

Macroeconomics

EIGHTH EDITION



Abel Bernanke Croushore

Applying Macroeconomics to the Real World

Applications

The Federal Reserve's Preferred Inflation Measures	49
The Production Function of the U.S. Economy and U.S. Productivity Growth	62
Output, Employment, and the Real Wage During Oil Price Shocks	85
Unemployment Duration and the 2007-2009 Recession	91
Consumer Sentiment and Forecasts of Consumer Spending	110
How Consumers Respond to Tax Rebates	120
Measuring the Effects of Taxes on Investment	129
Macroeconomic Consequences of the Boom and Bust in Stock Prices	140
The United States as International Debtor	177
The Impact of Globalization on the U.S. Economy	189
Recent Trends in the U.S. Current Account Deficit	191
The Twin Deficits	196
The Post-1973 Slowdown in Productivity Growth	213
The Recent Surge in U.S. Productivity Growth	215
The Growth of China	231
Money Growth and Inflation in European Countries in Transition	269
Measuring Inflation Expectations	272
The Job Finding Rate and the Job Loss Rate	295
Oil Price Shocks Revisited	334
Calibrating the Business Cycle	371
The Value of the Dollar and U.S. Net Exports	491
European Monetary Unification	517
Crisis in Argentina	519
The Money Multiplier During Severe Financial Crises	542
The Financial Crisis of 2008	564
Inflation Targeting	574
Labor Supply and Tax Reform in the 1980s	593
Social Security: How Can It Be Fixed?	597

In Touch with Data and Research

Developing and Testing an Economic Theory	13
The National Income and Product Accounts	24
Natural Resources, the Environment, and the National Income Accounts	29
The Computer Revolution and Chain-Weighted GDP	45
Does CPI Inflation Overstate Increases in the Cost of Living?	47
Labor Market Data	88
Interest Rates	116
Investment and the Stock Market	133
The Balance of Payments Accounts	171
Money in a Prisoner-of-War Camp	243
The Monetary Aggregates	246
Where Have All the Dollars Gone?	247
The Housing Crisis That Began in 2007	254
Coincident and Leading Indexes	302
The Seasonal Cycle and the Business Cycle	307
Econometric Models and Macroeconomic Forecasts for Monetary Policy Analysis	335
Are Price Forecasts Rational?	396
Henry Ford's Efficiency Wage	415
DSGE Models and the Classical-Keynesian Debate	435
The Lucas Critique	461
Indexed Contracts	469
The Sacrifice Ratio	473
Exchange Rates	483
McParity	487
Measuring the Impact of Government Purchases on the Economy	604

Symbols Used in This Book

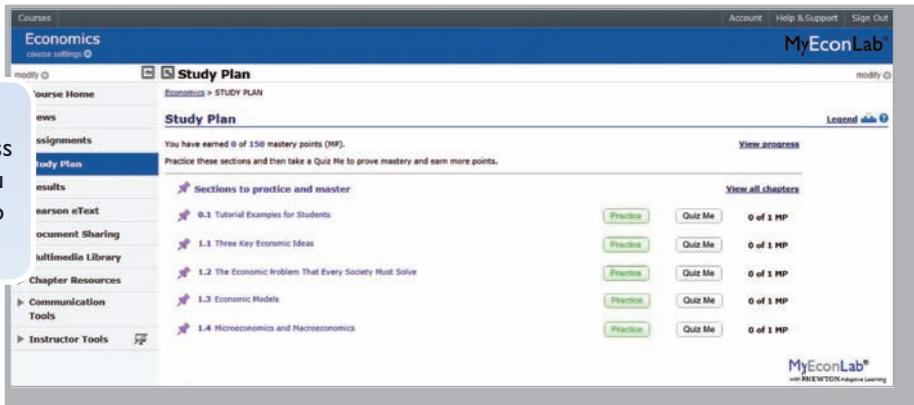
A	productivity	V	velocity
B	government debt	W	nominal wage
$BASE$	monetary base	Y	total income or output
C	consumption	\bar{Y}	full-employment output
CA	current account balance		
CU	currency held by nonbank public		
DEP	bank deposits	a	individual wealth or assets
E	worker effort	c	individual consumption; consumption per worker
G	government purchases	cu	currency–deposit ratio
I	investment	d	depreciation rate
INT	net interest payments	e	real exchange rate
K	capital stock	e_{nom}	nominal exchange rate
KFA	capital and financial account balance	\bar{e}_{nom}	official value of nominal exchange rate
M	money supply	i	nominal interest rate
MC	marginal cost	i^m	nominal interest rate on money
MPK	marginal product of capital	k	capital–labor ratio
MPN	marginal product of labor	n	growth rate of labor force
$MRPN$	marginal revenue product of labor	p_K	price of capital goods
N	employment, labor	r	expected real interest rate
\bar{N}	full-employment level of employment	r^w	world real interest rate
NFP	net factor payments	r_{a-t}	expected after-tax real interest rate
NM	nonmonetary assets	res	reserve–deposit ratio
NX	net exports	s	individual saving; saving rate
P	price level	t	income tax rate
P^e	expected price level	u	unemployment rate
P_{sr}	short-run price level	\bar{u}	natural unemployment rate
R	real seignorage revenue	uc	user cost of capital
RES	bank reserves	w	real wage
S	national saving	y	individual labor income; output per worker
S_{pvt}	private saving	π	inflation rate
S_{govt}	government saving	π^e	expected inflation rate
T	taxes	η_Y	income elasticity of money demand
TR	transfers	τ	tax rate on firm revenues

MyEconLab[®] Provides the Power of Practice

Optimize your study time with **MyEconLab**, the online assessment and tutorial system. When you take a sample test online, **MyEconLab** gives you targeted feedback and a personalized Study Plan to identify the topics you need to review.

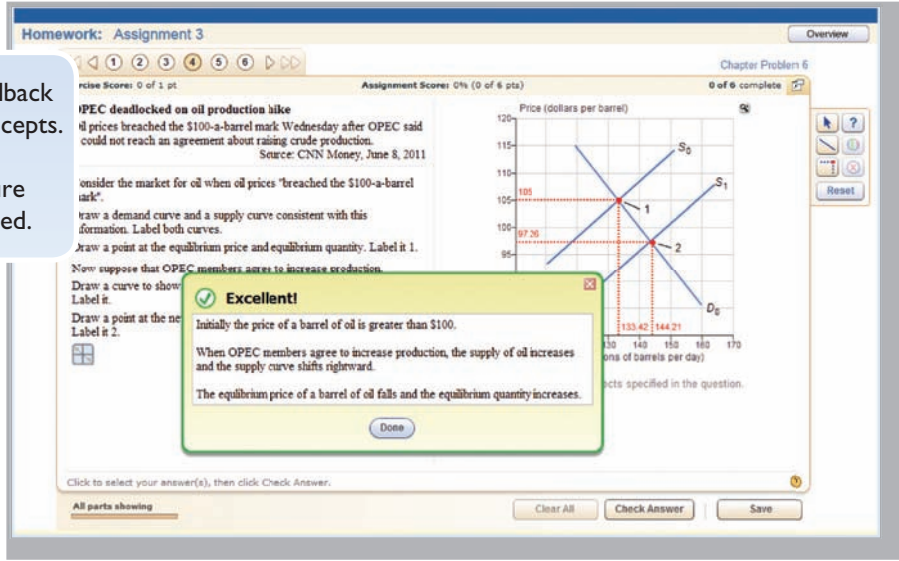
Study Plan

The Study Plan shows you the sections you should study next, gives easy access to practice problems, and provides you with an automatically generated quiz to prove mastery of the course material.



Unlimited Practice

As you work each exercise, instant feedback helps you understand and apply the concepts. Many Study Plan exercises contain algorithmically generated values to ensure that you get as much practice as you need.



Learning Resources

Study Plan problems link to learning resources that further reinforce concepts you need to master.

- **Help Me Solve This** learning aids help you break down a problem much the same way as an instructor would do during office hours. Help Me Solve This is available for select problems.
- **eText links** are specific to the problem at hand so that related concepts are easy to review just when they are needed.
- A **graphing tool** enables you to build and manipulate graphs to better understand how concepts, numbers, and graphs connect.

MyEconLab[®]

Find out more at www.myeconlab.com

This page intentionally left blank

Real-Time Data Analysis Exercises

Up-to-date macro data is a great way to engage in and understand the usefulness of macro variables and their impact on the economy. Real-Time Data Analysis exercises communicate directly with the Federal Reserve Bank of St. Louis's FRED site, so every time FRED posts new data, students see new data.

End-of-chapter exercises accompanied by the Real-Time Data Analysis icon include Real-Time Data versions in **MyEconLab**.

Select in-text figures labeled **MyEconLab** Real-Time Data update in the electronic version of the text using FRED data.

Assignment 3
RTDA: GDP and the Business Cycle
Assignment Scores: 0% (0 of 4 pts)

Real-Time Data Analysis Exercise

Following table contains data for **nominal GDP, real GDP, and potential real GDP from FRED** for the third quarter of 2012.

Series	Value (in billions)
Nominal GDP	\$15,775.7
Real GDP	\$13,616.2
Potential real GDP	\$14,474.4

Variable identified as nominal is one that is measured in **current** dollars.

Using the data above, calculate the following: (Enter your responses rounded to decimal places.)

GDP deflator is **115.86**.

Relative to potential real GDP, real GDP is **5.93** percent below potential real GDP.

*Real-time data provided by Federal Reserve Economic Data (FRED), Federal Reserve Bank of Saint Louis.

U.S. GDP Data

GDP (billions of dollars)

15,000
15,025
15,050
15,075
15,100
15,125
15,150
15,175
15,200
15,225
15,250
15,275
15,300
15,325
15,350
15,375
15,400
15,425
15,450
15,475
15,500

03'06 03'08 03'10 03'12

Click this icon for a helpful formula.

To compute the GDP deflator, divide nominal GDP by real GDP and multiply the result by 100.

To calculate the percent that real GDP is below real potential GDP, use the following formula:

Current News Exercises

Posted weekly, we find the latest microeconomic and macroeconomic news stories, post them, and write auto-graded multi-part exercises that illustrate the economic way of thinking about the news.

Homework: Assignment 3
November 2, 2012
Exercise Scores: 0 of 1 pt
Assignment Scores: 25% (1 of 4 pts)

Philippines' Credit Rating Boosted by Moody's to Baa1

Source: Yap, Cecilia and Mas Estaya. "Philippines' Credit Rating Boosted by Moody's to Baa1." Bloomberg.com, posted 10/29/2012. Click [here](#) to read the article.

