available, but limited, resources.

Second, the economist sees that competition takes the form of people trying to get more of the rationing device. If dollar price is the rationing device, people compete to earn dollars. Look at your own case. You are a college student working for a degree. One reason (but perhaps not the only reason) you are attending college is to earn a higher income after graduation. But why do you want a higher income? You want it because it will allow you to satisfy more of your wants.

Suppose muscular strength (measured by lifting weights), instead of dollar price, were the rationing device. Then people with more muscular strength would receive more resources and goods than people with less muscular strength. In that case, people would compete for muscular strength. (Would they spend more time at the gym lifting weights?) The lesson is simple: *Whatever the rationing device is, people will compete for it.*

## FINDING ECONOMICS

**At the campus bookstore** To learn economics well, you must practice what you learn. One of the ways to practice economics is to find it in everyday life. Consider the following scene: You are in the campus bookstore buying a book for your computer science course, and you are handing over \$85 to the cashier. Can you find the economics in this simple scene? Before you read on, think about it for a minute.

Let's work backward to find the economics. You are currently handing the cashier \$85. We know that dollar price is a rationing device. But let's now ask ourselves why we would need a rationing device to get the book. The answer is scarcity. In other words, scarcity is casting its long shadow there in the bookstore as you buy a book. We have found one of the key economic concepts—scarcity—in the campus bookstore. (If you also said that a book is a good, then you have found even more economics in the bookstore. Can you find more than scarcity and a good?)

## SELF-TEST

(Answers to Self-Test questions are in Answers to Self-Test Questions at the back of the book.)

1. True or false? Scarcity is the condition of finite resources. Explain your answer.
2. How does competition arise out of scarcity?
3. How does choice arise out of scarcity?

## 1-3 KEY CONCEPTS IN ECONOMICS

A number of key concepts in economics define the field. We discuss a few of these concepts next.

### 1-3a Opportunity Cost

So far, we have established that people must make choices because scarcity exists. In other words, because our seemingly unlimited wants push up against limited resources, some wants must go unsatisfied. We must therefore *choose* which wants we will satisfy and which we will not. The most highly valued opportunity or alternative forfeited when we make a choice is known as **opportunity cost**. Every time you make a choice, you incur an opportunity cost. For example, you have chosen to read this chapter. In making this choice, you denied yourself the benefits of doing something else. You could have watched television, written text messages to a friend, taken a nap, eaten a few slices of pizza, read a novel, shopped for a new computer, and so on. Whatever you *would have chosen* to do is the opportunity cost of your reading this chapter. For instance, if you would have watched television instead of reading this chapter—if that was your next best alternative—then the opportunity cost of reading the chapter is watching television.

**There Is No Such Thing as a Free Lunch** Economists are fond of saying that “there is no such thing as a free lunch.” This catchy phrase expresses the idea that opportunity costs are incurred whenever choices are made. Perhaps this is an obvious point, but consider how often people mistakenly assume that there *is* a free lunch. For example, some parents think that education is free, because they do not pay tuition for their children to attend public elementary school. That's a misconception. “Free” implies no sacrifice and no opportunities forfeited, but an elementary school education requires resources that could be used for other things.

Consider the people who speak about free medical care, free housing, free bridges (“there's no charge to cross it”), and free parks. Again, free medical care, free housing, free bridges, and free parks are misconceptions. The resources that provide medical care, housing, bridges, and parks could have been used in other ways.

### Opportunity Cost

The most highly valued opportunity or alternative forfeited when a choice is made.

# ECONOMICS 24/7

## Rationing Spots at Yale

Each year, Yale University receives more applications for admission to the freshmen class than spots are available. In most years, for every 100 applications for admission that Yale receives, it can accept only seven applicants for admission. What Yale has to do, then, is ration its available admission spots.

How does it ration its available spots? One way is simply to use money as a rationing device. In other words, raise the dollar amount of attending Yale to a high enough level so that the number of spots equals the number of students willing and available to pay for admission. To illustrate, think of Yale as auctioning off spots in its freshman class. It calls out a price of \$50,000 a year, and at this price more people wish to be admitted to Yale than there are spots available. Yale keeps on raising the price until the number of students who are willing and able to pay the tuition is equal to the number of available spots. Maybe this price is, say, \$200,000.

As we know, Yale does not ration its available spots this way. In fact, it uses numerous rationing devices in an attempt to whittle down the number of applicants to the number of available spots. For example, it might use the rationing device of high school grades. Anyone with a GPA in high school of less than, say, 3.50 is not going to be admitted. If, after doing this, Yale still has too many applicants, it might then make use of the rationing device of standardized test scores. Anyone with an SAT score of under, say, 2100 is eliminated from the pool of applicants. If there are still too many applicants, then perhaps other rationing devices will be used, such as academic achievements, community service, degree of interest in attending Yale, and so on.



