

GLENN
HUBBARD

ANTHONY PATRICK
O'BRIEN



Macroeconomics

EIGHTH EDITION



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BRIEF CONTENTS

Preface	P-1
A Word of Thanks	P-26

PART 1 Introduction

Chapter 1: Economics: Foundations and Models	2
Appendix: Using Graphs and Formulas	27
Chapter 2: Trade-offs, Comparative Advantage, and the Market System	40
Chapter 3: Where Prices Come From: The Interaction of Demand and Supply	72
Chapter 4: Economic Efficiency, Government Price Setting, and Taxes	108
Appendix: Quantitative Demand and Supply Analysis	143
Chapter 5: The Economics of Health Care	148

PART 2 Firms in the Domestic and International Economies

Chapter 6: Firms, the Stock Market, and Corporate Governance	182
Appendix: Using Present Value	206
* Online Appendix: Income Statements and Balance Sheets	
Chapter 7: Comparative Advantage and the Gains from International Trade	212

PART 3 Macroeconomic Foundations and Long-Run Growth

Chapter 8: GDP: Measuring Total Production and Income	248
Chapter 9: Unemployment and Inflation	276
Chapter 10: Economic Growth, the Financial System, and Business Cycles	316
Chapter 11: Long-Run Economic Growth: Sources and Policies	350

PART 4 Short-Run Fluctuations

Chapter 12: Aggregate Expenditure and Output in the Short Run	392
Appendix: The Algebra of Macroeconomic Equilibrium	436
Chapter 13: Aggregate Demand and Aggregate Supply Analysis	438
Appendix: Macroeconomic Schools of Thought	474

PART 5 Monetary and Fiscal Policy

Chapter 14: Money, Banks, and the Federal Reserve System	478
Chapter 15: Monetary Policy	516
Chapter 16: Fiscal Policy	560
Appendix: A Closer Look at the Multiplier	604
Chapter 17: Inflation, Unemployment, and Federal Reserve Policy	610

PART 6 The International Economy

Chapter 18: Macroeconomics in an Open Economy	644
* Online Appendix: The Gold Standard and the Bretton Woods System	

Glossary	G-1
Company Index	I-1
Subject Index	I-3
Credits	C-1

* Online appendices can be found within **MyLab Economics** or within an associated eText.

CONTENTS

Preface	P-1		
A Word of Thanks	P-26		
PART 1 Introduction			
CHAPTER 1: Economics: Foundations and Models	2		
Does Apple Manufacture the iPhone in the United States?	2		
1.1 Three Key Economic Ideas	4		
People Are Rational	5		
People Respond to Economic Incentives	5		
Apply the Concept: Would a Congressional Bill Aimed at Increasing the Pay of Low-Wage Workers Backfire?	5		
Optimal Decisions Are Made at the Margin	6		
Solved Problem 1.1: The Marginal Benefit and Marginal Cost of Delivering Packages for Amazon	7		
1.2 The Economic Problem That Every Society Must Solve	8		
What Goods and Services Will Be Produced?	8		
How Will the Goods and Services Be Produced?	8		
Who Will Receive the Goods and Services Produced?	9		
Centrally Planned Economies versus Market Economies	9		
The Modern “Mixed” Economy	10		
Efficiency and Equity	10		
1.3 Economic Models	11		
The Role of Assumptions in Economic Models	12		
Forming and Testing Hypotheses in Economic Models	12		
Positive and Normative Analysis	13		
Don’t Let This Happen to You: Don’t Confuse Positive Analysis with Normative Analysis	14		
Economics as a Social Science	14		
Apply the Concept: What Can Economics Contribute to the Debate over Tariffs?	14		
1.4 Microeconomics and Macroeconomics	15		
1.5 Economic Skills and Economics as a Career	16		
1.6 A Preview of Important Economic Terms	17		
Conclusion	19		
An Inside Look: Are Tariffs Bringing Manufacturing Jobs Back Home or Just Raising Prices?	20		
*Chapter Summary and Problems	22		
Key Terms, Summary, Review Questions, Problems and Applications, and Critical Thinking Exercises			
Appendix: Using Graphs and Formulas	27		
Graphs of One Variable	28		
		Graphs of Two Variables	29
		Slopes of Lines	30
		Taking into Account More Than Two Variables on a Graph	31
		Positive and Negative Relationships	31
		Determining Cause and Effect	32
		Are Graphs of Economic Relationships Always Straight Lines?	33
		Slopes of Nonlinear Curves	34
		Formulas	35
		Formula for a Percentage Change	36
		Formulas for the Areas of a Rectangle and a Triangle	36
		Summary of Using Formulas	37
		Problems and Applications	38
		CHAPTER 2: Trade-offs, Comparative Advantage, and the Market System	40
		Elon Musk and Tesla Motors Face a Trade-off	40
		2.1 Production Possibilities Frontiers and Opportunity Costs	42
		Graphing the Production Possibilities Frontier	42
		Solved Problem 2.1: Analyzing Trade-offs Using a Production Possibilities Frontier for Tesla Motors	44
		Increasing Marginal Opportunity Costs	46
		Economic Growth	47
		2.2 Comparative Advantage and Trade	47
		Specialization and Gains from Trade	48
		Absolute Advantage versus Comparative Advantage	50
		Comparative Advantage and the Gains from Trade	51
		Don’t Let This Happen to You: Don’t Confuse Absolute Advantage and Comparative Advantage	51
		Solved Problem 2.2: Comparative Advantage and the Gains from Trade	51
		Apply the Concept: Comparative Advantage, Opportunity Cost, and Housework	53
		2.3 The Market System	54
		The Circular Flow of Income	55
		The Gains from Free Markets	56
		The Market Mechanism	56
		Apply the Concept: A Story of the Market System in Action: How Do You Make an iPad?	57
		The Role of the Entrepreneur in the Market System	59
		The Legal Basis of a Successful Market System	59
		Apply the Concept: What Is Socialism?	61
		Conclusion	63
		An Inside Look: A Plug-in Porsche?	64
		Chapter Summary and Problems	66

* These end-of-chapter resource materials repeat in all chapters. Select chapters also include Real-Time Data Exercises. Students can complete all questions, problems, and exercises in **MyLab Economics**.

CHAPTER 3: Where Prices Come From: The Interaction of Demand and Supply	72	Apply the Concept: The Consumer Surplus from Uber	112
A Basketball Player Takes a Tumble—And So Does Nike	72	Producer Surplus	114
3.1 The Demand Side of the Market	74	What Consumer Surplus and Producer Surplus Measure	115
Demand Schedules and Demand Curves	74	4.2 The Efficiency of Competitive Markets	115
The Law of Demand	75	Marginal Benefit Equals Marginal Cost in Competitive Equilibrium	115
What Explains the Law of Demand?	75	Economic Surplus	116
Holding Everything Else Constant: The <i>Ceteris Paribus</i> Condition	76	Deadweight Loss	117
Variables That Shift Market Demand	76	Economic Surplus and Economic Efficiency	117
Apply the Concept: Millennials and Generation Z Shake Up the Markets for Groceries, Big Macs, and Running Shoes	78	4.3 Government Intervention in the Market: Price Floors and Price Ceilings	118
A Change in Demand versus a Change in Quantity Demanded	79	Price Floors: Government Policy in Agricultural Markets	118
Apply the Concept: Forecasting the Demand for Athletic Shoes	80	Apply the Concept: Price Floors in Labor Markets: The Debate over Minimum Wage Policy	119
3.2 The Supply Side of the Market	82	Price Ceilings: Government Rent Control Policy in Housing Markets	121
Supply Schedules and Supply Curves	82	Don't Let This Happen to You: Don't Confuse "Scarcity" with "Shortage"	122
The Law of Supply	83	Black Markets and Peer-to-Peer Sites	122
Variables That Shift Market Supply	83	Solved Problem 4.3: What's the Economic Effect of a Black Market in Renting Apartments?	123
Apply the Concept: Fracking, the U.S. Oil Boom, and Expected Oil Prices	84	The Results of Government Price Controls: Winners, Losers, and Inefficiency	124
A Change in Supply versus a Change in Quantity Supplied	85	Apply the Concept: Price Controls Lead to Economic Crisis in Venezuela	124
3.3 Market Equilibrium: Putting Demand and Supply Together	87	Positive and Normative Analysis of Price Ceilings and Price Floors	126
How Markets Eliminate Surpluses and Shortages	88	4.4 The Economic Effect of Taxes	126
Demand and Supply Both Count	89	The Effect of Taxes on Economic Efficiency	126
Solved Problem 3.3: Demand and Supply Both Count: A Tale of Two Letters	89	Tax Incidence: Who Actually Pays a Tax?	127
3.4 The Effect of Demand and Supply Shifts on Equilibrium	90	Solved Problem 4.4: Who Bears the Burden of the Seattle Beverage Tax?	128
The Effect of Shifts in Demand on Equilibrium	90	Apply the Concept: Is the Burden of the Social Security Tax Really Shared Equally between Workers and Firms?	131
The Effect of Shifts in Supply on Equilibrium	90	Conclusion	133
The Effect of Shifts in Demand and Supply over Time	91	An Inside Look: Uber Fights to Repeal New York City Restrictions	134
Apply the Concept: Higher Demand for Cobalt—But Lower Prices?	93	Chapter Summary and Problems	136
Solved Problem 3.4: Can We Predict Changes in the Price and Quantity of Merino Wool?	94	Appendix: Quantitative Demand and Supply Analysis	143
Shifts in a Curve versus Movements along a Curve	95	Demand and Supply Equations	143
Don't Let This Happen to You: Remember: A Change in a Good's Price Does Not Cause the Demand or Supply Curve to Shift	96	Calculating Consumer Surplus and Producer Surplus	144
Conclusion	97	Review Questions	146
An Inside Look: If the Shoe Fits . . . Print It?	98	Problems and Applications	147
Chapter Summary and Problems	100	CHAPTER 5: The Economics of Health Care	148
CHAPTER 4: Economic Efficiency, Government Price Setting, and Taxes	108	Goodbye to Blue Cross and Blue Shield?	148
What Do Food Riots in Venezuela and the Rise of Uber in the United States Have in Common?	108	5.1 The Improving Health of People in the United States	150
4.1 Consumer Surplus and Producer Surplus	110	Changes over Time in U.S. Health	150
Consumer Surplus	110	Reasons for Long-Run Improvements in U.S. Health	151
		5.2 Health Care around the World	152
		The U.S. Health Care System	152