Moody's Investors Service upgraded Philippines debt to "one step away from investment grade." The move is on the heels of President Aquino's efforts to control deficit spending and take steps to "hare foreign investors." Moody's cited the country's ability to maintain solid tax revenues in the face of declining global output demand. The country has maintained economic growth while keeping inflation in check.

Credit ratings impact the cost of borrowing for countries and firms. A higher credit rating indicates lower credit risk and therefore attracts investors that may have shunned lower rated debt. The higher credit rating will lower the overall cost of borrowing and also signal that the country is politically stable. Foreign investors will not only look more closely at Philippine bonds but also at direct foreign investment in the country.

Analyzing the News

Credit ratings are important to both firms and countries because they are an external assessment of risk. A credit upgrade can be due to a number of factors but it sends the same positive signal to investors. More investors will buy the country's bonds but also invest in other aspects of the Philippine economy.

Thinking Critically Questions

1. A higher bond rating translates to a(n) _____ interest rate.

A. lower
 B. erratic
 C. stable

Interactive Homework Exercises

Participate in a fun and engaging activity that helps promote active learning and mastery of important economic concepts.

Pearson's experiments program is flexible and easy for instructors and students to use. For a complete list of available experiments, visit www.myeconlab.com.

INSTRUCTIONS EXPERIMENT RESULTS

Market for Cranberries

Round 1 of 4

KEY: ● Free Market

Click Play to start this round.

WTP: **\$12.00** You are a Buyer

Your Bid: \$

CURRENT BIDS AND ASKS

Your Bid: **\$11.50** Highest Bid: \$ Lowest Ask: \$

TOTAL RESULTS

Round	Role	WTP	Cost	Bid	Ask	Price	Gain
1	Buyer	\$12.00		\$11.50		\$11.50	\$0.50

Total Gain: \$0.50

Round 1

Your WTP: \$12.00
Transaction Price: \$11.50
Average Transaction Price: \$11.75
Total Transactions: 8

OK

Legend: ▶ Lowest Ask ▶ Highest Bid ▶ Sellers ◆ Buyers ◆ Transaction ● Your Transaction

This page intentionally left blank



Macroeconomics

Eighth Edition

Andrew B. Abel

*The Wharton School of the
University of Pennsylvania*

Ben S. Bernanke

Dean Croushore

*Robins School of Business
University of Richmond*

PEARSON

Boston Columbus Indianapolis New York San Francisco Upper Saddle River
Amsterdam Cape Town Dubai London Madrid Milan Munich Paris Montréal Toronto
Delhi Mexico City São Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

Editor in Chief: Donna Battista
Executive Editor: David Alexander
Senior Editorial Project Manager: Lindsey Sloan
Editorial Assistant: Emily Brodeur
Director of Marketing: Maggie Moylan
Senior Marketing Manager: Lori DeShazo
Managing Editor: Jeff Holcomb
Senior Production Project Manager: Kathryn Dinovo
Senior Manufacturing Buyer: Carol Melville
Cover Designer: Jonathan Boylan
Cover Art: Happy person/Shutterstock.com

Digital Publisher, Economics: Denise Clinton
Lead Media Project Manager: Noel Lotz
Executive Media Producer: Melissa Honig
Supplements Editor: Kathryn Dinovo
Full-Service Project Management and Composition: Integra Software Services Pvt. Ltd.
Printer/Binder: Von Hoffman, dba R. R. Donnelley/Jefferson City
Cover Printer: Lehigh-Phoenix Color/Hagerstown
Text Font: 10/12, Palatino

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear on the appropriate page within text.

FRED[®] is a registered trademark and the FRED[®] Logo and ST. LOUIS FED are trademarks of the Federal Reserve Bank of St. Louis. <http://research.stlouisfed.org/fred2/>

Microsoft[®] and Windows[®] are registered trademarks of the Microsoft Corporation in the U.S.A. and other countries. This book is not sponsored or endorsed by or affiliated with the Microsoft Corporation.

Copyright © 2014, 2011, 2008 by Pearson Education, Inc. All rights reserved. Manufactured in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. To obtain permission(s) to use material from this work, please submit a written request to Pearson Education, Inc., Permissions Department, One Lake Street, Upper Saddle River, New Jersey 07458, or you may fax your request to 201-236-3290.

Many of the designations by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed in initial caps or all caps.

Library of Congress Cataloging-in-Publication Data

Abel, Andrew B.

Macroeconomics / Andrew B. Abel, Ben S. Bernanke, Dean Croushore.—8th ed.

p. cm.

Includes index.

ISBN 978-0-13-299228-2

1. Macroeconomics. 2. United States—Economic conditions. I. Bernanke, Ben.

II. Croushore, Dean. III. Title.

HB172.5.A24 2014

339—dc23

2012042884

10 9 8 7 6 5 4 3 2 1

PEARSON

ISBN 10: 0-13-299228-0

ISBN 13: 978-0-13-299228-2

About the Authors



Andrew B. Abel

The Wharton School of the University of Pennsylvania

Ronald A. Rosenfeld Professor of Finance at The Wharton School

and professor of economics at the University of Pennsylvania, Andrew Abel received his A.B. *summa cum laude* from Princeton University and his Ph.D. from the Massachusetts Institute of Technology.

He began his teaching career at the University of Chicago and Harvard University and has held visiting appointments at both Tel Aviv University and The Hebrew University of Jerusalem.

A prolific researcher, Abel has published extensively on fiscal policy, capital formation, monetary policy, asset pricing, and Social Security—as well as serving on the editorial boards of numerous journals. He has been honored as an Alfred P. Sloan Fellow, a Fellow of the Econometric Society, and a recipient of the John Kenneth Galbraith Award for teaching excellence. Abel has served as a visiting scholar at the Federal Reserve Bank of Philadelphia, as a member of the Panel of Economic Advisers at the Congressional Budget Office, and as a member of the Technical Advisory Panel on Assumptions and Methods for the Social Security Advisory Board. He is also a Research Associate of the National Bureau of Economic Research and a member of the Advisory Board of the Carnegie-Rochester Conference Series.



Ben S. Bernanke

Previously the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs at Princeton University, Ben Bernanke received his B.A.

in economics from Harvard University *summa cum laude*—capturing both the Allyn Young Prize for best Harvard undergraduate economics thesis and the John H. Williams prize for outstanding senior in the Economics Department. Like coauthor Abel, he holds a Ph.D. from the Massachusetts Institute of Technology.

Bernanke began his career at the Stanford Graduate School of Business in 1979. In 1985 he moved to Princeton University, where he served as chair of the Economics Department from 1995 to 2002. He has twice been visiting professor at M.I.T. and once at New York University, and has taught in undergraduate, M.B.A., M.P.A., and Ph.D. programs. He has authored more than 60 publications in macroeconomics, macroeconomic history, and finance.

Bernanke has served as a visiting scholar and advisor to the Federal Reserve System. He is a Guggenheim Fellow and a Fellow of the Econometric Society. He has also been variously honored as an Alfred P. Sloan Research Fellow, a Hoover Institution National Fellow, a National Science Foundation Graduate Fellow, and a Research Associate of the National Bureau of Economic Research. He has served as editor of the *American Economic Review*. In 2005 he became Chairman of the President's Council of Economic Advisers. He is currently Chairman and a member of the Board of Governors of the Federal Reserve System.



Dean Croushore

Robins School of Business, University of Richmond

Dean Croushore is professor of economics and Rigsby Fellow at the University of Richmond.

He received his A.B. from Ohio University and his Ph.D. from Ohio State University.

Croushore began his career at Pennsylvania State University in 1984. After teaching for five years, he moved to the Federal Reserve Bank of Philadelphia, where he was vice president and economist. His duties during his fourteen years at the Philadelphia Fed included heading the macroeconomics section, briefing the bank's president and board of directors on the state of the economy and advising them about formulating monetary policy, writing articles about the economy, administering two national surveys of forecasters, and researching current issues in monetary policy. In his role at the Fed, he created the Survey of Professional Forecasters (taking over the defunct ASA/NBER survey and revitalizing it) and developed the Real-Time Data Set for Macroeconomists.

Croushore returned to academia at the University of Richmond in 2003. The focus of his research in recent years has been on forecasting and how data revisions affect monetary policy, forecasting, and macroeconomic research. Croushore's publications include articles in many leading economics journals and a textbook on money and banking. He is associate editor of several journals and visiting scholar at the Federal Reserve Bank of Philadelphia.

Brief Contents

Preface xv

PART **1 Introduction**

- 1** Introduction to Macroeconomics 1
- 2** The Measurement and Structure of the National Economy 22

PART **2 Long-Run Economic Performance**

- 3** Productivity, Output, and Employment 60
- 4** Consumption, Saving, and Investment 105
- 5** Saving and Investment in the Open Economy 168
- 6** Long-Run Economic Growth 207
- 7** The Asset Market, Money, and Prices 242

PART **3 Business Cycles and Macroeconomic Policy**

- 8** Business Cycles 280
- 9** The *IS-LM/AD-AS* Model: A General Framework for Macroeconomic Analysis 316
- 10** Classical Business Cycle Analysis: Market-Clearing Macroeconomics 367
- 11** Keynesianism: The Macroeconomics of Wage and Price Rigidity 408

PART **4 Macroeconomic Policy: Its Environment and Institutions**

- 12** Unemployment and Inflation 449
- 13** Exchange Rates, Business Cycles, and Macroeconomic Policy in the Open Economy 481
- 14** Monetary Policy and the Federal Reserve System 534
- 15** Government Spending and Its Financing 580

Appendix A Some Useful Analytical Tools 617

Glossary 624

Name Index 635

Subject Index 637

Detailed Contents

Preface xv

PART 1 Introduction

CHAPTER 1 Introduction to Macroeconomics 1

1.1 What Macroeconomics Is About 1

Long-Run Economic Growth 2

Business Cycles 4

Unemployment 5

Inflation 6

The International Economy 7

Macroeconomic Policy 8

Aggregation 9

1.2 What Macroeconomists Do 10

Macroeconomic Forecasting 10

Macroeconomic Analysis 11

Macroeconomic Research 12

IN TOUCH WITH DATA AND RESEARCH:
Developing and Testing an Economic Theory 13

Data Development 14

1.3 Why Macroeconomists Disagree 14

Classicals Versus Keynesians 15

A Unified Approach to Macroeconomics 18

CHAPTER 2 The Measurement and Structure of the National Economy 22

2.1 National Income Accounting: The Measurement of Production, Income, and Expenditure 22

IN TOUCH WITH DATA AND RESEARCH:
The National Income and Product Accounts 24

Why the Three Approaches Are Equivalent 25

2.2 Gross Domestic Product 26

The Product Approach to Measuring GDP 26

IN TOUCH WITH DATA AND RESEARCH:
Natural Resources, the Environment, and the National
Income Accounts 29