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Yale might also decide that it wants to admit certain students over others, even if the two categories of students have the same academic credentials. For example, suppose Yale wants at least one student from each state in the country, and only 10 students from Wyoming have applied to go to Yale whereas 500 students from California have applied. Then Yale could very well use the rationing device of state

diversity to decide in favor of the student from Wyoming instead of the applicant from California.

In the first week of April each year, Yale sends out many more rejection letters than acceptance letters. No doubt, some students who are rejected by Yale feel that some of the students who were accepted might not be as academically strong as they are. No doubt, the student with a 4.00 GPA and a perfect SAT score of 2400 feels that he might have been slighted by Yale when he learns that a student in his high school with a 3.86 GPA and SAT score of 2180 was chosen over him. What did the 3.86–2180 student have that he didn't have? What rationing device benchmark did the rejected student score lower on?

In life, you will often hear people arguing over what the rationing device for certain things should be. Should high school grades and standardized test scores be the only two rationing devices for college admission? What role should money play as a rationing device when a high school graduate applies to college? What role should ethnic or racial diversity, or state diversity, or income diversity play in the application process? Our point is a simple one: With scarcity comes the need for a rationing device. More people want a spot at Yale than there are spots available. Yale has to use one or more rationing devices to decide who will be accepted and who will be rejected.

## THINKING LIKE AN ECONOMIST

**Zero Price Doesn't Mean Zero Cost** A friend gives you a ticket to an upcoming concert for zero price (i.e., you pay nothing). Does it follow that zero price means zero cost? No. There is still an opportunity cost of attending the concert. Whatever you would be doing if you don't go to the concert is the opportunity cost of attending. To illustrate, if you don't attend the concert, you would hang out with friends. The value you place on hanging out with friends is the opportunity cost of your attending the concert.



### 1-3b Opportunity Cost and Behavior

Economists believe that a change in opportunity cost can change a person's behavior. For example, Ryan, who is a sophomore at college, attends classes Monday through Thursday of every week. Every time he chooses to go to class, he gives up the opportunity to do something else, such as earn \$15 an hour working at a job. The opportunity cost of Ryan's spending an hour in class is \$15.

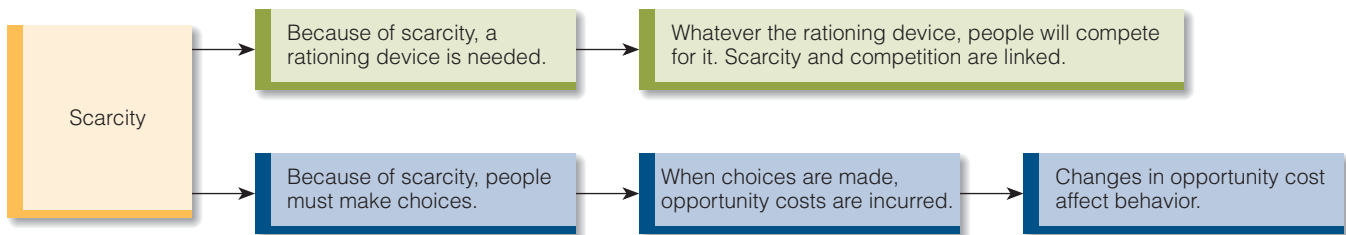
Now let's raise the opportunity cost of attending class. On Tuesday, we offer Ryan \$70 to skip his economics class. He knows that if he attends his economics class, he will forfeit \$70. What will Ryan do? An economist would predict that as the opportunity cost of attending class increases relative to the benefits of attending, Ryan is less likely to go to class.

This is how economists think about behavior: *The higher the opportunity cost of doing something, the less likely it is that it will be done.* This is part of the economic way of thinking.

Look at Exhibit 1, which summarizes some of the things about scarcity, choice, and opportunity cost up to this point.

#### EXHIBIT 1

##### Scarcity and Related Concepts



#### FINDING ECONOMICS

**In Being Late to Class** John is often a few minutes late to his biology class. The class starts at 10 a.m., but John usually walks into the class at 10:03 a.m. The instructor has asked John to be on time, but John usually excuses his behavior by saying that the traffic getting to college was bad or that his alarm didn't go off at the right time or that something else happened to delay him. One thing the instructor observes, though, is that John is never late when it comes to test day. He is usually in class a few minutes before the test begins. Where is the economics?