Apply the Concept: The Increasing Importance of Health Care in the U.S. Economy 154
 The Health Care Systems of Canada, Japan, and the United Kingdom 155
 Comparing Health Care Outcomes around the World 156
 How Useful Are Cross-Country Comparisons of Health Outcomes? 157

5.3 Information Problems and Externalities in the Market for Health Care 158
 Adverse Selection and the Market for “Lemons” 158
 Asymmetric Information in the Market for Health Insurance 159
Don’t Let This Happen to You: Don’t Confuse Adverse Selection with Moral Hazard 160
 Externalities in the Market for Health Care 161
 Should the Government Run the Health Care System? 163

5.4 The Debate over Health Care Policy in the United States 164
 The Rising Cost of Health Care 164
Apply the Concept: Are U.S. Firms Handicapped by Paying for Their Employees’ Health Insurance? 166
 Explaining Increases in Health Care Spending 167
 The Continuing Debate over Health Care Policy 170
Solved Problem 5.4: Recent Trends in U.S. Health Care 171
 Market-Based Reforms 172
Apply the Concept: Medicare for All? 173
Conclusion 175
Chapter Summary and Problems 176

PART 2 Firms in the Domestic and International Economies

CHAPTER 6: Firms, the Stock Market, and Corporate Governance 182
Investing in Lyft, a Company That Has Never Earned a Profit? 182

6.1 Types of Firms 184
 Who Is Liable? Limited and Unlimited Liability Corporations Earn the Majority of Revenue and Profits 184
Apply the Concept: Why Are Fewer Young People Starting Businesses? 186
 The Structure of Corporations and the Principal–Agent Problem 187

6.2 How Firms Raise Funds 188
 Sources of External Funds 188
Apply the Concept: The Rating Game: Are Federal, State, or City Governments Likely to Default on Their Bonds? 189
 Stock and Bond Markets Provide Capital—and Information 191
 The Fluctuating Stock Market 192
Don’t Let This Happen to You: When Lyft Shares Are Sold, Lyft Doesn’t Get the Money 192

Why Is It So Hard to Beat the Market? 194
Apply the Concept: Why Would Anyone Buy Lyft’s Stock? 195
Solved Problem 6.2: Why Does Warren Buffett Like Mutual Funds? 196

6.3 Using Financial Statements to Evaluate a Corporation 197
 The Income Statement 197
 The Balance Sheet 198
 Problems in Corporate Governance 198
Apply the Concept: Should Investors Worry about Corporate Governance at Lyft? 199
Conclusion 201
Chapter Summary and Problems 202
Appendix: Using Present Value 206
The Concept of Present Value 206
Solved Problem 6A.1: How to Receive Your Contest Winnings 208
 Using Present Value to Calculate Bond Prices 208
 Using Present Value to Calculate Stock Prices 209
 A Simple Formula for Calculating Stock Prices 209
 Review Questions 210
 Problems and Applications 210

Online Appendix: Income Statements and Balance Sheets

CHAPTER 7: Comparative Advantage and the Gains from International Trade 212
Being Careful What You Wish For: Trade Wars and Whirlpool 212

7.1 The United States in the International Economy 214
 The Importance of Trade to the U.S. Economy 215
 U.S. International Trade in a World Context 216

7.2 Comparative Advantage in International Trade 217
 A Brief Review of Comparative Advantage 217
 Comparative Advantage and Absolute Advantage 217

7.3 How Countries Gain from International Trade 218
 Increasing Consumption through Trade 219
Solved Problem 7.3: The Gains from Trade 220
 Why Don’t We See Complete Specialization? 221
 Does Anyone Lose as a Result of International Trade? 222
Don’t Let This Happen to You: Remember That Trade Creates Both Winners and Losers 222
Apply the Concept: Who Gains and Who Loses from U.S. Trade with China? 222
 Where Does Comparative Advantage Come From? 225

7.4 Government Policies That Restrict International Trade 226
 Tariffs 227
 Quotas and Voluntary Export Restraints 228
 Measuring the Economic Effect of the Sugar Quota 228
Solved Problem 7.4: Measuring the Economic Effect of a Quota 230
 The High Cost of Preserving Jobs with Tariffs and Quotas 231
Apply the Concept: Smoot-Hawley, the Politics of Tariffs, and the Cost of Protecting a Vanishing Industry 231

Gains from Unilateral Elimination of Tariffs and Quotas 233
 Other Barriers to Trade 233
7.5 The Debate over Trade Policies and Globalization 233
 Why Do Some People Oppose the World Trade Organization? 234
 Dumping 236
Apply the Concept: The Trade War of 2018 237
 Positive versus Normative Analysis (Once Again) 238
Conclusion 239
Chapter Summary and Problems 240

PART 3 Macroeconomic Foundations and Long-Run Growth

CHAPTER 8: GDP: Measuring Total Production and Income 248
Politics, Macroeconomics, and General Motors 248
8.1 Gross Domestic Product Measures Total Production 251
 Measuring Total Production: Gross Domestic Product 251
Solved Problem 8.1: Calculating GDP 252
 Production, Income, and the Circular-Flow Diagram 252
 Components of GDP 254
Don't Let This Happen to You: Remember What Economists Mean by *Investment* 255
 An Equation for GDP and Some Actual Values 255
Apply the Concept: Microsoft's Steve Ballmer Uses the U.S. Constitution to Reorganize Government Data 256
 Measuring GDP Using the Value-Added Method 258
8.2 Does GDP Measure What We Want It to Measure? 258
 Shortcomings in GDP as a Measure of Total Production 258
Apply the Concept: Why Do Many Developing Countries Have Such Large Underground Economies? 259
 Shortcomings of GDP as a Measure of Well-Being 260
8.3 Real GDP versus Nominal GDP 261
 Calculating Real GDP 262
Solved Problem 8.3: Calculating Real GDP 262
 Comparing Real GDP and Nominal GDP 263
 The GDP Deflator 264
8.4 Other Measures of Total Production and Total Income 264
 Gross National Product 265
 National Income 265
 Personal Income 265
 Disposable Personal Income 265
 The Division of Income 265
Apply the Concept: Should We Pay More Attention to Gross Domestic Income? 267

Conclusion 268
Chapter Summary and Problems 269
CHAPTER 9: Unemployment and Inflation 276
Former Inmates and Stoughton Trailers Meet in a High-Pressure Economy 276
9.1 Measuring the Unemployment Rate, the Labor Force Participation Rate, and the Employment–Population Ratio 278
 The Household Survey 278
Solved Problem 9.1: What Happens if the BLS Includes the Military? 280
 Problems with Measuring the Unemployment Rate 281
 Unemployment Rates for Different Groups 282
 How Long Are People Typically Unemployed? 283
 Trends in Labor Force Participation 283
Apply the Concept: How Large Is the Potential U.S. Labor Force? 284
 The Establishment Survey: Another Measure of Employment 286
 Revisions in the Establishment Survey Employment Data: How Bad Was the 2007–2009 Recession? 287
 Job Creation and Job Destruction over Time 288
9.2 Types of Unemployment 288
 Frictional Unemployment and Job Search 288
 Structural Unemployment 289
 Cyclical Unemployment 290
 Full Employment 290
Apply the Concept: Will Advances in Information Technology Permanently Increase Structural Unemployment? 290
9.3 Explaining Unemployment 292
 Government Policies and the Unemployment Rate 292
 Labor Unions 293
 Efficiency Wages 294
9.4 Measuring Inflation 294
 The Consumer Price Index 294
 Is the CPI Accurate? 296
Don't Let This Happen to You: Don't Miscalculate the Inflation Rate 296
 The Producer Price Index 297
9.5 Using Price Indexes to Adjust for the Effects of Inflation 297
Solved Problem 9.5: What Has Been Happening to Real Wages in the United States? 298
9.6 Nominal Interest Rates versus Real Interest Rates 299
9.7 Does Inflation Impose Costs on the Economy? 301
 Inflation Affects the Distribution of Income 302
 The Problem with Anticipated Inflation 302
 The Problem with Unanticipated Inflation 303
Apply the Concept: What's So Bad about Falling Prices? 303
Conclusion 305
Chapter Summary and Problems 306

CHAPTER 10: Economic Growth, the Financial System, and Business Cycles	316	Technological Change: The Key to Sustaining Economic Growth	359
Millennials Experience the iPhone, Snapchat, . . . and the Great Recession	316	Apply the Concept: What Explains the Economic Failure of the Soviet Union?	360
10.1 Long-Run Economic Growth	318	Solved Problem 11.2: Using the Economic Growth Model to Analyze the Failure of the Soviet Economy	361
Apply the Concept: The Connection between Economic Prosperity and Health	319	New Growth Theory	362
Calculating Growth Rates and the Rule of 70	321	Joseph Schumpeter and Creative Destruction	363
What Determines the Rate of Long-Run Growth?	322	11.3 Economic Growth in the United States	364
Solved Problem 10.1: Where Does Productivity Come From?	323	Economic Growth in the United States since 1950	365
Apply the Concept: Can India Sustain Its Rapid Growth?	324	Is the United States Headed for a Long Period of Slow Growth?	365
Potential GDP	326	11.4 Why Isn't the Whole World Rich?	367
10.2 Saving, Investment, and the Financial System	327	Catch-up: Sometimes but Not Always	368
An Overview of the Financial System	327	Solved Problem 11.4: The Economic Growth Model's Prediction of Catch-up	370
The Macroeconomics of Saving and Investment	328	Why Haven't Most Western European Countries, Canada, and Japan Caught Up to the United States?	371
The Market for Loanable Funds	330	Why Don't More Low-Income Countries Experience Rapid Growth?	373
Apply the Concept: Ebenezer Scrooge: Accidental Promoter of Economic Growth?	331	Apply the Concept: Why Hasn't Mexico Grown as Fast as China?	373
Solved Problem 10.2: Are Future Budget Deficits a Threat to the Economy?	333	The Benefits of Globalization	376
10.3 The Business Cycle	335	11.5 Growth Policies	376
Some Basic Business Cycle Definitions	335	Enhancing Property Rights and the Rule of Law	377
How Do We Know When the Economy Is in a Recession?	336	Apply the Concept: Will China's Standard of Living Ever Exceed That of the United States?	377
What Happens during the Business Cycle?	337	Improving Health and Education	378
Don't Let This Happen to You: Don't Confuse the Price Level and the Inflation Rate	338	Policies That Promote Technological Change	379
Has the U.S. Economy Returned to Stability?	342	Policies That Promote Saving and Investment	379
Conclusion	343	Apply the Concept: Is Sub-Saharan Africa on the Road to Economic Growth?	380
Chapter Summary and Problems	344	Is Economic Growth Good or Bad?	381
 		Conclusion	382
CHAPTER 11: Long-Run Economic Growth: Sources and Policies	350	Chapter Summary and Problems	383
Technological Change, Creative Destruction, and Rising Living Standards	350		
11.1 Economic Growth over Time and around the World	352		
Economic Growth from 1,000,000 B.C.E. to the Present	352		
Apply the Concept: Why Did the Industrial Revolution Begin in England?	353		
Small Differences in Growth Rates Are Important	354		
The Problem with Slow Economic Growth	355		
Don't Let This Happen to You: Don't Confuse the Average Annual Percentage Change with the Total Percentage Change	355		
The Variation in per Capita Income around the World	355		
Is Income All That Matters?	356		
11.2 What Determines How Fast Economies Grow?	357		
The Per-Worker Production Function	358		
Which Is More Important for Economic Growth: More Capital or Technological Change?	359		