The Expenditure Approach to Measuring GDP 30

The Income Approach to Measuring GDP 33

2.3 Saving and Wealth 36

Measures of Aggregate Saving 36

The Uses of Private Saving 39

Relating Saving and Wealth 40

2.4 Real GDP, Price Indexes, and Inflation 42

Real GDP 42

Price Indexes 44

IN TOUCH WITH DATA AND RESEARCH:
The Computer Revolution and Chain-Weighted GDP 45

IN TOUCH WITH DATA AND RESEARCH:
Does CPI Inflation Overstate Increases in the Cost of
Living? 47

APPLICATION The Federal Reserve's Preferred Inflation
Measures 49

2.5 Interest Rates 51

PART 2 Long-Run Economic Performance

CHAPTER 3 Productivity, Output, and Employment 60

3.1 How Much Does the Economy Produce? The Production Function 61

APPLICATION The Production Function of the U.S.
Economy and U.S. Productivity Growth 62

The Shape of the Production Function 64

The Marginal Product of Capital 65

The Marginal Product of Labor	66
Supply Shocks	68
3.2 The Demand for Labor	70
The Marginal Product of Labor and Labor Demand: An Example	71
A Change in the Wage	73
The Marginal Product of Labor and the Labor Demand Curve	73
Factors That Shift the Labor Demand Curve	75
Aggregate Labor Demand	77
3.3 The Supply of Labor	77
The Income–Leisure Trade-Off	78
Real Wages and Labor Supply	78
The Labor Supply Curve	81
Aggregate Labor Supply	82
3.4 Labor Market Equilibrium	83
Full-Employment Output	85
APPLICATION Output, Employment, and the Real Wage During Oil Price Shocks	85
3.5 Unemployment	87
Measuring Unemployment	87
IN TOUCH WITH DATA AND RESEARCH: Labor Market Data	88
Changes in Employment Status	89
How Long Are People Unemployed?	90
APPLICATION Unemployment Duration and the 2007–2009 Recession	91
Why There Always Are Unemployed People	92
3.6 Relating Output and Unemployment: Okun’s Law	94
APPENDIX 3.A The Growth Rate Form of Okun’s Law	104
CHAPTER 4 Consumption, Saving, and Investment	105
4.1 Consumption and Saving	106
The Consumption and Saving Decision of an Individual	107
Effect of Changes in Current Income	108
Effect of Changes in Expected Future Income	109
APPLICATION Consumer Sentiment and Forecasts of Consumer Spending	110
Effect of Changes in Wealth	113
Effect of Changes in the Real Interest Rate	113
Fiscal Policy	115
IN TOUCH WITH DATA AND RESEARCH: Interest Rates	116
APPLICATION How Consumers Respond to Tax Rebates	120
4.2 Investment	122
The Desired Capital Stock	123
Changes in the Desired Capital Stock	126
APPLICATION Measuring the Effects of Taxes on Investment	129
From the Desired Capital Stock to Investment	130
Investment in Inventories and Housing	133
IN TOUCH WITH DATA AND RESEARCH: Investment and the Stock Market	133
4.3 Goods Market Equilibrium	135
The Saving–Investment Diagram	136
APPLICATION Macroeconomic Consequences of the Boom and Bust in Stock Prices	140
APPENDIX 4.A A Formal Model of Consumption and Saving	152
CHAPTER 5 Saving and Investment in the Open Economy	168
5.1 Balance of Payments Accounting	169
The Current Account	169
IN TOUCH WITH DATA AND RESEARCH: The Balance of Payments Accounts	171
The Capital and Financial Account	172
The Relationship Between the Current Account and the Capital and Financial Account	174
Net Foreign Assets and the Balance of Payments Accounts	176
APPLICATION The United States as International Debtor	177
5.2 Goods Market Equilibrium in an Open Economy	180
5.3 Saving and Investment in a Small Open Economy	181

The Effects of Economic Shocks in a Small Open Economy 184

5.4 Saving and Investment in Large Open Economies 186

APPLICATION The Impact of Globalization on the U.S. Economy 189

APPLICATION Recent Trends in the U.S. Current Account Deficit 191

5.5 Fiscal Policy and the Current Account 194

The Critical Factor: The Response of National Saving 194

The Government Budget Deficit and National Saving 195

APPLICATION The Twin Deficits 196

CHAPTER 6 Long-Run Economic Growth 207

6.1 The Sources of Economic Growth 208

Growth Accounting 210

APPLICATION The Post–1973 Slowdown in Productivity Growth 213

APPLICATION The Recent Surge in U.S. Productivity Growth 215

6.2 Long-Run Growth: The Solow Model 218

Setup of the Solow Model 219

The Fundamental Determinants of Long-Run Living Standards 226

APPLICATION The Growth of China 231

6.3 Endogenous Growth Theory 233

6.4 Government Policies to Raise Long-Run Living Standards 235

Policies to Affect the Saving Rate 235

Policies to Raise the Rate of Productivity Growth 235

CHAPTER 7 The Asset Market, Money, and Prices 242

7.1 What Is Money? 242

IN TOUCH WITH DATA AND RESEARCH:
Money in a Prisoner-of-War Camp 243

The Functions of Money 244

IN TOUCH WITH DATA AND RESEARCH:
The Monetary Aggregates 246

IN TOUCH WITH DATA AND RESEARCH:
Where Have All the Dollars Gone? 247

7.2 Portfolio Allocation and the Demand for Assets 249

Expected Return 249

Risk 250

Liquidity 250

Time to Maturity 250

Types of Assets and Their Characteristics 251

IN TOUCH WITH DATA AND RESEARCH:
The Housing Crisis That Began in 2007 254

Asset Demands 256

7.3 The Demand for Money 256

The Price Level 257

Real Income 257

Interest Rates 258

The Money Demand Function 258

Other Factors Affecting Money Demand 260

Velocity and the Quantity Theory of Money 262

7.4 Asset Market Equilibrium 265

Asset Market Equilibrium: An Aggregation Assumption 265

The Asset Market Equilibrium Condition 267

7.5 Money Growth and Inflation 268

APPLICATION Money Growth and Inflation in European Countries in Transition 269

The Expected Inflation Rate and the Nominal Interest Rate 270

APPLICATION Measuring Inflation Expectations 272

PART 3 Business Cycles and Macroeconomic Policy

CHAPTER 8 Business Cycles 280

8.1 What Is a Business Cycle? 281

8.2 The American Business Cycle: The Historical Record 283

- The Pre–World War I Period 283
- The Great Depression and World War II 283
- Post–World War II U.S. Business Cycles 285
- The “Long Boom” 286
- The Great Recession 286
- Have American Business Cycles Become Less Severe? 287

8.3 Business Cycle Facts 290

- The Cyclical Behavior of Economic Variables: Direction and Timing 290
- Production 291
- Expenditure 293
- Employment and Unemployment 294
- APPLICATION** The Job Finding Rate and the Job Loss Rate 295
- Average Labor Productivity and the Real Wage 298
- Money Growth and Inflation 299
- Financial Variables 300
- International Aspects of the Business Cycle 301
- IN TOUCH WITH DATA AND RESEARCH: Coincident and Leading Indexes 302

8.4 Business Cycle Analysis: A Preview 306

- IN TOUCH WITH DATA AND RESEARCH: The Seasonal Cycle and the Business Cycle 307
- Aggregate Demand and Aggregate Supply: A Brief Introduction 308

CHAPTER 9 The *IS–LM/AD–AS* Model: A General Framework for Macroeconomic Analysis 316

- 9.1 The *FE* Line: Equilibrium in the Labor Market 317
 - Factors That Shift the *FE* Line 317
- 9.2 The *IS* Curve: Equilibrium in the Goods Market 319
 - Factors That Shift the *IS* Curve 321
- 9.3 The *LM* Curve: Asset Market Equilibrium 323
 - The Interest Rate and the Price of a Nonmonetary Asset 324

- The Equality of Money Demanded and Money Supplied 324
- Factors That Shift the *LM* Curve 327

9.4 General Equilibrium in the Complete *IS–LM* Model 330

- Applying the *IS–LM* Framework: A Temporary Adverse Supply Shock 332
- APPLICATION** Oil Price Shocks Revisited 334
- IN TOUCH WITH DATA AND RESEARCH: Econometric Models and Macroeconomic Forecasts for Monetary Policy Analysis 335

9.5 Price Adjustment and the Attainment of General Equilibrium 336

- The Effects of a Monetary Expansion 336
- Classical Versus Keynesian Versions of the *IS–LM* Model 340

9.6 Aggregate Demand and Aggregate Supply 342

- The Aggregate Demand Curve 342
- The Aggregate Supply Curve 344
- Equilibrium in the *AD–AS* Model 347
- Monetary Neutrality in the *AD–AS* Model 348

APPENDIX 9.A Worked-Out Numerical Exercise for Solving the *IS–LM/AD–AS* Model 357

APPENDIX 9.B Algebraic Versions of the *IS–LM* and *AD–AS* Models 360

CHAPTER 10 Classical Business Cycle Analysis: Market-Clearing Macroeconomics 367

- 10.1 Business Cycles in the Classical Model 368
 - The Real Business Cycle Theory 368
 - APPLICATION** Calibrating the Business Cycle 371
- 10.2 Fiscal Policy Shocks in the Classical Model 378
- 10.3 Unemployment in the Classical Model 382
 - Jobless Recoveries 384
- 10.4 Money in the Classical Model 386
 - Monetary Policy and the Economy 386

Monetary Nonneutrality and Reverse Causation 387

The Nonneutrality of Money: Additional Evidence 388

10.5 The Misperceptions Theory and the Nonneutrality of Money 389

Monetary Policy and the Misperceptions Theory 392

Rational Expectations and the Role of Monetary Policy 394

IN TOUCH WITH DATA AND RESEARCH:
Are Price Forecasts Rational? 396

APPENDIX 10.A Worked-Out Numerical Exercise for Solving the Classical *AD-AS* Model with Misperceptions 405