We would expect behavior to change as opportunity cost changes. When a test is being given in class, the opportunity cost of being late to class is higher than when a test is not being given and the instructor is simply lecturing. If John is late to class on test day, he then has fewer minutes to complete the test, and having less time can adversely affect his grade. In short, the higher the opportunity cost of being late to class, the less likely it is that John will be late.

### 1-3c Benefits and Costs

If we could eliminate air pollution completely, should we do it? If your answer is yes, then you are probably focusing on the *benefits* of eliminating air pollution. For example, one benefit might be healthier individuals. Certainly, individuals who do not breathe polluted air have fewer lung disorders than people who do breathe polluted air.

But benefits rarely come without costs. The economist reminds us that, although eliminating pollution has its benefits, it has costs too. To illustrate, one way to eliminate all car pollution tomorrow is to pass a law stating that anyone caught driving a car will go to prison for 40 years. With such a draconian law in place and enforced, very few people would drive cars and all car pollution would be a thing of the past. Presto! Cleaner air! However, many people would think that the cost of obtaining that cleaner air is too high. Someone might say, “I want cleaner air, but not if I have to completely give up driving my car. How will I get to work?”

What distinguishes the economist from the noneconomist is that the economist thinks in terms of *both* costs *and* benefits. Often, the noneconomist thinks in terms of one or the other. Studying has its benefits, but it has costs too. Coming to class has benefits, but it has costs too. Getting up early each morning and exercising has its costs, but let’s not forget that there are benefits too.

### 1-3d Decisions Made at the Margin

It is late at night, and you have already studied three hours for your biology test tomorrow. You look at the clock and wonder if you should study another hour. How would you summarize your thinking process? What question or questions do you ask yourself to decide whether to study another hour?

Perhaps without knowing it, you think in terms of the costs and benefits of further study. You probably realize that studying an additional hour has certain benefits (you may be able to raise your grade a few points), but it has costs too (you will get less sleep or have less time to watch television or talk on the phone with a friend). *That* you think in terms of costs and benefits, however, doesn’t tell us *how* you think in terms of costs and benefits. For example, when deciding what to do, do you look at the *total costs* and *total benefits* of the proposed action, or do you look at something less than the total costs and benefits? According to economists, for most decisions, you think in terms of *additional*, or *marginal*, costs and benefits, not *total* costs and benefits. That’s because most decisions deal with making a small, or additional, change.

To illustrate, suppose you just finished eating a hamburger and drinking a soda for lunch. You are still a little hungry and are considering whether to order another hamburger. An economist would say that, in deciding whether to order another hamburger, you compare the additional benefits of the second hamburger with its additional costs. In economics, the word *marginal* is a synonym for *additional*. So, we say that you compare the **marginal benefits (MB)** of the (next) hamburger to its **marginal costs (MC)**. If the marginal benefits are greater than the marginal costs, you obviously expect a net benefit to ordering the next hamburger, and therefore you order another. If, however, the marginal benefits are less than the marginal costs, you obviously expect a net cost to ordering the next hamburger, and therefore you do not order another. Logically, the situation is as follows:

Condition	Action
$MB$ of next hamburger $>$ $MC$ of next hamburger	Buy next hamburger
$MB$ of next hamburger $<$ $MC$ of next hamburger	Do not buy next hamburger

What you don’t consider when making this decision are the *total* benefits and *total* costs of hamburgers. That’s because the benefits and costs connected with the first hamburger (the one you have already eaten) are no longer relevant to the current decision. You are not deciding between eating two hamburgers or eating no hamburgers; your decision is whether to eat a second hamburger after you have already eaten one.

According to economists, when individuals make decisions by comparing marginal benefits with marginal costs, they are making **decisions at the margin**. The employee makes a decision at the margin in deciding whether to work two hours overtime; the economics professor makes a decision at the margin in deciding whether to put an additional question on the final exam.

#### Marginal Benefits (MB)

Additional benefits; the benefits connected with consuming an additional unit of a good or undertaking one more unit of an activity.

#### Marginal Costs (MC)

Additional costs; the costs connected with consuming an additional unit of a good or undertaking one more unit of an activity.

#### Decisions at the Margin

Decision making characterized by weighing the additional (marginal) benefits of a change against the additional (marginal) costs of a change with respect to current conditions.

# ECONOMICS 24/7

## When Is It Too Costly to Attend College?

Look around your class. Are there any big-name actors, sports stars, or comedians between the ages of 18 and 25 in your class? Probably not. The reason is that, for these people, the opportunity cost of attending college is much higher than it is for most 18-to-25-year-olds. Think of LeBron James, a basketball star, Chris Rock, a comedian, Johnny Depp, an actor, Will Smith, also an actor—these people and many more like them chose not to go to college. Why didn't they go to college? The fact is that they didn't go to college because it was too expensive for them to go to college. Not "too expensive" in the sense that the "tuition was too high," but expensive in terms of what they would have had to give up if they attended college—expensive in opportunity cost terms.