PART 4 Short-Run Fluctuations

CHAPTER 12: Aggregate Expenditure and Output in the Short Run	392
Glamping and Airstream's Ride on the Business Cycle	392
12.1 The Aggregate Expenditure Model	394
Aggregate Expenditure	394
The Difference between Planned Investment and Actual Investment	395
Macroeconomic Equilibrium	395
Adjustments to Macroeconomic Equilibrium	396
12.2 Determining the Level of Aggregate Expenditure in the Economy	397
Consumption	397
The Volatility of Consumer Spending on Durables	399

14.3 How Do Banks Create Money?	488	A Summary of How Monetary Policy Works	534
Bank Balance Sheets	488	Don't Let This Happen to You: Remember	
Apply the Concept: Help for Young Borrowers: Fintech or Ceilings on Interest Rates?	489	That with Monetary Policy, It's the Interest Rates—Not the Money—That Counts	534
Using T-accounts to Show How a Bank Can Create Money	491	15.4 Monetary Policy in the Dynamic Aggregate Demand and Aggregate Supply Model	535
The Simple Deposit Multiplier	493	The Effects of Monetary Policy on Real GDP and the Price Level: A More Complete Account	535
Don't Let This Happen to You: Don't Confuse Assets and Liabilities	494	Using Monetary Policy to Fight Inflation	536
Solved Problem 14.3: Showing How Banks Create Money	494	Solved Problem 15.4: The Effects of Monetary Policy	538
The Simple Deposit Multiplier versus the Real-World Deposit Multiplier	496	15.5 A Closer Look at the Fed's Setting of Monetary Policy Targets	539
14.4 The Federal Reserve System	497	Should the Fed Target the Money Supply?	539
The Establishment of the Federal Reserve System	497	Why Doesn't the Fed Target Both the Money Supply and the Interest Rate?	540
How the Federal Reserve Manages the Money Supply	499	The Taylor Rule	541
The "Shadow Banking System" and the Financial Crisis of 2007–2009	502	Solved Problem 15.5: Applying the Taylor Rule	542
14.5 The Quantity Theory of Money	504	Inflation Targeting . . . or Nominal GDP Targeting?	543
Connecting Money and Prices: The Quantity Equation	504	Apply the Concept: Should the Fed Worry about the Prices of Food and Gasoline?	544
The Quantity Theory Explanation of Inflation	504	15.6 Fed Policies during the 2007–2009 Recession	545
How Accurate Are Forecasts of Inflation Based on the Quantity Theory?	505	The Inflation and Deflation of the Housing Market Bubble	545
High Rates of Inflation	506	The Changing Mortgage Market	546
Apply the Concept: The German Hyperinflation of the Early 1920s	507	The Role of Investment Banks	546
Conclusion	508	Apply the Concept: The Wonderful World of Leverage	547
Chapter Summary and Problems	509	The Fed and the Treasury Department Respond	548
CHAPTER 15: Monetary Policy	516	Conclusion	550
Who Elected the Fed?	516	Chapter Summary and Problems	551
15.1 What Is Monetary Policy?	518	CHAPTER 16: Fiscal Policy	560
The Goals of Monetary Policy	518	Can Fiscal Policy Increase Economic Growth?	560
15.2 The Money Market and the Fed's Choice of Monetary Policy Targets	520	16.1 What Is Fiscal Policy?	562
Monetary Policy Targets	520	What Fiscal Policy Is and What It Isn't	562
The Demand for Money	520	Automatic Stabilizers versus Discretionary Fiscal Policy	562
Shifts in the Money Demand Curve	521	An Overview of Government Spending and Taxes	562
How the Fed Manages the Money Supply:		Apply the Concept: Is Spending on Social Security and Medicare a Fiscal Time Bomb?	565
A Quick Review	522	16.2 The Effects of Fiscal Policy on Real GDP and the Price Level	567
Equilibrium in the Money Market	522	Short-Run Expansionary and Contractionary Fiscal Policy	567
A Tale of Two Interest Rates	524	A Summary of How Fiscal Policy Affects Aggregate Demand	569
Choosing a Monetary Policy Target	524	Don't Let This Happen to You: Don't Confuse Fiscal Policy and Monetary Policy	569
The Importance of the Federal Funds Rate	524	16.3 Fiscal Policy in the Dynamic Aggregate Demand and Aggregate Supply Model	569
Managing the Federal Funds Rate Today	525	16.4 The Government Purchases and Tax Multipliers	571
15.3 Monetary Policy and Economic Activity	526	The Effect of Changes in the Tax Rate	574
How Interest Rates Affect Aggregate Demand	526	Taking into Account the Effects of Aggregate Supply	574
The Effects of Monetary Policy on Real GDP and the Price Level	527	The Multipliers Work in Both Directions	575
Apply the Concept: Quantitative Easing, the Fed's Balance Sheet, and Negative Interest Rates in Europe	528	Solved Problem 16.4: Fiscal Policy Multipliers	575
Can the Fed Eliminate Recessions?	530		
Fed Forecasts	532		
Apply the Concept: Trying to Hit a Moving Target: Making Policy with "Real-Time Data"	532		

16.5 The Limits to Using Fiscal Policy to Stabilize the Economy 576

- Apply the Concept:** Why Was the Recession of 2007–2009 So Severe? 576
- Does Government Spending Reduce Private Spending? 578
- Crowding Out in the Short Run 578
- Crowding Out in the Long Run 579
- Fiscal Policy in Action: Did the Stimulus Package of 2009 Succeed? 580

16.6 Deficits, Surpluses, and Federal Government Debt 582

- How the Federal Budget Can Serve as an Automatic Stabilizer 583
- Should the Federal Budget Always Be Balanced? 585
- Solved Problem 16.6:** The Italian Government Confronts a Budget Deficit 585
- The Federal Government Debt 586
- Is Government Debt a Problem? 587
- Apply the Concept:** Modern Monetary Theory: Should We Stop Worrying and Love the Debt? 587

16.7 Long-Run Fiscal Policy and Economic Growth 588

- Explaining Long-Run Increases in Real GDP 589
- How Can Fiscal Policy Affect Long-Run Economic Growth? The Long-Run Effects of Tax Policy 590
- Tax Simplification 591
- The Economic Effects of Tax Reform 591
- How Large Are Supply-Side Effects? 592
- Apply the Concept:** Will President Trump’s Fiscal Policy Raise the Rate of Economic Growth? 593

Conclusion 595

Chapter Summary and Problems 596

Appendix: A Closer Look at the Multiplier 604

An Expression for Equilibrium Real GDP 604

A Formula for the Government Purchases Multiplier 605

A Formula for the Tax Multiplier 606

The “Balanced Budget” Multiplier 606

The Effects of Changes in Tax Rates on the Multiplier 607

The Multiplier in an Open Economy 607

- Problem and Applications 609

CHAPTER 17: Inflation, Unemployment, and Federal Reserve Policy 610

The Fed Deals with Inflation, Unemployment, . . . and the President 610

17.1 The Discovery of the Short-Run Trade-off between Unemployment and Inflation 612

- Explaining the Phillips Curve with Aggregate Demand and Aggregate Supply Curves 613
- Is the Phillips Curve a Policy Menu? 614
- Is the Short-Run Phillips Curve Stable? 614
- The Long-Run Phillips Curve 614
- The Role of Expectations of Future Inflation 615
- Apply the Concept:** Do Workers Understand Inflation? 616

17.2 The Short-Run and Long-Run Phillips Curves 617

- Shifts in the Short-Run Phillips Curve 618
- How Does a Vertical Long-Run Phillips Curve Affect Monetary Policy? 619
- Apply the Concept:** Does the Natural Rate of Unemployment Ever Change? 620
- Solved Problem 17.2:** Changing Views of the Phillips Curve 621

17.3 Monetary Policy and Expectations of the Inflation Rate 622

- The Implications of Rational Expectations for Monetary Policy 622
- Is the Short-Run Phillips Curve Really Vertical? 623
- Real Business Cycle Models 624

17.4 Federal Reserve Policy from the 1970s to the Present 624

- The Effect of a Supply Shock on the Phillips Curve 625
- Paul Volcker and Disinflation 626
- Don’t Let This Happen to You:** Don’t Confuse Disinflation with Deflation 627
- Solved Problem 17.4:** Using Monetary Policy to Lower the Inflation Rate 627
- Recent Fed Chairs and the Debate over the Fed’s Future 629
- Apply the Concept:** Has the Phillips Curve Disappeared? 631
- Should the Fed Be Independent of Congress and the President? 633

Conclusion 636

Chapter Summary and Problems 637

PART 6 The International Economy

CHAPTER 18: Macroeconomics in an Open Economy 644

Amazon Deals with a Fluctuating Dollar 644

18.1 The Balance of Payments: Linking the United States to the International Economy 646

- The Current Account 646
- The Financial Account 648
- The Capital Account 648
- Why Is the Balance of Payments Always Zero? 648
- Don’t Let This Happen to You:** Don’t Confuse the Trade Balance, the Current Account Balance, and the Balance of Payments 649

18.2 The Foreign Exchange Market and Exchange Rates 650

- Equilibrium in the Market for Foreign Exchange 650
- Shifts in Demand and Supply in the Foreign Exchange Market 651