APPENDIX 10.B An Algebraic Version of the Classical *AD-AS* Model with Misperceptions 406

CHAPTER 11 Keynesianism: The Macroeconomics of Wage and Price Rigidity 408

11.1 Real-Wage Rigidity 409

Some Reasons for Real-Wage Rigidity 409

The Efficiency Wage Model 410

Wage Determination in the Efficiency Wage Model 411

Employment and Unemployment in the Efficiency Wage Model 412

Efficiency Wages and the *FE* Line 414

IN TOUCH WITH DATA AND RESEARCH:
Henry Ford's Efficiency Wage 415

11.2 Price Stickiness 416

Sources of Price Stickiness: Monopolistic Competition and Menu Costs 416

11.3 Monetary and Fiscal Policy in the Keynesian Model 422

Monetary Policy 422

Fiscal Policy 425

11.4 The Keynesian Theory of Business Cycles and Macroeconomic Stabilization 428

Keynesian Business Cycle Theory 428

Macroeconomic Stabilization 431

Supply Shocks in the Keynesian Model 433

IN TOUCH WITH DATA AND RESEARCH:
DSGE Models and the Classical–Keynesian Debate 435

APPENDIX 11.A Labor Contracts and Nominal-Wage Rigidity 442

APPENDIX 11.B Worked-Out Numerical Exercise for Calculating the Multiplier in a Keynesian Model 445

APPENDIX 11.C The Multiplier in the Keynesian Model 447



PART 4 Macroeconomic Policy: Its Environment and Institutions

CHAPTER 12 Unemployment and Inflation 449

12.1 Unemployment and Inflation: Is There a Trade-Off? 449

The Expectations-Augmented Phillips Curve 452

The Shifting Phillips Curve 455

12.2 Macroeconomic Policy and the Phillips Curve 460

IN TOUCH WITH DATA AND RESEARCH:

The Lucas Critique 461

The Long-Run Phillips Curve 462

12.3 The Problem of Unemployment 462

The Costs of Unemployment 463

The Long-Term Behavior of the Unemployment Rate 463

12.4 The Problem of Inflation 467

The Costs of Inflation 467

IN TOUCH WITH DATA AND RESEARCH:

Indexed Contracts 469

12.5 Fighting Inflation: The Role of Inflationary Expectations 471

IN TOUCH WITH DATA AND RESEARCH:

The Sacrifice Ratio 473

The U.S. Disinflation of the 1980s and 1990s 474

CHAPTER 13 Exchange Rates, Business Cycles, and Macroeconomic Policy in the Open Economy 481

- 13.1 Exchange Rates 482**
 - Nominal Exchange Rates 482
 - IN TOUCH WITH DATA AND RESEARCH: Exchange Rates 483
 - Real Exchange Rates 484
 - Appreciation and Depreciation 485
 - Purchasing Power Parity 486
 - IN TOUCH WITH DATA AND RESEARCH: McParity 487
 - The Real Exchange Rate and Net Exports 489
 - APPLICATION** The Value of the Dollar and U.S. Net Exports 491
 - 13.2 How Exchange Rates Are Determined: A Supply-and-Demand Analysis 493**
 - Macroeconomic Determinants of the Exchange Rate and Net Export Demand 495
 - 13.3 The IS–LM Model for an Open Economy 497**
 - The Open-Economy IS Curve 498
 - Factors That Shift the Open-Economy IS Curve 501
 - The International Transmission of Business Cycles 503
 - 13.4 Macroeconomic Policy in an Open Economy with Flexible Exchange Rates 504**
 - A Fiscal Expansion 504
 - A Monetary Contraction 507
 - 13.5 Fixed Exchange Rates 509**
 - Fixing the Exchange Rate 510
 - Monetary Policy and the Fixed Exchange Rate 512
 - Fixed Versus Flexible Exchange Rates 515
 - Currency Unions 516
 - APPLICATION** European Monetary Unification 517
 - APPLICATION** Crisis in Argentina 519
- APPENDIX 13.A Worked-Out Numerical Exercise for the Open-Economy IS–LM Model 528**
- APPENDIX 13.B An Algebraic Version of the Open-Economy IS–LM Model 531**

CHAPTER 14 Monetary Policy and the Federal Reserve System 534

- 14.1 Principles of Money Supply Determination 535**
 - Open-Market Operations 537
 - The Money Multiplier 538
 - Bank Runs 541
 - APPLICATION** The Money Multiplier During Severe Financial Crises 542
 - 14.2 Monetary Control in the United States 547**
 - The Federal Reserve System 547
 - The Federal Reserve’s Balance Sheet and Open-Market Operations 548
 - Reserve Requirements 550
 - Discount Window Lending 551
 - Interest Rate on Reserves 553
 - 14.3 Setting Monetary Policy Targets 553**
 - Targeting the Federal Funds Rate 553
 - 14.4 Making Monetary Policy in Practice 557**
 - Lags in the Effect of Monetary Policy 557
 - Conducting Monetary Policy Under Uncertainty 559
 - Monetary Policy in the Great Recession 560
 - APPLICATION** The Financial Crisis of 2008 564
 - 14.5 The Conduct of Monetary Policy: Rules Versus Discretion 565**
 - The Monetarist Case for Rules 566
 - Rules and Central Bank Credibility 568
 - The Taylor Rule 570
 - Other Ways to Achieve Central Bank Credibility 572
 - APPLICATION** Inflation Targeting 574
- CHAPTER 15 Government Spending and Its Financing 580**
- 15.1 The Government Budget: Some Facts and Figures 580**
 - Government Outlays 580
 - Taxes 583
 - Deficits and Surpluses 586

15.2 Government Spending, Taxes, and the Macroeconomy 588

Fiscal Policy and Aggregate Demand 588

Government Capital Formation 590

Incentive Effects of Fiscal Policy 591

APPLICATION Labor Supply and Tax Reform in the 1980s 593

15.3 Government Deficits and Debt 595

The Growth of the Government Debt 595

APPLICATION Social Security: How Can It Be Fixed? 597

The Burden of the Government Debt on Future Generations 599

Budget Deficits and National Saving: Ricardian Equivalence Revisited 600

Departures from Ricardian Equivalence 603

IN TOUCH WITH DATA AND RESEARCH:

Measuring the Impact of Government Purchases on the Economy 604

15.4 Deficits and Inflation 605

The Deficit and the Money Supply 606

Real Seignorage Collection and Inflation 607

APPENDIX 15.A The Debt–GDP Ratio 616

APPENDIX A Some Useful Analytical Tools 617

A.1 Functions and Graphs 617

A.2 Slopes of Functions 618

A.3 Elasticities 619

A.4 Functions of Several Variables 620

A.5 Shifts of a Curve 620

A.6 Exponents 621

A.7 Growth Rate Formulas 621

Problems 622

Glossary 624

Name Index 635

Subject Index 637

Summary Tables

- 1 Measures of Aggregate Saving 37
- 2 Comparing the Benefits and Costs of Changing the Amount of Labor 73
- 3 Factors That Shift the Aggregate Labor Demand Curve 77
- 4 Factors That Shift the Aggregate Labor Supply Curve 83
- 5 Determinants of Desired National Saving 120
- 6 Determinants of Desired Investment 132
- 7 Equivalent Measures of a Country's International Trade and Lending 177
- 8 The Fundamental Determinants of Long-Run Living Standards 226
- 9 Macroeconomic Determinants of the Demand for Money 260
- 10 The Cyclical Behavior of Key Macroeconomic Variables (The Business Cycle Facts) 292
- 11 Factors That Shift the Full-Employment (*FE*) Line 318
- 12 Factors That Shift the *IS* Curve 321
- 13 Factors That Shift the *LM* Curve 327
- 14 Factors That Shift the *AD* Curve 346
- 15 Terminology for Changes in Exchange Rates 486
- 16 Determinants of the Exchange Rate (Real or Nominal) 497
- 17 Determinants of Net Exports 497
- 18 International Factors That Shift the *IS* Curve 503
- 19 Factors Affecting the Monetary Base, the Money Multiplier, and the Money Supply 550

Key Diagrams

- 1 The production function 97
- 2 The labor market 98
- 3 The saving–investment diagram 145
- 4 National saving and investment in a small open economy 200
- 5 National saving and investment in large open economies 201
- 6 The *IS–LM* model 351
- 7 The aggregate demand–aggregate supply model 352
- 8 The misperceptions version of the *AD–AS* model 399

Preface

Since February 2006, Ben Bernanke has been chairman of the Board of Governors of the Federal Reserve System. Federal ethics rules prohibited him from making substantive contributions to the sixth, seventh, and eighth editions.

In preparing the eighth edition, we viewed our main objective to be keeping the book fresh and up-to-date, especially in light of the recent crises in the United States and Europe and many new tools used by the Federal Reserve in response to the crisis. We have also added new applications, boxes, and problems throughout and made many revisions of the text to reflect recent events and developments in the field. In addition, the empirical problems at the end of most chapters direct students to appropriate data in the FRED database on the Web site of the Federal Reserve Bank of St. Louis. Because this database is frequently updated and is available free of charge, students will develop familiarity and facility with a current data source that they can continue to use after completing the course.

A summary of our revisions follows.

What's New in This Edition

The severe recession that occurred from 2007 to 2009 and the slow recovery that followed have motivated many changes in this edition of *Macroeconomics*. The main changes in this textbook are geared toward explaining those economic events and related issues, including the large increase in the duration of unemployment, the slow recovery of the labor market, the Fed's new tools for conducting monetary policy and how they have been used, and the impact of fiscal policy on the economy in a severe recession.

This is a summary of the changes made in the textbook for the eighth edition. See the following section for further details on these changes.

- We add a new application on the large increase in unemployment duration in the 2007–2009 recession and evaluate four potential explanations for it.
- We discuss the severity of the 2007–2009 recession and show how it compares historically to other recessions, leading many economists to label it the Great Recession.
- We analyze the slow recovery in employment that followed the three most recent recessions and review potential explanations.
- We look at the various crises facing European countries since 2008 and consider the major changes that may be required if the euro is to survive.
- We examine monetary policy in greater detail, discussing both the theory of the conduct of monetary policy under uncertainty and what the Fed did in response to the Great Recession.
- We add detail on the new tools the Fed has used in recent years, including quantitative easing, credit easing, forward guidance, and modifying the maturity structure of its assets.