To understand this idea, think of what it's costing you to attend college. If you pay \$3,000 tuition a semester for eight semesters, the full tuition amounts to \$24,000. However, \$24,000 is not the full cost of attending college, because if you were not a student, you could be earning income working at a job. For example, you could be working at a full-time job earning \$32,000 annually. Certainly, this \$32,000, or at least part of it if you are currently working part time, is forfeited because you are attending college. It is part of the total cost of your attending college.

The *tuition cost* may be the same for everyone who attends your college, but the *opportunity cost* is not. Some people have higher opportunity costs of attending college than others. It just so happens that Johnny Depp, LeBron James, Will Smith, and Chris Rock had extremely high opportunity costs of attending college. Each would have to give up hundreds of thousands of dollars if he were to attend college on a full-time basis.

Simply put, our story illustrates two related points we have made in this chapter. First, earlier we said that *the higher the opportunity cost of doing something, the less likely it will be done*. The opportunity cost of attending college is higher for some people than others, and that is why not everyone who can pay for college chooses to attend college.



Kent Smith/NBAE/Getty Images

Second, we said that economists believe that *individuals think and act in terms of costs and benefits and that they undertake actions only if they expect the benefits to outweigh the costs*. Thus, Johnny Depp, LeBron James, Will Smith, and Chris Rock saw certain benefits to attending college—just as you see certain benefits to attending college. But those benefits—although they may be the same for you and everyone else—are not enough to get everyone to attend college. That's because the benefits are not all that matters. The costs matter, too. In the case of Johnny Depp, LeBron James, Will Smith, and Chris Rock, the costs of attending college were much higher than the benefits, so they chose not to attend college. In your case, the benefits are higher than the costs, so you have decided to attend college.

### 1-3e Efficiency

What is the right amount of time to study for a test? In economics, the *right amount* of anything is the *optimal* or *efficient* amount—the amount for which the marginal benefits equal the marginal costs. Stated differently, you have achieved **efficiency** when the marginal benefits equal the marginal costs.

Suppose you are studying for an economics test, and for the first hour of studying, the marginal benefits (*MB*) are greater than the marginal costs (*MC*):

$$MB \text{ studying first hour} > MC \text{ studying first hour}$$

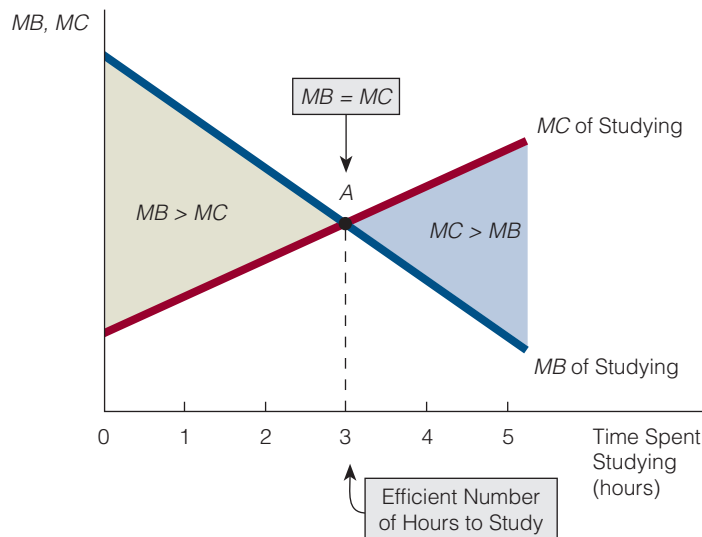
Given this condition, you will certainly study for the first hour, because it is worth it: The additional benefits are greater than the additional costs, so there is a net benefit to studying.

Suppose, for the second hour of studying, the marginal benefits are still greater than the marginal costs:

$$MB \text{ studying second hour} > MC \text{ studying second hour}$$

Then you will study for the second hour, because the additional benefits are still greater than the additional costs. In other words, studying the second hour is worthwhile. In fact, you will continue to study as long as the marginal benefits are greater than the marginal costs. Exhibit 2 illustrates this discussion graphically.

#### EXHIBIT 2



#### Efficiency

*MB* = marginal benefits and *MC* = marginal costs. In the exhibit, the *MB* curve of studying is downward sloping and the *MC* curve of studying is upward sloping. As long as  $MB > MC$ , the person will study. The person stops studying when  $MB = MC$ . This point is where efficiency is achieved.