How Movements in the Exchange Rate Affect Exports and Imports	653	Domestic Saving, Domestic Investment, and Net Foreign Investment	664
Apply the Concept: Is a Strong Currency Good for a Country?	654	Solved Problem 18.4: Arriving at the Saving and Investment Equation	665
Don't Let This Happen to You: Don't Confuse What Happens When a Currency Appreciates with What Happens When It Depreciates	655	18.5 The Effect of a Government Budget Deficit on Investment	666
Solved Problem 18.2: Toyota Rides the Exchange Rate Rollercoaster	655	18.6 Monetary Policy and Fiscal Policy in an Open Economy	668
The Real Exchange Rate	656	Monetary Policy in an Open Economy	668
Exchange Rates in the Long Run	656	Fiscal Policy in an Open Economy	668
Apply the Concept: The Big Mac Theory of Exchange Rates	658	Conclusion	669
18.3 Exchange Rate Systems	659	Chapter Summary and Problems	670
The Floating Dollar	659	Online Appendix: The Gold Standard and the Bretton Woods System	
The Euro	660	Glossary	G-1
Pegging against the Dollar	661	Company Index	I-1
Apply the Concept: The Chinese Yuan: The World's Most Controversial Currency	662	Subject Index	I-3
18.4 The International Sector and National Saving and Investment	664	Credits	C-1
Net Exports Equal Net Foreign Investment	664		

PREFACE

Our approach in this new edition remains what it was in the first edition: to provide students and instructors with a text that delivers complete coverage of economic topics using many real-world examples. Our goal from the beginning has been to teach economics in a “widget-free” way by using real-world business and policy examples.

Much has happened in the U.S. and world economies since we prepared the previous edition, including the longest economic expansion in the history of the U.S. economy, the first significant international trade war since the 1930s, and record peacetime federal budget deficits. We have incorporated many of these developments in the new real-world examples and policy discussions in this edition and also in the extensive digital resources, which include:

- More than 70 author-created application videos of the chapter openers and *Apply the Concept* features
- More than 160 figure animation videos
- More than 20 *Solved Problem* whiteboard videos

New to This Edition

Here is an overview of the revisions, followed by a more detailed description of the changes in each chapter.

Overview of Changes

- All the chapter openers feature either new companies or have updated information.
- Chapters 1–4 include new *An Inside Look* features to help students apply economic thinking to current events and policy debates as they are presented in news articles.
- There are 14 new *Apply the Concept* features and videos to help students tie economic concepts to current events and policy issues. The *Apply the Concept* features and videos that were retained from the previous edition have been updated.
- There are 4 new *Solved Problems*, and many of those retained from the previous edition have been updated. The *Solved Problem* feature uses real-world products, events, and policies to help students break down and answer economic problems step by step. New to this edition are whiteboard videos of select *Solved Problems* that bring these real-world problems to life with audio, background photos, and step-by-step construction of graphs and tables.
- All the figures and tables and their animations have been updated with the latest data available.
- Many of the end-of-chapter *Problems and Applications* have been updated or replaced. In most chapters, one or two problems include graphs or tables for students to analyze. Select chapters have a category titled *Real-Time Data Exercises*, and we have updated some of those exercises.
- Based on marketing feedback and our analysis of instructor assignments, we have made the following organizational changes to the print version of the book:
 - We cut the income statement and balance sheet material from the appendix to Chapter 6 (the discussion of present value was retained) and the gold standard and Bretton Woods material from the appendix to Chapter 19 (now Chapter 18). All of this material is still available within MyLab Economics for instructors and students who wish to use it.

- We streamlined and merged Chapter 18, “Macroeconomics in an Open Economy,” and Chapter 19, “The International Financial System” into one chapter, Chapter 18, “Macroeconomics in an Open Economy”

New Content and Features by Chapter

Here is a description of key changes by chapter.

Chapter 1, “Economics: Foundations and Models,” opens with a new discussion of how the Trump administration’s tariff policy may affect Apple and other firms. *An Inside Look* at the end of the chapter presents a news article and analysis of whether those tariffs are bringing manufacturing jobs back home or primarily raising prices for U.S. consumers. New *Solved Problem 1.1* analyzes the marginal benefit and marginal cost of the U.S. Postal Service delivering packages for Amazon. A new *Apply the Concept* discusses whether a congressional bill aimed at increasing the pay of low-wage workers could backfire.

Chapter 2, “Trade-offs, Comparative Advantage, and the Market System,” opens with an updated discussion of the resource allocation decisions Elon Musk and managers at Tesla Motors face. *An Inside Look* at the end of the chapter discusses the plans of Porsche’s parent company, Volkswagen, to create a full line of electric automobiles. A new *Apply the Concept* discusses the recent debates about socialism.

Chapter 3, “Where Prices Come From: The Interaction of Demand and Supply,” opens with a new discussion of Nike and the highly competitive market for athletic shoes. We use that market to develop the demand and supply model. *An Inside Look* at the end of the chapter examines plans by BASF and Reebok to release 3D printed shoes. There are three new *Apply the Concepts*: “Forecasting the Demand for Athletic Shoes,” “Fracking, the U.S. Oil Boom, and Expected Oil Prices,” and “Higher Demand for Cobalt—But Lower Prices?” New *Solved Problem 3.4* examines how we can predict changes in the price and quantity of merino wool.

Chapter 4, “Economic Efficiency, Government Price Setting, and Taxes,” opens with an updated discussion about the economic link between food riots in Venezuela and the rise in popularity of Uber in the United States. At the end of the chapter, *An Inside Look* examines why Uber is suing New York City over its limit on the number of cars ride-hailing companies are allowed. New *Solved Problem 4.4* examines who bears the burden of the Seattle beverage tax.

Chapter 5, “The Economics of Health Care,” opens with a new discussion of whether private insurance companies such as Blue Cross and Blue Shield should be eliminated in favor of a single-payer government health system. New Table 5.2 summarizes and compares the essential aspects of the health care systems in Canada, Japan, and the United Kingdom. A new *Apply the Concept* discusses the debate over “Medicare for All.”

Chapter 6, “Firms, the Stock Market, and Corporate Governance,” opens with a new discussion of Lyft’s initial public offering. A new *Apply the Concept* explores why someone would want to buy Lyft stock, given the company’s financial losses. New Table 6.2 summarizes the historical long-run returns from investing in different assets. Coverage of recent issues in corporate governance policy, formerly in Section 6.4, has been streamlined and merged into Section 6.3. The appendix still covers present value, but the coverage of income statements and balance sheets now appears as an online appendix.

Chapter 7, “Comparative Advantage and the Gains from International Trade,” opens with a discussion of how the 2019 Trump Administration tariffs on imports from China affected Whirlpool, a home appliance maker based in Benton Harbor, Michigan. A new *Apply the Concept* analyzes who gains and who loses from tariffs on imports from China.

Chapter 8, “GDP: Measuring Total Production and Income,” opens with a new discussion of how General Motors and other car companies deal with the business cycle. A new *Apply the Concept* discusses whether gross domestic income is a more reliable measure of total production than gross domestic product.

Chapter 9, “Unemployment and Inflation,” opens with a new discussion of how Wisconsin-based Stoughton Trailers dealt with the challenge of finding workers during a period of very low unemployment. A new *Apply the Concept* discusses whether advances in information technology permanently increase structural unemployment. A new section covers trends in labor force participation rates.

Chapter 10, “Economic Growth, the Financial System, and Business Cycles,” begins with a new opener that discusses how millennials (people born between 1981 and 1996) have experienced both technological change and the effects of the business cycle. New Figure 10.9 and surrounding text also cover this topic.

Chapter 11, “Long-Run Economic Growth: Sources and Policies,” opens with a new discussion of the role of technological change and creative destruction in lifting living standards. A new *Apply the Concept* explores the economic growth of sub-Saharan Africa and projections of future growth for that region.

Chapter 12, “Aggregate Expenditure and Output in the Short Run,” opens with a new opener about how the business cycle affects manufacturers of recreational vehicles (RVs), such as Airstream, many of which are based in Elkhart, Indiana. A new section covers the volatility of consumer spending on durables, and new Table 12.1 summarizes the relationship between actual investment and planned investment.

Chapter 13, “Aggregate Demand and Aggregate Supply Analysis,” opens with a new discussion of the effect of the business cycle on General Motors and other auto manufacturers. A new *Apply the Concept* discusses whether there really is a business cycle.

Chapter 14, “Money, Banks, and the Federal Reserve System,” opens with a new discussion of the Venmo app, which allows people to send money to friends using their smartphones.

Chapter 15, “Monetary Policy,” opens with a new discussion of the organization of the Federal Reserve and Fed Chair Jerome Powell’s relationship with President Trump in 2019. Coverage of the financial crisis of 2007–2009 has been streamlined.

Chapter 16, “Fiscal Policy,” opens with a new discussion of the effects of fiscal policy on the growth rate of real GDP. A new *Apply the Concept* discusses modern monetary theory (MMT) and whether policymakers should worry about the national debt. New *Solved Problem 16.6* explores how the Italian government confronts its budget deficit.

Chapter 17, “Inflation, Unemployment, and Federal Reserve Policy,” opens with a new discussion of the Fed’s challenge of meeting its dual mandate of low inflation and unemployment while dealing with political pressure from President Trump. A new *Apply the Concept* considers whether the Phillips curve has disappeared. There are two new sections in the chapter: One covers the recent debates about the future of the Federal Reserve, and another discusses whether the Fed should be independent of Congress and the president.

Chapter 18, “Macroeconomics in an Open Economy,” includes streamlined and updated content from two seventh edition chapters: Chapter 18 of the same title and Chapter 19, “The International Financial System.” The appendix on the gold standard and Bretton Woods that appeared in the seventh edition Chapter 19 is now an online appendix.

To make room for new content, we cut 14 *Apply the Concepts* and 2 *Solved Problems* from the previous edition and transferred some of them to the book’s *Instructor’s Manual*, where they are available for instructors who wish to continue using them. As noted earlier, as a result of market feedback and analysis of instructor assignments we moved two appendices to appear within MyLab Economics and streamlined and merged two chapters.

Solving Teaching and Learning Challenges

Many students who take a principles of economics course have difficulty seeing the relevance of key concepts such as opportunity cost, trade-offs, scarcity, and demand and supply to their lives and their careers. This reduces the willingness of some students to prepare for class and to be engaged during class. We address this challenge with contextual learning, a modern organization of content, engaging pedagogy, and an extensive selection of digital assets.