- We describe new research evaluating the impact of government purchases on the economy, motivated by the fiscal stimulus put in place in the United States in response to the Great Recession.
- We update our extensive series of graphs illustrating the historical movements of key economic variables.

New and Updated Coverage

What is taught in intermediate macroeconomics courses—and how it is taught—has changed substantially in recent years. Previous editions of *Macroeconomics* played a major role in these developments. The eighth edition provides lively coverage of a broad spectrum of macroeconomic issues and ideas, including a variety of new and updated topics:

- *Monetary policy.* In response to the slow economic recovery following the 2007–2009 recession, the Federal Reserve introduced new tools to influence economic activity, so we have added a substantial amount of material to discuss many different aspects of these policy changes. Thus, we have rewritten Chapter 14 on monetary policy substantially. *New or substantially revised coverage:* In Chapter 14 we describe all the new tools the Fed has used for monetary policy, including quantitative easing, credit easing, forward guidance, and twisting the yield curve. In Chapter 14, we also increase our discussion of policymaking under uncertainty and discuss how policymakers can deal optimally with uncertainty. Finally, we also show how the Fed’s balance sheet has changed since the financial crisis, with the Fed’s assets more than tripling in size.
- *Long-term economic growth.* Because the rate of economic growth plays a central role in determining living standards, we devote much of Part 2 to growth and related issues. We first discuss factors contributing to growth, such as productivity (Chapter 3) and rates of saving and investment (Chapter 4); then in Chapter 6 we turn to a full-fledged analysis of the growth process, using tools such as growth accounting and the Solow model. Growth-related topics covered include the post-1973 productivity slowdown, the factors that determine long-run living standards, and the productivity “miracle” of the 1990s. *Revised coverage:* Updated data and a discussion of China’s growth prospects plus a discussion of how governments can encourage research and development is included.
- *International macroeconomic issues.* We address the increasing integration of the world economy in two ways. First, we frequently use cross-country comparisons and applications that draw on the experiences of nations other than the United States. For example, in Chapter 6 we compare the long-term economic growth rates of several countries; in Chapter 7 we compare inflation experiences among European countries in transition; in Chapter 8 we compare the growth in industrial production in several countries; in Chapter 12 we compare sacrifice ratios among various countries; and in Chapter 14 we discuss strategies used for making monetary policy around the world. Second, we devote two chapters, 5 and 13, specifically to international issues. In Chapter 5 we show how the trade balance is related to a nation’s rates of saving and investment, and then apply this framework to discuss issues such as the U.S.

trade deficit and the relationship between government budget deficits and trade deficits. In Chapter 13 we use a simple supply–demand framework to examine the determination of exchange rates. The chapter features innovative material on fixed exchange rates and currency unions, including an explanation of why a currency may face a speculative run. *Revised coverage:* The text includes a discussion of the series of financial crises in Europe that began in 2008 (Chapter 13).

- *Business cycles.* Our analysis of business cycles begins with facts rather than theories. In Chapter 8 we give a history of U.S. business cycles and then describe the observed cyclical behavior of a variety of important economic variables (the “business cycle facts”). In Chapters 9–11 we evaluate alternative classical and Keynesian theories of the cycle by how well they explain the facts. *New to this edition:* The text now includes an analysis of the Great Recession (Chapter 8), and a description of the jobless recoveries that have occurred following the three most recent recessions (Chapter 10).
- *Fiscal policy.* The effects of macroeconomic policies are considered in nearly every chapter, in both theory and applications. We present classical (Chapter 10), Keynesian (Chapter 11), and monetarist (Chapter 14) views on the appropriate use of policy. *New or substantially revised coverage:* The text now discusses new research measuring the impact of government purchases on the economy.
- *Labor market issues.* We pay close attention to issues relating to employment, unemployment, and real wages. We introduce the basic supply–demand model of the labor market, as well as unemployment, early, in Chapter 3. We discuss unemployment more extensively in Chapter 12, which covers the inflation–unemployment trade-off, the costs of unemployment, and government policies for reducing unemployment. Other labor market topics include efficiency wages (Chapter 11) and the effects of marginal and average tax rate changes on labor supply (Chapter 15). *New or substantially revised coverage:* The text now discusses the large rise in unemployment duration that occurred during the 2007–2009 recession (Chapter 3).

A Solid Foundation

The eighth edition builds on the strengths that underlie the book’s lasting appeal to instructors and students, including:

- *Real-world applications.* A perennial challenge for instructors is to help students make active use of the economic ideas developed in the text. The rich variety of applications in this book shows by example how economic concepts can be put to work in explaining real-world issues such as the housing crisis that began in 2007 and the financial crisis of 2008, the slowdown and revival in productivity growth, the challenges facing the Social Security system and the Federal budget, the impact of globalization on the U.S. economy, and new approaches to making monetary policy that were used in response to the financial crisis in 2008 and the slow recovery since 2009. The eighth edition offers new applications as well as updates of the best applications and analyses of previous editions.
- *Broad modern coverage.* From its conception, *Macroeconomics* has responded to students’ desires to investigate and understand a wider range of macroeconomic issues than is permitted by the course’s traditional emphasis on

short-run fluctuations and stabilization policy. This book provides a modern treatment of these traditional topics but also gives in-depth coverage of other important macroeconomic issues such as the determinants of long-run economic growth, the trade balance and financial flows, labor markets, and the institutional framework of policymaking. This comprehensive coverage also makes the book a useful tool for instructors with differing views about course coverage and topic sequence.

- *Reliance on a set of core economic ideas.* Although we cover a wide range of topics, we avoid developing a new model or theory for each issue. Instead we emphasize the broad applicability of a set of core economic ideas (such as the production function, the trade-off between consuming today and saving for tomorrow, and supply–demand analysis). Using these core ideas, we build a theoretical framework that encompasses all the macroeconomic analyses presented in the book: long-run and short-run, open-economy and closed-economy, and classical and Keynesian.
- *A balanced presentation.* Macroeconomics is full of controversies, many of which arise from the split between classical and Keynesians (of the old, new, and neo-varieties). Sometimes the controversies overshadow the broad common ground shared by the two schools. We emphasize that common ground. First, we pay greater attention to long-run issues (on which classical and Keynesians have less disagreement). Second, we develop the classical and Keynesian analyses of short-run fluctuations within a single overall framework, in which we show that the two approaches differ principally in their assumptions about how quickly wages and prices adjust. Where differences in viewpoint remain—for example, in the search versus efficiency-wage interpretations of unemployment—we present and critique both perspectives. This balanced approach exposes students to all the best ideas in modern macroeconomics. At the same time, an instructor of either classical or Keynesian inclination can easily base a course on this book.
- *Innovative pedagogy.* The eighth edition, like its predecessors, provides a variety of useful tools to help students study, understand, and retain the material. Described in more detail later in the preface, these tools include summary tables, key diagrams, key terms, and key equations to aid students in organizing their study, and four types of questions and problems for practice and developing understanding, including problems that encourage students to do their own empirical work, using data readily available on the Internet. Several appendices illustrate how to solve numerical exercises that are based on the algebraic descriptions of the *IS–LM/AS–AD* model.

A Flexible Organization

The eighth edition maintains the flexible structure of earlier editions. In Part 1 (Chapters 1–2), we introduce the field of macroeconomics and discuss issues of economic measurement. In Part 2 (Chapters 3–7), we focus on long-run issues, including productivity, saving, investment, the trade balance, growth, and inflation. We devote Part 3 (Chapters 8–11) to the study of short-run economic fluctuations and stabilization policy. Finally, in Part 4 (Chapters 12–15), we take a closer look at issues and institutions of policymaking. Appendix A at the end of the book reviews useful algebraic and graphical tools.

Instructors of intermediate macroeconomics have different preferences as to course content, and their choices are often constrained by their students' backgrounds and the length of the term. The structure of *Macroeconomics* accommodates various needs. In planning how to use the book, instructors might find it useful to consider the following points:

- *Core chapters.* We recommend that every course include these six chapters:

Chapter 1 Introduction to Macroeconomics
 Chapter 2 The Measurement and Structure of the National Economy
 Chapter 3 Productivity, Output, and Employment
 Chapter 4 Consumption, Saving, and Investment
 Chapter 7 The Asset Market, Money, and Prices
 Chapter 9 The *IS–LM/AD–AS* Model: A General Framework for Macroeconomic Analysis

Chapters 1 and 2 provide an introduction to macroeconomics, including national income accounting. The next four chapters in the list make up the analytical core of the book: Chapter 3 examines the labor market, Chapters 3 and 4 together develop the goods market, Chapter 7 discusses the asset market, and Chapter 9 combines the three markets into a general equilibrium model usable for short-run analysis (in either a classical or Keynesian mode).

- *Suggested additions.* To a syllabus containing these six chapters, instructors can add various combinations of the other chapters, depending on the course focus. The following are some possible choices:

Short-run focus. Instructors who prefer to emphasize short-run issues (business cycle fluctuations and stabilization policy) may omit Chapters 5 and 6 without loss of continuity. They could also go directly from Chapters 1 and 2 to Chapters 8 and 9, which introduce business cycles and the *IS–LM/AD–AS* framework. Although the presentation in Chapters 8 and 9 is self-contained, it will be helpful for instructors who skip Chapters 3–7 to provide some background and motivation for the various behavioral relationships and equilibrium conditions.

Classical emphasis. For instructors who want to teach the course with a modern classical emphasis, we recommend assigning all the chapters in Part 2. In Part 3, Chapters 8–10 provide a self-contained presentation of classical business cycle theory. Other material of interest includes the Friedman–Phelps interpretation of the Phillips curve (Chapter 12), the role of credibility in monetary policy (Chapter 14), and Ricardian equivalence with multiple generations (Chapter 15).

Keynesian emphasis. Instructors who prefer a Keynesian emphasis may choose to omit Chapter 10 (classical business cycle analysis). As noted, if a short-run focus is preferred, Chapter 5 (full-employment analysis of the open economy) and Chapter 6 (long-run economic growth) may also be omitted without loss of continuity.

International focus. Chapter 5 discusses saving, investment, and the trade balance in an open economy with full employment. Chapter 13 considers exchange rate determination and macroeconomic policy in an open-economy

model in which short-run deviations from full employment are possible. (Chapter 5 is a useful but not essential prerequisite for Chapter 13.) Both chapters may be omitted for a course focusing on the domestic economy.

Applying Macroeconomics to the Real World

Economists sometimes get caught up in the elegance of formal models and forget that the ultimate test of a model or theory is its practical relevance. In the previous editions of *Macroeconomics*, we dedicated a significant portion of each chapter to showing how the theory could be applied to real events and issues. Our efforts were well received by instructors and students. The eighth edition continues to help students learn how to “think like an economist” by including the following features:

- *Applications.* Applications in each chapter show students how they can use theory to understand an important episode or issue. Examples of topics covered in Applications include the increase in the duration of unemployment in the Great Recession (Chapter 3), the macroeconomic consequences of the boom and bust in stock prices (Chapter 4), how people respond to tax rebates (Chapter 4), the United States as international debtor (Chapter 5), the recent surge in U.S. productivity growth (Chapter 6), calibrating the business cycle (Chapter 10), inflation targeting (Chapter 14), and labor supply and tax reform (Chapter 15).
- *In Touch with Data and Research.* These boxes give the reader further insight into new developments in economic research as well as a guide to keeping abreast of new developments in the economy. Research topics in these boxes include discussions of biases in inflation measurement (Chapter 2), the link between capital investment and the stock market (Chapter 4), flows of U.S. dollars abroad (Chapter 7), DSGE models and the classical–Keynesian debate (Chapter 10), the Lucas critique (Chapter 12), and the impact on the economy of fiscal stimulus packages (Chapter 15). Keeping abreast of the economy requires an understanding of what data are available, as well as their strengths and shortcomings. We provide a series of boxes to show where to find key macroeconomic data—such as labor market data (Chapter 3), balance of payments data (Chapter 5), and exchange rates (Chapter 13)—and how to interpret them. Online data sources are featured along with more traditional media.

Learning Features

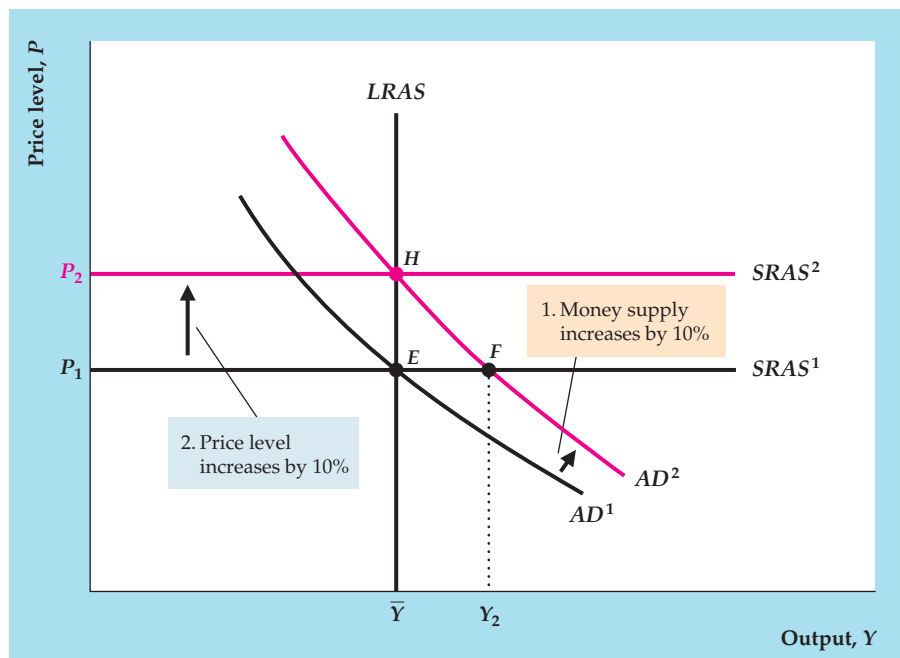
The following features of this book aim to help students understand, apply, and retain important concepts:

- *Detailed, full-color graphs.* The book is liberally illustrated with data graphs, which emphasize the empirical relevance of the theory, and analytical graphs, which guide students through the development of model and theory in a step-by-step manner. For both types of graphs, descriptive captions summarize the details of the events shown.
- The use of color in an analytical graph is demonstrated by the figure on the next page, which shows the effects of a shifting curve on a set of endogenous variables. Note that the original curve is in black, whereas its new position is marked in red, with the direction of the shift indicated by arrows.

FIGURE 9.14

Monetary neutrality in the AD–AS framework

If we start from general equilibrium at point E , a 10% increase in the nominal money supply shifts the AD curve up and to the right from AD^1 to AD^2 . The points on the new AD curve are those for which the price level is 10% higher at each level of output demanded, because a 10% increase in the price level is needed to keep the real money supply, and thus the aggregate quantity of output demanded, unchanged. In the new short-run equilibrium at point F , the price level is unchanged, and output is higher than its full-employment level. In the new long-run equilibrium at point H , output is unchanged at \bar{Y} , and the price level P_2 is 10% higher than the initial price level P_1 . Thus money is neutral in the long run.



A peach-colored “shock box” points out the reason for the shift, and a blue “result box” lists the main effects of the shock on endogenous variables. These and similar conventions make it easy for students to gain a clear understanding of the analysis.

- **Key diagrams.** Key diagrams, a unique study feature at the end of selected chapters, are self-contained descriptions of the most important analytical graphs in the book (see the end of the Detailed Contents for a list). For each key diagram, we present the graph (for example, the production function, p. 97, or the AD–AS diagram, p. 352) and define and describe its elements in words and, where appropriate, equations. We then analyze what the graph reveals and discuss the factors that shift the curves in the graph.
- **Summary tables.** Throughout the book, summary tables bring together the main results of an analysis and reduce the time that students must spend writing and memorizing results, allowing a greater concentration on understanding and applying these results.
- **End-of-chapter review materials.** To facilitate review, at the end of each chapter students will find a chapter summary, covering the chapter’s main points; a list of key terms with page references; and an annotated list of key equations.
- **End-of-chapter questions and problems.** An extensive set of questions and problems includes review questions, for student self-testing and study; numerical problems, which have numerical solutions and are especially useful for checking students’ understanding of basic relationships and concepts; analytical problems, which ask students to use or extend a theory qualitatively; and empirical problems that direct students to use data from the FRED database of the Federal Reserve Bank of St. Louis and allow them to see for themselves how well theory explains real-world data. Answers to these problems (except the empirical problems, the answers to which change over time) appear


in the *Instructor's Manual*. All end-of-chapter Review Questions, Numerical Problems, and most Analytical Problems can be assigned in and automatically graded by MyEconLab.

- *Worked numerical problems at the end of selected chapters.* The IS-LM/AD-AS model is the analytic centerpiece of Parts 3 and 4 of the book. In addition to providing algebraic descriptions of this model in appendixes at the end of selected chapters in Parts 3 and 4, separate appendixes illustrate worked-out numerical problems using this model.
- *Review of useful analytical tools.* Although we use no mathematics beyond high school algebra, some students will find it handy to have a review of the book's main analytical tools. Appendix A (at the end of the text) succinctly discusses functions of one variable and multiple variables, graphs, slopes, exponents, and formulas for finding the growth rates of products and ratios.
- *Glossary.* The glossary at the end of the book defines all key terms (boldface within the chapter and also listed at the end of each chapter) and refers students to the page on which the term is fully defined and discussed.



MyEconLab

MyEconLab is a powerful assessment and tutorial system that works hand-in-hand with *Macroeconomics*. MyEconLab includes comprehensive homework, quiz, test, and tutorial options, allowing instructors to manage all assessment needs in one program. Key innovations in the MyEconLab course for *Macroeconomics*, eighth edition, include the following:

- Real-time *Data Analysis Exercises*, marked with , allow students and instructors to use the absolute latest data from FRED, the online macroeconomic data bank from the Federal Reserve Bank of St. Louis. By completing the exercises, students become familiar with a key data source, learn how to locate data, and develop skills to interpret data.
- In the eText available in MyEconLab, select figures labeled **MyEconLab Real-time data** allow students to display a popup graph updated with real-time data from FRED.
- Current News Exercises, new to this edition of the MyEconLab course, provide a turn-key way to assign gradable news-based exercises in MyEconLab. Every week, Pearson scours the news, finds a current article appropriate for the macroeconomics course, creates an exercise around this news article, and then automatically adds it to MyEconLab. Assigning and grading current news-based exercises that deal with the latest macro events and policy issues has never been more convenient.

Students and MyEconLab. This online homework and tutorial system puts students in control of their own learning through a suite of study and practice tools correlated with the online, interactive version of the textbook and other media tools. Within MyEconLab's structured environment, students practice what they learn, test their understanding, and then pursue a study plan that MyEconLab generates for them based on their performance on practice tests.

Instructors and MyEconLab. MyEconLab provides flexible tools that allow instructors to easily and effectively customize online course materials to suit their needs. Instructors can create and assign tests, quizzes, or homework assignments. MyEconLab saves time by automatically grading all questions and tracking results in an online gradebook. MyEconLab can even grade assignments that require students to draw a graph.

After registering for MyEconLab instructors have access to downloadable supplements such as an instructor’s manual, PowerPoint lecture notes, and a test bank. The test bank can also be used within MyEconLab, giving instructors ample material from which they can create assignments.

For advanced communication and customization, MyEconLab is delivered in CourseCompass. Instructors can upload course documents and assignments, and use advanced course management features. For more information about MyEconLab or to request an instructor access code, visit *www.myeconlab.com*.

Additional MyEconLab resources include:

- *Animated figures.* Key figures from the textbook are presented in step-by-step animations with audio explanations of the action.
- *MySearchLab.* This site includes research tools, steps for researching and writing a paper, and avoiding plagiarism tutorials.

Additional Supplementary Resources

A full range of additional supplementary materials to support teaching and learning accompanies this book. All of these items are available to qualified domestic adopters but in some cases may not be available to international adopters.

- The *Instructor’s Manual* offers guidance for instructors on using the text, solutions to all end-of-chapter problems in the book (except the empirical questions), and suggested topics for class discussion.
- The *Test Item File* contains a generous selection of multiple-choice questions and problems, all with answers. All questions and problems are also available in TestGen.
- *PowerPoint Lectures* provide slides for all the basic text material, including all tables and figures from the textbook.