The Foundation: Contextual Learning and Modern Organization

We believe a course is successful if students can apply what they have learned to both their personal lives and their careers and if they have developed the analytical skills to understand what they see in the media. That's why we explain economic concepts by using many real-world business examples and applications in the chapter openers, graphs, *Apply the Concept* features, *An Inside Look* features, and end-of-chapter problems. This approach helps majors from all disciplines become educated consumers, voters, and citizens. In addition to our widget-free approach, we have a modern organization and place interesting policy topics early in the book to pique student interest.

Students come to study macroeconomics with a strong interest in understanding events and developments in the economy. We capture that interest and develop students' economic intuition and understanding by presenting macroeconomics in a way that is modern and based in the real world of business and economic policy. And we believe we achieve this presentation without making the analysis more difficult. We avoid the recent trend of using simplified versions of intermediate models, which are often more detailed and complex than what students need to understand the basic macroeconomic issues. Instead, we use a more realistic version of the familiar aggregate demand and aggregate supply model to analyze short-run fluctuations and monetary and fiscal policy. We also avoid the "dueling schools of thought" approach often used to teach macroeconomics at the principles level. We emphasize the many areas of macroeconomics where most economists agree. And we present throughout real business and policy situations to develop students' intuition.

Here are a few highlights of our approach to macroeconomics:

- **A careful discussion of macro statistics.** Many students pay some attention to the financial news and know that the release of statistics by federal agencies can cause movements in stock and bond prices. A background in macroeconomic statistics helps clarify some of the policy issues encountered in later chapters. In Chapter 8, "GDP: Measuring Total Production and Income," and Chapter 9, "Unemployment and Inflation," we provide students with an understanding of the uses and potential shortcomings of the key macroeconomic statistics, without getting bogged down in the minutiae of how the statistics are constructed. For instance, we discuss the important differences between the payroll survey and the household survey for understanding conditions in the labor market. We explain why financial markets react more strongly to news from the payroll survey. We provide a discussion of the employment–population ratio, which is not covered in some other texts but which many economists regard as a key measure of labor market performance.
- **Early coverage of long-run topics.** We place key macroeconomic issues in their long-run context in Chapter 10, "Economic Growth, the Financial System, and Business Cycles," and Chapter 11, "Long-Run Economic Growth: Sources and Policies."

Chapter 10 puts the business cycle in the context of underlying long-run growth and discusses what actually happens during the phases of the business cycle. We believe this material is important if students are to have the understanding of business cycles they will need to interpret economic events; this material is often discussed only briefly or omitted entirely in other books. We know that many instructors prefer to have a short-run orientation to their macro courses, with a strong emphasis on policy. Accordingly, we have structured Chapter 10 so that its discussion of long-run growth is sufficient for instructors who want to move quickly to short-run analysis. Chapter 11 uses a simple neoclassical growth model to explain important growth issues. We apply the model to topics such as the decline of the Soviet economy, the long-run prospects for growth in China, the implications of the slowdown in productivity growth for the U.S. economy, and the failure of many developing countries to sustain high growth rates. We also challenge students with the discussion “Why Isn’t the Whole World Rich?”

- **A dynamic model of aggregate demand and aggregate supply.** We take a fresh approach to the standard aggregate demand and aggregate supply (AD–AS) model in Chapter 13, “Aggregate Demand and Aggregate Supply Analysis.” We realize there is no good, simple alternative to using the AD–AS model when explaining movements in the price level and in real GDP. But we know that more instructors are dissatisfied with the AD–AS model than with any other aspect of the macro principles course. The key problem, of course, is that AD–AS is a static model that attempts to account for dynamic changes in real GDP and the price level. Our approach retains the basics of the AD–AS model but makes it more accurate and useful by making it more dynamic. We emphasize two points:
 1. Changes in the position of the short-run (upward-sloping) aggregate supply curve depend mainly on the state of expectations of the inflation rate.
 2. The existence of growth in the economy means that the long-run (vertical) aggregate supply curve shifts to the right every year.

This “dynamic” AD–AS model provides students with a more accurate understanding of the causes and consequences of fluctuations in real GDP and the price level. We introduce this model in Chapter 13 and use it to discuss monetary policy in Chapter 15, “Monetary Policy,” and fiscal policy in Chapter 16, “Fiscal Policy.” The material on dynamic AD–AS is presented in self-contained sections in Chapters 13, 15, and 16, so instructors may safely omit the sections on the dynamic AD–AS model without any loss in continuity to the discussion of macroeconomic theory and policy.

- **Extensive coverage of monetary policy.** Because of the central role monetary policy plays in the economy and in students’ curiosity about business and financial news, we devote two chapters to the topic: Chapter 15, “Monetary Policy,” and Chapter 17, “Inflation, Unemployment, and Federal Reserve Policy.” We emphasize the issues involved in the Fed’s choice of monetary policy targets, and we include coverage of the Taylor rule. We also cover the Fed’s new policy tools and the debate over whether the Fed’s policies during and after the 2007–2009 financial crisis were consistent with its mandate under the Federal Reserve Act, and recent challenges to the Fed’s independence.
- **Coverage of both the demand-side and supply-side effects of fiscal policy.** Our discussion of fiscal policy in Chapter 16, “Fiscal Policy,” carefully distinguishes between automatic stabilizers and discretionary fiscal policy. We also provide significant coverage of the supply-side effects of fiscal policy. A new section discusses the requirements for the Trump administration to hit its goal of restoring the long-run annual growth rate of real GDP to 3 percent.
- **A self-contained but thorough discussion of the Keynesian income–expenditure approach.** The Keynesian income–expenditure approach (the “45°-line diagram,”

or “Keynesian cross”) is useful for introducing students to the short-run relationship between spending and production. Many instructors, however, prefer to omit this material. Therefore, we use the 45°-line diagram only in Chapter 12, “Aggregate Expenditure and Output in the Short Run.” The discussions of monetary and fiscal policy in Chapter 15, “Monetary Policy,” and Chapter 16, “Fiscal Policy,” respectively, use only the AD–AS model, making it possible to omit Chapter 12.

- **Extensive international coverage.** We include two chapters devoted to international topics: Chapter 7, “Comparative Advantage and the Gains from International Trade,” and Chapter 18, “Macroeconomics in an Open Economy.” Having a good understanding of the international trading and financial systems is essential to understanding the macroeconomy and to satisfying students’ curiosity about the economic world around them. In addition to the material in our two international chapters, we weave international comparisons into the narratives of several other chapters, including our discussion of labor market policies in Chapter 17, “Inflation, Unemployment, and Federal Reserve Policy,” and central banking in Chapter 14, “Money, Banks, and the Federal Reserve System.”
- **Flexible chapter organization.** Because we realize that there are a variety of approaches to teaching principles of macroeconomics, we have structured our chapters for maximum flexibility. For example, our discussion of long-run economic growth in Chapter 10, “Economic Growth, the Financial System, and Business Cycles,” makes it possible for instructors to omit the more thorough discussion of these issues in Chapter 11, “Long-Run Economic Growth: Sources and Policies.” Our discussion of the Keynesian 45°-line diagram is confined to Chapter 12, “Aggregate Expenditure and Output in the Short Run,” so that instructors who do not use this approach can proceed directly to aggregate demand and aggregate supply analysis in Chapter 13, “Aggregate Demand and Aggregate Supply Analysis.” While we devote two chapters to monetary policy, the first of these—Chapter 15, “Monetary Policy”—is a self-contained discussion, so instructors may safely omit the material in Chapter 17, “Inflation, Unemployment, and Federal Reserve Policy,” if they choose to. Finally, instructors may choose to omit both of the international chapters (Chapter 7, “Comparative Advantage and the Gains from International Trade,” and Chapter 18, “Macroeconomics in an Open Economy”), cover just Chapter 7 on international trade, or cover just Chapter 18. Please refer to the flexibility chart on pages P14–P15 of this preface to help select the chapters and order best suited to your classroom needs.

Pedagogy That Emphasizes Real-World Examples, Applications, and Practice

A number of pedagogical features illustrate the relevance of economics to students’ everyday lives, help students focus on key concepts, and help them prepare for exams.

Business Cases and *An Inside Look* News Articles

Each chapter-opening case provides a real-world context for learning, sparks students’ interest in economics, and helps unify the chapter. The case describes an actual company facing a real situation. The company is integrated in the narrative, graphs, and pedagogical features of the chapter. Some of the chapter openers focus on the role of entrepreneurs in developing new products and bringing them to market. For example, Chapter 2 features Elon Musk of Tesla Motors; Chapter 14 features Venmo app founders Andrew Kortina and Iqram Magdon-Ismael; and Chapter 18 features Jeff Bezos of Amazon.

3 Where Prices Come From: The Interaction of Demand and Supply

A Basketball Player Takes a Tumble—And So Does Nike

Zion Williamson of Duke University was probably the best male college basketball player during the 2018–2019 season. So it was big news when during a game against archrival University of North Carolina, Zion's Nike athletic shoe split open while he was dribbling the ball, causing him to fall to the floor and injure his knee. Nike was immediately subjected to intense criticism on social media—a damaging development for a firm in the intensely competitive athletic shoe industry.



The manufacture of shoes designed specifically for playing sports or exercising dates to the mid-1800s, after Charles Goodyear invented the vulcanizing process, which hardened rubber enough for it to be used on the soles of shoes. Initially, athletic shoes were expensive, and they were worn primarily by wealthy people when playing tennis. By the late 1800s, mass production of athletic shoes in factories made them widely available at prices comparable to those of other shoes. Albert Spalding is credited with inventing the basketball in 1894 and the basketball shoe in 1907.

Today, Nike has the largest market share among athletic shoe firms. The firm that Nike was founded in 1963 by Oregon track coach Bill Bowerman and track team member Phil Knight. At first the firm sold only imported shoes that a Japanese firm produced. Nike's goal was to compete with the German firm Adidas, at the time the main supplier of running shoes in the U.S. market. In 1973, the firm introduced the Nike Oregon Walker, which used a distinctive waffle pattern that provided excellent cushioning and traction. Nike was able to achieve lasting success by combining innovative shoe designs with heavily advertised endorsements from celebrities and star athletes.