Acknowledgments

A textbook isn’t the lonely venture of its author or coauthors but rather is the joint project of dozens of skilled and dedicated people. We extend special thanks to Denise Clinton, digital publisher; David Alexander, executive editor; and project manager Lindsey Sloan, for their superb work on the eighth edition. For their efforts, care, and craft, we also thank Kathryn Dinovo, senior production project manager; Debbie Meyer, managing editor from Integra; Melissa Honig, executive media producer; Noel Lotz, MyEconLab content lead; and Lori DeShazo, executive marketing manager.

We also appreciate the contributions of the reviewers and colleagues who have offered valuable comments on succeeding drafts of the book in all eight editions thus far:

- Ugur Aker, *Hiram College*
 Krishna Akkina, *Kansas State University*
 Terence J. Alexander, *Iowa State University*
 Edward Allen, *University of Houston*
 Richard G. Anderson, *Federal Reserve Bank of St. Louis*
 David Aschauer, *Bates College*
 Martin A. Asher, *The Wharton School, University of Pennsylvania*
 David Backus, *New York University*
 Daniel Barbezat, *Amherst College*
 Parantap Basu, *Fordham University*
 Valerie R. Bencivenga, *University of Texas*
 Haskel Benishag, *Kellogg Graduate School of Management, Northwestern University*
 Charles A. Bennett, *Gannon University*
 Joydeep Bhattacharya, *Iowa State University*
 Robert A. Blewett, *Saint Lawrence University*
 Scott Bloom, *North Dakota State University*
 Bruce R. Bolnick, *Northeastern University*
 David Brasfield, *Murray State University*
 Viacheslav Breusov, *University of Pennsylvania*
 Audie Brewton, *Northeastern Illinois University*
 Stacey Brook, *University of Sioux Falls*
 Nancy Burnett, *University of Wisconsin, Oshkosh*
 Maureen Burton, *California Polytechnic University, Pomona*
 John Campbell, *Harvard University*
 Kevin Carey, *American University*
 J. Lon Carlson, *Illinois State University*
 Wayne Carroll, *University of Wisconsin, Eau Claire*
 Arthur Schiller Casimir, *Western New England College*
 Stephen Cecchetti, *Brandeis University*
 Anthony Chan, *Woodbury University*
 Leo Chan, *University of Kansas*
 S. Chandrasekhar, *Pennsylvania State University*
 Henry Chappell, *University of South Carolina*
 Jen-Chi Cheng, *Wichita State University*
 Menzie Chinn, *University of California, Santa Cruz*
 K. A. Chopra, *State University of New York, Oneonta*
 Nan-Ting Chou, *University of Louisville*
 Jens Christiansen, *Mount Holyoke College*
 Reid W. Click, *George Washington University*
 John P. Cochran, *Metropolitan State College of Denver*
 Juan Carlos Cordoba, *Rice University*
 Steven R. Cunningham, *University of Connecticut*
 Bruce R. Dalgaard, *St. Olaf College*
 Betty C. Daniel, *University at Albany—SUNY*
 Joe Daniels, *Marquette University*
 Edward Day, *University of Central Florida*
 Robert Dekle, *University of Southern California*
 Greg Delemeester, *Marietta College*
 Wouter J. Den Haan, *University of Amsterdam*
 Johan Deprez, *Texas Tech University*
 James Devine, *Loyola Marymount University*
 Wael William Diab, *Cisco Systems*
 Aimee Dimmerman, *George Washington University*
 Peter Dohlman, *International Monetary Fund*
 Patrick Dolenc, *Keene State College*
 Allan Drazen, *University of Maryland*
 Robert Driskill, *Vanderbilt University*
 Bill Dupor, *Ohio State University*
 Donald H. Dutkowsky, *Syracuse University*
 James E. Eaton, *Bridgewater College*
 Janice C. Eberly, *Northwestern University*
 Andrew Economopoulos, *Ursinus College*
 Alejandra Cox Edwards, *California State University, Long Beach*
 Martin Eichenbaum, *Northwestern University*
 Carlos G. Elias, *Manhattan College*
 Kirk Elwood, *James Madison University*
 Sharon J. Erenburg, *Eastern Michigan University*
 Christopher Erickson, *New Mexico State University*
 James Fackler, *University of Kentucky*
 Steven Fazzari, *Washington University*
 J. Peter Ferderer, *Clark University*
 Abdollah Ferdowsi, *Ferris State University*
 David W. Findlay, *Colby College*
 Thomas J. Finn, *Wayne State University*
 Charles C. Fischer, *Pittsburg State University*
 John A. Flanders, *Central Methodist College*
 Juergen Fleck, *Hollins College*
 Adrian Fleissig, *California State University, Fullerton*
 R. N. Folsom, *San Jose State University*
 Kevin Foster, *City University of New York*
 J. E. Fredland, *U.S. Naval Academy*
 James R. Gale, *Michigan Technological University*
 Edward N. Gamber, *Lafayette College*
 William T. Ganley, *Buffalo State College*
 Charles B. Garrison, *University of Tennessee, Knoxville*
 Kathie Gilbert, *Mississippi State University*
 Carlos G. Glias, *Manhattan College*
 Roger Goldberg, *Ohio Northern University*
 Joao Gomes, *The Wharton School, University of Pennsylvania*
 Fred C. Graham, *American University*
 John W. Graham, *Rutgers University*

- Stephen A. Greenlaw, *Mary Washington College*
- Alan F. Gummerson, *Florida International University*
- A. R. Gutowsky, *California State University, Sacramento*
- David R. Hakes, *University of Northern Iowa*
- Michael Haliassos, *University of Maryland*
- George J. Hall, *Brandeis University*
- John C. Haltiwanger, *University of Maryland*
- James Hamilton, *University of California, San Diego*
- David Hammes, *University of Hawaii*
- Reza Hamzaee, *Missouri Western State College*
- Robert Stanley Herren, *North Dakota University*
- Charles Himmelberg, *Federal Reserve Bank of New York*
- Barney F. Hope, *California State University, Chico*
- Fenn Horton, *Naval Postgraduate School*
- Christopher House, *University of Michigan*
- E. Philip Howrey, *University of Michigan*
- John Huizinga, *University of Chicago*
- Nayyer Hussain, *Tougaloo College*
- Steven Husted, *University of Pittsburgh*
- Matthew Hyle, *Winona State University*
- Matteo Iacoviello, *Boston College*
- Selo Imrohorglu, *University of Southern California*
- Kenneth Inman, *Claremont McKenna College*
- Liana Jacobi, *Washington University*
- Philip N. Jefferson, *Swarthmore College*
- Urban Jermann, *The Wharton School, University of Pennsylvania*
- Charles W. Johnston, *University of Michigan, Flint*
- Barry E. Jones, *Binghamton University*
- Paul Junk, *University of Minnesota*
- James Kahn, *Yeshiva University*
- George Karras, *University of Illinois, Chicago*
- Roger Kaufman, *Smith College*
- Adrienne Kearney, *University of Maine*
- James Keeler, *Kenyon College*
- Patrick R. Kelso, *West Texas State University*
- Kusum Ketkar, *Seton Hall University*
- F. Khan, *University of Wisconsin, Parkside*
- Jinill Kim, *Korea University*
- Robert King, *Boston University*
- Milka S. Kirova, *Saint Louis University*
- Nobuhiro Kiyotaki, *Princeton University*
- Michael Klein, *Tufts University*
- Peter Klenow, *Stanford University*
- Kenneth Koelln, *University of North Texas*
- Douglas Koritz, *Buffalo State College*
- Eugene Kroch, *Villanova University*
- Corinne Krupp, *University of North Carolina, Chapel Hill*
- Kishore Kulkarni, *Metropolitan State College of Denver*
- Krishna B. Kumar, *University of Southern California*
- Andre Kurmann, *Federal Reserve Board*
- Maureen Lage, *Miami University*
- John S. Lapp, *North Carolina State University*
- G. Paul Larson, *University of North Dakota*
- Sven R. Larson, *Skidmore College*
- James Lee, *Fort Hays State University*
- Junsoo Lee, *University of Alabama*
- Keith J. Leggett, *Davis and Elkins College*
- Carol Scotese Lehr, *Virginia Commonwealth University*
- John Leyes, *Florida International University*
- Xuan Liu, *East Carolina University*
- Ming Chien Lo, *University of Virginia*
- Mary Lorely, *Syracuse University*
- Cara Lown, *Federal Reserve Bank of New York*
- Richard MacDonald, *St. Cloud State University*
- Thampy Mammen, *St. Norbert College*
- Linda M. Manning, *University of Missouri*
- Michael Marlow, *California Polytechnic State University*
- Kathryn G. Marshall, *Ohio State University*
- Patrick Mason, *University of California, Riverside*
- Ben Matta, *New Mexico State University*
- Stephen McCafferty, *Ohio State University*
- J. Harold McClure, Jr., *Villanova University*
- Ken McCormick, *University of Northern Iowa*
- John McDermott, *University of South Carolina*
- Michael B. McElroy, *North Carolina State University*
- Randolph McGee, *University of Kentucky*
- Michael McPherson, *University of North Texas*
- Tim Miller, *Denison University*
- Bruce Mizrach, *Rutgers University*
- Tommaso Monacelli, *Boston College*
- B. Moore, *Wesleyan University*
- W. Douglas Morgan, *University of California, Santa Barbara*
- Jon Nadenichek, *California State University, Northridge*
- K. R. Nair, *West Virginia Wesleyan College*
- Emi Nakamura, *Columbia University*
- John Neri, *University of Maryland*
- Jeffrey Nugent, *University of Southern California*
- Maurice Obstfeld, *University of California, Berkeley*
- Stephen A. O'Connell, *Swarthmore College*
- William P. O'Dea, *State University of New York, Oneonta*
- Heather O'Neill, *Ursinus College*
- Athanasios Orphanides, *Federal Reserve Board*
- Spencer Pack, *Connecticut College*
- Walter Park, *American University*
- Randall Parker, *East Carolina University*
- Allen Parkman, *University of New Mexico*
- David Parsley, *Vanderbilt University*
- James E. Payne, *Eastern Kentucky University*
- Rowena Pecchenino, *Michigan State University*