In recent years, new entrants to the athletic shoe industry have competed by offering shoes made of different materials in different styles. For instance, Allbirds began selling shoes with wool uppers, and Skechers focused on comfort. Adopting such strategies allowed these firms to avoid

changing the latest styles or paying for the endorsements of the hottest celebrities and athletes.

Athletic shoes are manufactured primarily in factories in Asia that employ low-wage labor. Contracting with these factories to launch a new shoe brand is relatively low cost, which allows the entry of new firms into the industry. As a result, competition is intense, and firms have to respond quickly to changes in consumer tastes. Nike has adapted to other once fashionable products, from men's hats to wrist-watches? Although competition is not always good news for firms, it is great news for consumers because it increases the choice of available products and lowers the prices consumers pay for those products.

AN INSIDE LOOK At the end of this chapter discusses plans by BASF and Reebok to release 3D printed liquid speed shoes.

Chapter Outline & Learning Objectives

- 1. The Demand Side of the Market, page 14
List and describe the variables that influence demand.
- 2. The Supply Side of the Market, page 82
List and describe the variables that influence supply.
- 3. Market Equilibrium: Pulling Demand and Supply Together, page 87
Use a graph to illustrate market equilibrium.
- 4. The Effect of Demand and Supply Shifts on Equilibrium, page 92
Use demand and supply graphs to predict changes in prices and quantities.

Economics in Your Life & Career

Can You Forecast the Future Demand for Athletic Shoes?

Firms face many challenges in responding to changes in consumer demand. For example, firms selling athletic shoes need to forecast future demand in order to determine how much production capacity they will need. If you were a manager for a firm that sells athletic shoes,

such as Nike, Adidas, or Allbirds, what factors would you take into account in forecasting future demand? As you read this chapter, try to answer this question. You can check your answer against the one we provide at the end of this chapter.

An Inside Look is a two-page feature that shows students how to apply the concepts from the chapter to the analysis of a news article. The feature appears at the end of Chapters 1–4. An Inside Look presents an excerpt from an article, analysis of the article, a graph(s), and critical thinking questions.

AN INSIDE LOOK If the Shoe Fits . . . Print It?

BASF and Reebok to Release Additional 3D Printed Liquid Speed Shoes, More Projects in Development

Multiple major shoe manufacturing corporations have been turning to 3D printing over the last couple of years. While 3D printed shoes aren't filling shoe stores just yet, companies are being attracted to the technology for its design potential and customization possibilities. Now we're in the age of the small-series exclusive 3D printed shoe. Earlier this year, Nike introduced the first shoe with a 3D printed upper, while New Balance had led the way with the first partially 3D printed shoe to be made commercially available. And in 2016, Reebok introduced the Liquid Speed shoe, which uses liquid-developed BASF to draw a frame directly onto the shoe. This allows for a lighter fit, and it's pretty cool-looking, too.

The technique also does away with the traditional mold-driven process, which is expensive and time-consuming, and allows for localized production. Currently, nearly all athletic footwear is made in Asian factories due to the labor-intensive nature of the mold process, but thanks to Reebok's 3D printing technology, the Liquid Speed shoe can be made anywhere, including in the company's Liquid Factory, which is located in Rhode Island.

3DPRINT.COM

"The point of automation is to shorten the production cost and enable that automation," said Chau Nguyen, Market Segment Manager for Footwear, PM North America, BASF. "So instead of a person sitting there and putting a sole on, they were able to deposit it in 3D on the part itself—that saved a lot of time."

Reebok approached BASF, which it had worked with before, about creating a polyurethane material that it could use to create a unique outsole. BASF formulated a urethane-based ink that could be drawn on to create an outsole that molds with the lacing on the shoe.

"When you're running, a certain amount of energy is going to the ground," he said. "So, when you hit the ground, in this case, it absorbs the energy and then it returns it, that's why it's called high rebound."

When the Liquid Speed shoe was first released in November, only 300 pairs were made, and they sold out within hours for \$119.50 each. The first batch was so limited because Reebok was borrowing lab time, but now that it has moved to one Liquid Factory, there will be more extensive testing and then it returns it, that's why it's called high rebound."

So keep an eye out for Liquid Speed to reemerge on the market before long, or well as some new developments from Reebok. As 3D printed shoes become more easily and frequently made, costs will likely go down as well, making them more accessible—Liquid Speed shoes are already relatively inexpensive compared to some of the other 3D printed shoes that have been released. Many of these other shoes have been made specifically for professional athletes, but Reebok seems to have the average consumer in mind.

Consider key items shoe design, some formal wear, but especially running shoes, where performance depends largely on how comfortably the shoe fits. The design of the Liquid Speed shoe allows for an especially secure and comfortable fit, according to Nguyen.

"In this case the outsole has wings on it and it wraps around to the sides of the shoe. You have tension at the top of your foot, and usually all of the materials are combined together," he explained. "Well, in this case you have material attached to the sides, the

Key Points in the Article

3D printing technology has entered the realm of the highly competitive athletic shoe market. In 2016, Reebok introduced the Liquid Speed shoe, made in part using 3D printing, with competitors such as Nike and New Balance adopting this technology for a limited number of products in 2018. 3D printing allows shoe manufacturers to improve the fit and performance of their products and eliminates the need for the expensive and time-consuming mold-driven production process common in traditional shoe manufacturing. The cost savings also enables manufacturers to relocate production from low-wage regions such as Asia, as Reebok did by establishing its Liquid Factory in Rhode Island. As 3D printed shoe manufacturing expands, consumers can expect greater accessibility as a result of decreases in cost.

Analysing the News

A growing number of athletic shoe manufacturers are starting to incorporate 3D printing technology into their design and manufacturing processes. While still relatively new, companies such as Reebok, Nike, and New Balance are using the

technology to produce components for certain product lines. 3D printing allows for expedited design possibilities and product customization. Although 3D printing is not yet a dominant production technique, companies see the potential for this process to improve productivity and increase profits. Companies to avoid much of the traditional production process, which is both time-consuming and expensive. 3D printing represents a positive technological change, allowing a firm to produce more output using the same amount of inputs. Suppose Figure 1 below illustrates the market for athletic shoes. This positive technological change shifts the supply curve to the right, from S_1 to S_2 , resulting in a decrease in the equilibrium price (from P_1 to P_2) and an increase in the equilibrium quantity (from Q_1 to Q_2). The lower equilibrium price will also result in an increase in quantity demanded, illustrated by the movement from the original equilibrium (point A) to the new equilibrium (point B).

Reebok is increasing production of its Liquid Speed shoe and plans to expand 3D printing to other models. Reebok also hopes to attract more customers

who are looking for the better fit and performance these shoes offer. Figure 2 illustrates an increase in consumers' taste for athletic shoes as a result of the better fit these shoes provide. This increase in taste shifts the demand curve to the right, from D_1 to D_2 , resulting in an increase in both the equilibrium price (from P_1 to P_2) and the equilibrium quantity (from Q_1 to Q_2). The higher equilibrium price results in an increase in quantity supplied, illustrated by the movement from equilibrium point A to equilibrium point C.

Thinking Critically

- Why is it particularly important for a firm like Reebok to stay informed of technological advancements and seek out the ones it could possibly use in its operations?
- Suppose that athletic shoe firms experience an improvement in technology from the use of 3D printing and that the improved performance and fit of these 3D printed shoes increase consumers' taste for the shoes. Draw a demand and supply graph to illustrate this situation and explain what happens to equilibrium price and equilibrium quantity.

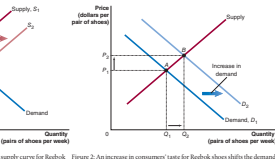
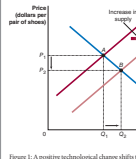


Figure 1: Positive technological change shifts the supply curve for Reebok shoes to the right. All else equal, equilibrium price decreases, and equilibrium quantity increases.

Figure 2: An increase in consumers' taste for Reebok shoes shifts the demand curve to the right. All else equal, both equilibrium price and equilibrium quantity increase.

Solved Problems

Many students have great difficulty handling applied economics problems. We help students overcome this hurdle by including in each chapter two or three worked-out problems that analyze real-world economic issues they hear and read about in the news. Our goals are to keep students focused on the main ideas of each chapter and give them a model for how to solve an economic problem by breaking it down step by step. We tie additional exercises in the end-of-chapter *Problems and Applications* section to every *Solved Problem*. Additional *Solved Problems* appear in the *Instructor's Manual*. In addition, the Test Banks include problems tied to the *Solved Problems* in the main book.

New to this edition are whiteboard videos of select *Solved Problems* that bring these real-world problems to life with audio, background photos, and step-by-step construction of graphs and tables.

94 CHAPTER 3 Where Prices Come From: The Interaction of Demand and Supply The Effect of Demand and Supply Shifts on Equilibrium 95

Solved Problem 3.4
Can We Predict Changes in the Price and Quantity of Merino Wool?

When Allbirds introduced athletic shoes with uppers made from merino wool, it helped increase the popularity of this type of wool, which is softer than other wools. A news article noted that, "Brands from Adidas to Lululemon and Under Armour are selling wool apparel, touting the fiber's soft feel and odor-resisting properties." Most merino wool is harvested from sheep raised in Australia and New Zealand. The article noted that the sheep population in those countries has been declining because sheep farmers have been converting to dairy farming or raising wheat and other crops.

a. Can we use this information to be certain whether the equilibrium price of merino wool has increased or decreased? Use a demand and supply graph showing the market for merino wool to answer your question.
 b. Can we use this information to be certain whether the equilibrium quantity of merino wool has increased or decreased? Use a demand and supply graph showing the market for merino wool to illustrate your answer.

Solving the Problem
Step 1: Review the chapter material. This problem is about how shifts in demand and supply curves affect the equilibrium price, so you might want to review the section "The Effect of Shifts in Demand and Supply over Time."
Step 2: Answer part (a) using demand and supply analysis. The problem gives you the information that consumer tastes have changed, leading to an increase in the demand for merino wool in athletic shoes and other products. So, the demand curve has shifted to the right. The problem also gives you the information that farmers in Australia and New Zealand have been moving out of sheep farming. So, the supply curve for merino wool has shifted to the left. The following graph shows both of these shifts.

As Table 3.3 summarizes, if the demand curve shifts to the right and the supply curve shifts to the left, the equilibrium price must increase. Therefore, we can answer part (a) by stating that we are certain that the equilibrium price of merino wool has increased.

Step 3: Answer part (b) using demand and supply analysis. The graph we drew in step 2 shows that the equilibrium quantity of merino wool has increased. But given the information provided, the following graph would also be correct.

Unlike the graph in step 2, which shows the equilibrium quantity increasing, this graph shows the equilibrium quantity decreasing. The uncertainty about whether the equilibrium quantity has increased or decreased is consistent with what Table 3.3 indicates happens when the demand curve shifts to the right and the supply curve shifts to the left. Therefore, the answer to part (b) is that we cannot be certain whether the equilibrium quantity of merino wool has increased or decreased.

Extra Credit: The article cited in this problem states that sheep farmers had switched to dairy farming or raising crops because wool prices had been declining. The farmers were responding to the market signal they received from the price of wool declining relative to the prices of other products they could supply. Using wool prices resulting from an increased consumer taste for wool athletic shoes and other apparel will send a signal that some farmers will respond to by returning to raising sheep. Eventually, we would expect that the quantity of merino wool will increase in response to the change in consumer tastes.

Your Turn: For more practice, do related problems 4.7 and 4.8 at the end of this chapter.

Shifts in a Curve versus Movements along a Curve
 When analyzing markets using demand and supply curves, remember that when a shift in a demand or supply curve causes a change in equilibrium price, the change in price does not cause a further shift in demand or supply. Suppose that an increase in supply causes the price of a good to fall, while everything else that affects the willingness of consumers to buy the good is constant. The result will be an increase in the quantity demanded but not an increase in demand. For demand to increase, the whole curve must shift. The point is the same for supply: If the price of the good falls but everything else that affects the willingness of sellers to supply the good is constant, the quantity supplied decreases, but the supply does not. For supply to decrease, the whole curve must shift.

Apply the Concept

Each chapter includes two to four *Apply the Concept* features that provide real-world reinforcement of key concepts and help students learn how to interpret what they read on the Web and in newspapers. Most of the 60 *Apply the Concept* features use relevant, stimulating, and provocative news stories focused on businesses and policy issues. One-third of them are new to this edition, and most others have been updated. Several discuss health care and trade, which have been at the forefront of recent policy discussions. Each *Apply the Concept* has at least one supporting end-of-chapter problem to allow students to test their understanding of the topic discussed.

Apply the Concept
Forecasting the Demand for Athletic Shoes

It's important for managers to forecast the demand for their products accurately because doing so helps them determine how much of a good to produce. Firms typically set manufacturing schedules at least a month ahead of time. The market for athletic shoes is steadily growing, and firms need to carefully plan increases in productive capacity. Firms that fail to produce a large enough quantity to keep pace with increasing demand can lose out to competitors. But will the demand for athletic shoes continue to grow, or has it reached a peak?

Richard Tedlow of the Harvard Business School has developed a theory of the "three phases of marketing" that can provide some insight into how the markets for many consumer products develop over time. The table below summarizes the phases. The first phase often has many large firms, each producing a relatively small volume of goods and charging high prices. This phase corresponds to the carbonated soft drink industry in the late nineteenth century, the automobile industry in the early twentieth century, and the personal computer industry in the late 1970s. In the second phase, the market consolidates, with one or a few brands attaining high market shares by selling a large number of units at lower prices. This phase corresponds to the soft drink industry during the middle of the twentieth century, the automobile industry during the 1920s, and the personal computer industry during the late 1980s. The third phase of marketing involves a rapid multiplication of products introduced by the leading firms. Colas, automobiles, and personal computers are all currently in this phase. For instance, Coca-Cola and Pepsi are the dominant firms in the carbonated soft drink industry, but they offer a large variety of products, from basic Coke and Pepsi to caffeine-free Coke and Pepsi, Diet Cherry Coke, and Pepsi Mango.

Patrick T. Fallon/Bloomberg via Getty Images
 How will changes in demographics, income, and tastes shape the market for athletic shoes?

Phase 1	Phase 2	Phase 3
<p>Evolution:</p> <ul style="list-style-type: none"> Many large firms Each firm producing a relatively small volume of goods and charging high prices <p>Examples:</p> <ul style="list-style-type: none"> The carbonated soft drink industry in the late nineteenth century The automobile industry in the early twentieth century The personal computer industry in the late 1970s The athletic shoe industry in the late nineteenth century 	<p>Evolution:</p> <ul style="list-style-type: none"> Market consolidation, with one or a few brands attaining high market shares Each firm selling a large number of units at lower prices <p>Examples:</p> <ul style="list-style-type: none"> The carbonated soft drink industry during the middle of the twentieth century The automobile industry during the 1920s The personal computer industry in the late 1980s The athletic shoe industry in the 1970s 	<p>Evolution:</p> <ul style="list-style-type: none"> A rapid multiplication of products introduced by the dominant firms <p>Examples:</p> <ul style="list-style-type: none"> The carbonated soft drink industry today, with Coca-Cola and Pepsi being the dominant firms The automobile industry today The personal computer industry today The athletic shoe industry today

The athletic shoe industry is probably in the third phase of marketing, with market leaders Nike, Adidas, Skechers, New Balance, and Under Armour each having market shares of at least 5 percent and offering a variety of styles, and dozens of smaller firms making up the remainder of the market.

Managers at athletic shoe firms will have to take into account a number of factors when estimating the future demand for athletic shoes. Factors that will tend to lead to higher demand for athletic shoes include (1) the popularity of the product with millennials and members of generation Z; (2) the trend away from women wearing high heels toward wearing more casual shoes; and (3) rising incomes in some developing countries, such as China and India, which should increase demand. But in their key North American and European markets, athletic shoe firms face slowing population growth, which will reduce the rate at which demand increases. The industry is also dependent on changing tastes. As millennials and members of generation Z have become less interested in participating in competitive running, the sector of the industry producing running shoes has already experienced declining sales. Similarly, a significant fraction of the demand for basketball shoes comes from people who collect them or buy them intending to resell them to collectors. Although an article in the *Wall Street Journal* described collecting athletic shoes as a "mainstream passion," if tastes change and collectors stop buying hundreds of pairs of new shoes each, demand will decline.

As we saw in Chapter 1, economists can use formal models to forecast future values of economic variables. In this case, an economist forecasting the demand for athletic shoes would want to include the factors mentioned in the previous paragraphs, although forecasting changes in tastes can be difficult and, over the longer run, changes in the growth of income and population across countries cannot be estimated exactly.

Your Turn: Test your understanding by doing related problem 1.17 at the end of this chapter.

Don't Let This Happen to You

We know from many years of teaching which concepts students find most difficult. We include in each chapter a box feature called *Don't Let This Happen to You* that alerts students to the most common pitfalls in that chapter's material. We follow up with a related question in the end-of-chapter *Problems and Applications* section.

Concept Checks

For each learning objective section, we provide a Concept Check that is accessible in the corresponding section within the MyLab Economics page. Each Concept Check contains one or two multiple-choice, true/false, or fill-in questions. These checks act as "speed bumps" that encourage students to stop and check their understanding of fundamental terms and concepts before moving on to the next section. The goal of this digital resource is to help students assess their progress on a section-by-section basis so they can be better prepared for homework, quizzes, and exams.

Graphs and Summary Tables

Graphs are an indispensable part of a principles of economics course but are a major stumbling block for many students. Every chapter except Chapter 1 includes end-of-chapter problems that require students to draw, read, and interpret graphs. Video animations of the figures appear within the book's MyLab Economics page. We use four devices to help students read and interpret graphs:

1. Detailed captions
2. Boxed notes
3. Color-coded curves
4. Summary tables with graphs

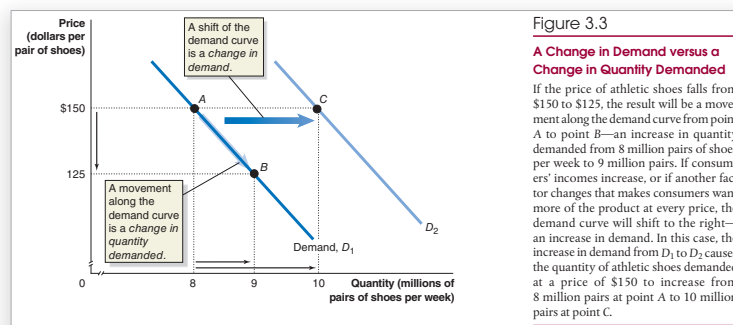
Don't Let This Happen to You

Remember: A Change in a Good's Price Does Not Cause the Demand or Supply Curve to Shift

Suppose a student is asked to draw a demand and supply graph to illustrate how an increase in the price of oranges would affect the market for apples, with other variables being constant. He draws the graph on the left and explains it as follows: "Because apples and oranges are substitutes, an increase in the price of oranges will cause an initial shift to the right in the demand curve for apples, from D_1 to D_2 . However, because this initial shift in the demand curve for apples results in a higher price for apples, P_2 , consumers will find apples less desirable, and the demand curve will shift to the left, from D_2 to D_3 , resulting in a final equilibrium price of P_1 ." Do you agree or disagree with the student's analysis? You should disagree. The student has correctly understood that an increase in the price of oranges will cause the demand curve for apples to shift to the right. But, the second demand curve shift the student describes, from D_2 to D_3 , will not take place. Changes in the price of a product do not result in shifts in the product's demand curve. Changes in the price of a product result only in movements along a demand curve.

The graph on the right shows the correct analysis. The increase in the price of oranges causes the demand curve for apples to increase from D_1 to D_2 . At the original price, P_1 , the increase in demand initially results in a shortage of apples equal to $Q_1 - Q_2$. But, as we have seen, a shortage causes the price to increase until the shortage is eliminated. In this case, the price will rise to P_2 , where both the quantity demanded and the quantity supplied are equal to Q_2 . Notice that the increase in price causes a decrease in the quantity demanded, from Q_1 to Q_2 , but does not cause a decrease in demand.

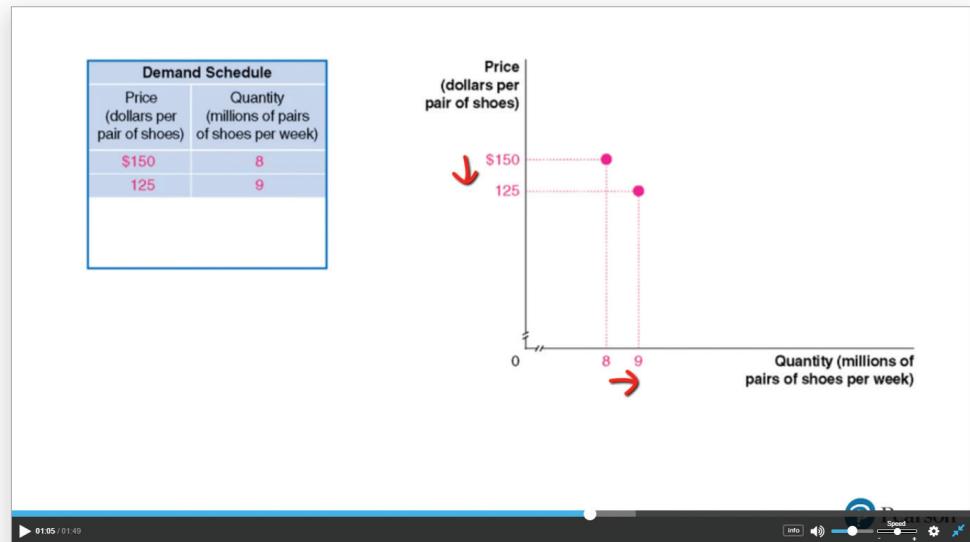
Your Turn: Test your understanding by doing related problems 4.13 and 4.14 at the end of this chapter.



Variables That Shift Market Demand Curves	An increase in ...	shifts the demand curve ...	because ...
	income (and the good is normal)		consumers spend more of their higher incomes on the good.
	income (and the good is inferior)		consumers spend less of their higher incomes on the good.
	the price of a substitute good		consumers buy less of the substitute good and more of this good.
	the price of a complementary good		consumers buy less of the complementary good and less of this good.
	taste for the good		consumers are willing to buy a larger quantity of the good at every price.
	population		additional consumers result in a greater quantity demanded at every price.
	the expected price of the good in the future		consumers buy more of the good today to avoid the higher price in the future.

Here is a screen capture to show one of the many figure animation videos that appear within MyLab Economics and the eText.

Figure Animation 3.1 A Demand Schedule and Demand Curve



Review Questions and Problems and Applications—Grouped by Learning Objective to Improve Assessment

We group the main end-of-chapter material—*Summary*, *Review Questions*, and *Problems and Applications*—under learning objectives. The goals of this organization are to make it easier for instructors to assign problems based on learning objectives and to help students efficiently review material that they find difficult. If students have difficulty with a particular learning objective, an instructor can easily identify which end-of-chapter questions and problems support that objective and assign them as homework or discuss them in class. Also, student learning will be enhanced by having the summary material and problems grouped together by learning objective, which allows them to focus on the parts of the chapter they find most challenging. Each major section of the chapter, paired with a learning objective, has at least two review questions and three problems.

As in the previous editions, we include one or more end-of-chapter problems that test students' understanding of the content presented in the chapter-opening business vignette, *Solved Problem*, *Apply the Concept*, *Economics in Your Life & Career*, and *Don't Let This Happen to You* special features in the chapter. Instructors can cover a feature in class and assign the corresponding problem(s) for homework. The Test Bank files also include questions that pertain to these special features.

Critical Thinking Exercises

Each chapter includes two or more *Critical Thinking Exercises* that help students build skills in the following areas: (1) analyzing and interpreting information; (2) applying reasoning and logic to new or unfamiliar ideas and situations; (3) examining ideas and concepts from multiple perspectives; and (4) clearly communicating their findings in a brief paper or class presentation.

Real-Time Data Exercises

We end select chapters with at least two *Real-Time Data Exercises* that help students become familiar with a key data source, learn how to locate data, and develop skills in interpreting data. Select *Real-Time Data Analysis Exercises* allow students and instructors to use the very latest data from the Federal Reserve Economic Data (FRED) website.

Developing Career Skills

It is important for students to learn key economic terms, concepts, and models. But for a course to be successful, students need to develop the skills and confidence to apply what they've learned outside the classroom.

After the chapter-opening real-world business case, we have a feature titled *Economics in Your Life & Career* that adds a personal dimension to the chapter opener by asking students to consider how economics affects their lives and careers. The feature piques the interest of students and emphasizes the connection between the material they are learning and their personal and career decisions.

Economics in Your Life & Career

Can You Forecast the Future Demand for Athletic Shoes?

Firms face many challenges in responding to changes in consumer demand. For example, firms selling athletic shoes need to forecast future demand in order to determine how much production capacity they will need. If you were a manager for a firm that sells athletic shoes,

such as Nike, Adidas, or Allbirds, what factors would you take into account in forecasting future demand? As you read this chapter, try to answer this question. You can check your answer against the one we provide at the end of this chapter.

At the end of the chapter, we use the chapter concepts to answer the questions asked at the beginning of the chapter.

Economics in Your Life & Career

Can You Forecast the Future Demand for Athletic Shoes?

At the beginning of this chapter, we asked what variables you would take into account in forecasting future demand if you were a manager for a firm selling athletic shoes. In Section 3.1, we discussed the factors that affect the demand for a product and provided a list of the most important variables. In the *Apply the Concept* in the same section, we discussed the future demand for athletic shoes.

In forecasting demand for athletic shoes, you should take into account factors such as changing demographics, as millennials and members of generation Z become larger fractions of prime-age consumers, and the extent to which

changing consumer tastes may help or hurt demand. You may also need to consider whether increased advertising of athletic shoes by large firms such as Adidas and Nike in developing countries with rising incomes will raise consumer awareness of the product in those countries and increase demand for athletic shoes being sold by other firms as well.

The factors discussed in this chapter provide you with the basic information needed to forecast demand for athletic shoes, although arriving at numerical forecasts requires using statistical analysis that you can learn in more advanced courses.

Chapter 1, “Economics: Foundations and Models,” includes a section that describes economics as a career and the key skills students of any major can gain from studying economics. As described earlier, features such as chapter-opening business cases, *Apply the Concepts*, *Solved Problems*, and end-of-chapter problems provide real-world context for learning that exposes students to economics as applied in a variety of large and small businesses, government agencies, and nonprofit organizations. *Critical Thinking Exercises*, located at the end of each chapter, help build student skills to analyze and interpret information and apply reasoning and logic to new or unfamiliar ideas and situations.

Instructor Teaching Resources

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

Supplements Available to Instructors for Download at www.pearsonhighered.com	Features of the Supplement
<p>Instructor's Manual Authored by Eva Dziadula of the University of Notre Dame</p>	<ul style="list-style-type: none"> • Chapter-by-chapter summaries organized by learning objectives • Extended examples and class exercises • Teaching outlines incorporating key terms and definitions, teaching tips, and topics for class discussion • <i>New Solved Problems</i> • <i>New Apply the Concept</i> features • Solutions to all review questions, problems, and <i>Real-Time Data Exercises</i> in the book
<p>Test Bank Authored by Randy Methenitis of Richland College</p>	<ul style="list-style-type: none"> • Each volume includes 4,000 multiple-choice, true/false, short-answer, and graphing questions. • Test questions are annotated with the following categories: Difficulty—1 for straight recall, 2 for some analysis, and 3 for complex analysis Type—multiple-choice, true/false, short-answer, essay Topic—the term or concept the question supports Learning outcome Page number in the main book Special feature in the main book The Association to Advance Collegiate Schools of Business (AACSB) Guidelines, which propose learning experiences in the following categories of Assurance of Learning Standards: Written and Oral Communication; Ethical Understanding and Reasoning; Analytical Thinking; Information Technology; Interpersonal Relations and Teamwork, Diverse and Multicultural Work; Reflective Thinking; and Application of Knowledge
<p>Computerized TestGen</p>	<ul style="list-style-type: none"> • Allows instructors to customize, save, and generate classroom tests. • Instructors can edit, add, or delete questions from the Test Banks; analyze test results; and organize a database of tests and student results. • Many options are available for organizing and displaying tests, along with search and sort features. • The software and the Test Banks can be downloaded from www.pearsonhighered.com.
<p>Three Sets of PowerPoint Lecture Presentations Authored by Paul Holmes of Ashland University</p>	<ul style="list-style-type: none"> • A comprehensive set of PowerPoint slides can be used by instructors for class presentations or by students for lecture preview or review. These slides include all the graphs, tables, and equations in the textbook. Two versions are available: step-by-step mode, in which you can build graphs as you would on a blackboard, and automated mode, in which you use a single click per slide. • A comprehensive set of PowerPoint slides have Classroom Response Systems (CRS) questions built in so that instructors can incorporate CRS “clickers” into their classroom lectures. • Student versions of the PowerPoint slides are available as .pdf files. This version allows students to print the slides and bring them to class for note taking.

FLEXIBILITY CHART

The following chart helps you organize your syllabus based on your teaching preferences and objectives:

Core	Optional	Policy
Chapter 1: Economics: Foundations and Models	Chapter 1 Appendix: Using Graphs and Formulas	
Chapter 2: Trade-offs, Comparative Advantage, and the Market System		
Chapter 3: Where Prices Come From: The Interaction of Demand and Supply		
	Chapter 4 Appendix: Quantitative Demand and Supply Analysis	Chapter 4: Economic Efficiency, Government Price Setting, and Taxes
		Chapter 5: The Economics of Health Care
	Chapter 6: Firms, the Stock Market, and Corporate Governance	
	Chapter 6 Appendix: Using Present Value	
	Chapter 6 Online Appendix: Income Statements and Balance Sheets	
Chapter 7: Comparative Advantage and the Gains from International Trade		
Chapter 8: GDP: Measuring Total Production and Income		
Chapter 9: Unemployment and Inflation		
Chapter 10: Economic Growth, the Financial System, and Business Cycles		
Chapter 11: Long-Run Economic Growth: Sources and Policies		
	Chapter 12: Aggregate Expenditure and Output in the Short Run	
	Chapter 12 Appendix: The Algebra of Macroeconomic Equilibrium	
Chapter 13: Aggregate Demand and Aggregate Supply Analysis		
	Chapter 13 Appendix: Macroeconomic Schools of Thought	

Core	Optional	Policy
Chapter 14: Money, Banks, and the Federal Reserve System		
		Chapter 15: Monetary Policy
	Chapter 16 Appendix: A Closer Look at the Multiplier	Chapter 16: Fiscal Policy
		Chapter 17: Inflation, Unemployment, and Federal Reserve Policy
	Chapter 18: Macroeconomics in an Open Economy	
	Chapter 18 Online Appendix: The Gold Standard and the Bretton Woods System	

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