- Peter Pedroni, *Williams College*
 Mark Pernecky, *St. Olaf College*
 Christopher Phelan, *University of Minnesota*
 Kerk Phillips, *Brigham Young University*
 Paul Pieper, *University of Illinois, Chicago*
 Andrew J. Policano, *State University of New York, Stony Brook*
 Richard Pollock, *University of Hawaii, Manoa*
 Jay B. Prag, *Claremont McKenna College*
 Kojo Quartey, *Talladega College*
 Vaman Rao, *Western Illinois University*
 Neil Raymon, *University of Missouri, Columbia*
 Colin Read, *University of Alaska, Fairbanks*
 Michael Redfearn, *University of North Texas*
 Robert R. Reed, *University of Alabama*
 Charles Revier, *Colorado State University*
 Patricia Reynolds, *International Monetary Fund*
 Jack Rezelman, *State University of New York, Potsdam*
 Robert Rich, *Federal Reserve Bank of New York*
 Libby Rittenberg, *Colorado College*
 Helen Roberts, *University of Illinois, Chicago*
 Kenneth Rogoff, *Harvard University*
 Rosemary Rossiter, *Ohio University*
 Benjamin Russo, *University of North Carolina*
 Heajin Heidi Ryoo, *La Trobe University*
 Plutarchos Sakellaris, *University of Maryland*
 Christine Sauer, *University of New Mexico*
 Edward Schmidt, *Randolph–Macon College*
 Stacey Schreft, *Federal Reserve Bank of Kansas City*
 William Seyfried, *Rose-Hulman Institute of Technology*
 Tayyeb Shabbir, *California State University, Dominguez Hills*
 Andrei Shevchenko, *Michigan State University*
 Virginia Shingleton, *Valparaiso University*
 Dorothy Siden, *Salem State College*
 Scott Simkins, *University of North Carolina, Greensboro*
 Tara Sinclair, *George Washington University*
 Abdol Soofi, *University of Wisconsin*
 Nicholas Souleles, *The Wharton School, University of Pennsylvania*
 David E. Spencer, *Brigham Young University*
 Don Stabile, *St. Mary's College*
 Richard Startz, *University of California, Santa Barbara*
 Gabriel Talmain, *State University of New York, Albany*
 Bryan Taylor, *California State University, Los Angeles*
 Susan Washburn Taylor, *Millsaps College*
 M. Dekalb Terrell, *Kansas State University*
 Henry S. Terrell, *University of Maryland*
 Willem Thorbecke, *George Mason University*
 Stephen J. Turnovsky, *University of Washington*
 Michael Twomey, *University of Michigan, Dearborn*
 Michael Ulan, *U.S. Department of State*
 Victor Valcarcel, *Texas Tech University*
 Dietrich Vollrath, *University of Houston*
 Ronald Warren, *University of Georgia*
 Chong K. Yip, *Chinese University of Hong Kong*

We thank John Haltiwanger of the University of Maryland for supplying data on job creation and destruction used in Chapter 10 and Shigeru Fujita of the Federal Reserve Bank of Philadelphia for data on the rates of job loss and job finding used in Chapter 8. We would also like to thank Robert H. Rasche, research director at the Federal Reserve Bank of St. Louis, for assisting us in our use of the FRED database cited at the end of each chapter in the “Working with Macroeconomic Data” exercises.

Finally, we thank Mark Gertler, Rick Mishkin, and Steve Zeldes for valuable assistance with the first edition. Also, we are grateful to several cohorts of students at the University of Pennsylvania, Princeton University, and the University of Richmond who—not entirely of their own free will but nonetheless very graciously—assisted us in the development of this textbook. Last and most important, we thank our families for their patience and support. We dedicate this book to them.

A. B. A.
 Wynnwood, PA
 B. S. B.
 Washington, DC
 D. C.
 Richmond, VA

Introduction to Macroeconomics

1.1 What Macroeconomics Is About

Summarize the primary issues addressed in macroeconomics.

Learning Objectives

1.1 Summarize the primary issues addressed in macroeconomics.

1.2 Describe the activities and objectives of macroeconomists.

1.3 Differentiate between the classical and Keynesian approaches to macroeconomics.

Macroeconomics is the study of the structure and performance of national economies and of the policies that governments use to try to affect economic performance. The issues that macroeconomists address include the following:

- *What determines a nation's long-run economic growth?* In 1890, income per capita was smaller in Norway than in Argentina. But today, income per capita is almost three times as high in Norway as in Argentina. Why do some nations' economies grow quickly, providing their citizens with rapidly improving living standards, while other nations' economies are relatively stagnant?
- *What causes a nation's economic activity to fluctuate?* The 1990s exhibited the longest period of uninterrupted economic growth in U.S. economic history, but economic performance in the 2000s was much weaker. A mild recession in 2001 was followed by a weak recovery that lasted only until December 2007. The recession that began at the end of 2007 was worsened by the financial crisis in 2008, which contributed to a sharp decline in output at the end of 2008 and in early 2009. Why do economies sometimes experience sharp short-run fluctuations, lurching between periods of prosperity and periods of hard times?
- *What causes unemployment?* During the 1930s, one-quarter of the work force in the United States was unemployed. A decade later, during World War II, less than 2% of the work force was unemployed. Why does unemployment sometimes reach very high levels? Why, even during times of relative prosperity, is a significant fraction of the work force unemployed?
- *What causes prices to rise?* The rate of inflation in the United States crept steadily upward during the 1970s, and exceeded 10% per year in the early 1980s, before dropping to less than 4% per year in the mid 1980s and dropping even further to less than 2% per year in the late 1990s. Germany's inflation experience has been much more extreme: Although Germany has earned a reputation for low inflation in recent decades, following its defeat in World War I Germany experienced an eighteen-month period (July 1922–December 1923) during which prices rose by a factor of several billion! What causes inflation, and what can be done about it?

- *How does being part of a global economic system affect nations' economies?* In the late 1990s, the U.S. economy was the engine of worldwide economic growth. The wealth gained by Americans in the stock market led them to increase their spending on consumer goods, including products made abroad, spurring greater economic activity in many countries. How do economic links among nations, such as international trade and borrowing, affect the performance of individual economies and the world economy as a whole?
- *Can government policies be used to improve a nation's economic performance?* In the 1980s and 1990s, the U.S. economy's output, unemployment rate, and inflation rate fluctuated much less than in the 1960s and 1970s. Some economists credit good government policy for the improvement in economic performance. In the financial crisis of 2008, the Federal Reserve and the federal government used extraordinary measures to keep banks and other financial institutions from failing. But some economists criticized these measures for going too far in trying to stabilize the economy, at the expense of creating incentives for increased risk taking by financial firms. Other economists criticize the Federal Reserve for not going far enough because the unemployment rate remained persistently high for years after the end of the recession in 2009. How should economic policy be conducted to keep the economy as prosperous and stable as possible?

Macroeconomics seeks to offer answers to such questions, which are of great practical importance and are constantly debated by politicians, the press, and the public. In the rest of this section, we consider these key macroeconomic issues in more detail.

Long-Run Economic Growth

If you have ever traveled in a developing country, you could not help but observe the difference in living standards relative to those of countries such as the United States. The problems of inadequate food, shelter, and health care experienced by the poorest citizens of rich nations often represent the average situation for the people of a developing country. From a macroeconomic perspective, the difference between rich nations and developing nations may be summarized by saying that rich nations have at some point in their history experienced extended periods of rapid economic growth but that the poorer nations either have never experienced sustained growth or have had periods of growth offset by periods of economic decline.

Figure 1.1 summarizes the growth in output of the U.S. economy since 1869.¹ The record is an impressive one: Over the past 142 years, the annual output of U.S. goods and services has increased by more than 125 times. The performance of the U.S. economy is not unique, however; other industrial nations have had similar, and in some cases higher, rates of growth over the same period of time. This massive increase in the output of industrial economies is one of the central facts of modern history and has had enormous political, military, social, and even cultural implications.

In part, the long-term growth of the U.S. economy is the result of a rising population, which has meant a steady increase in the number of available workers.

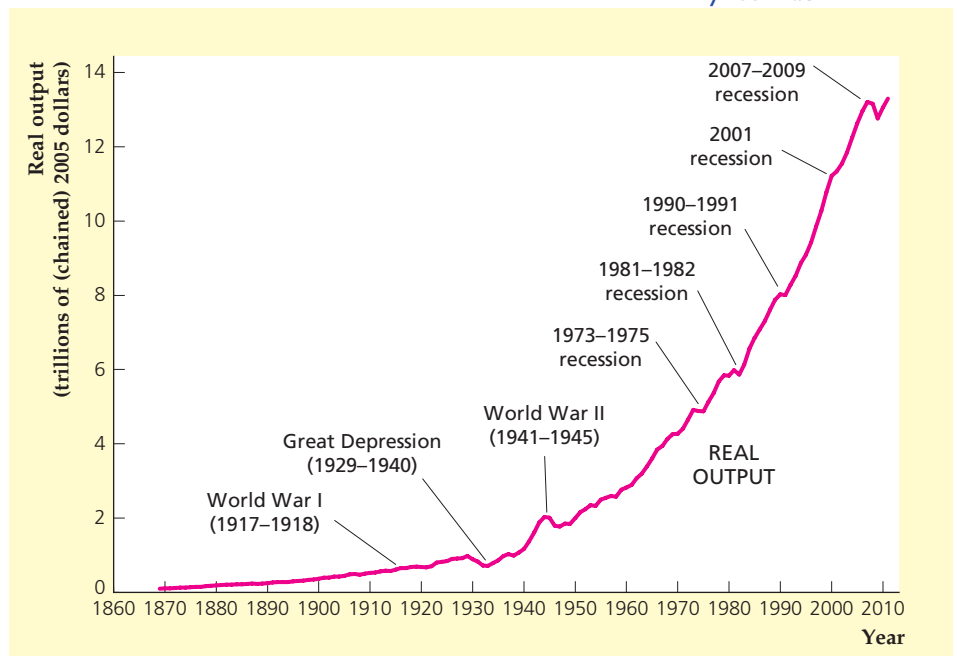
¹Output is measured in Fig. 1.1 by two very similar concepts, real gross national product (real GNP) until 1929 and real gross domestic product (real GDP) since 1929, both of which measure the physical volume of production in each year. We discuss the measurement of output in detail in Chapter 2.

FIGURE 1.1

Output of the U.S. economy, 1869–2011

In this graph the output of the U.S. economy is measured by real gross domestic product (real GDP) for the period 1929–2011 and by real gross national product (real GNP) for the period prior to 1929, with goods and services valued at their 2005 prices in both cases (see Chapter 2). Note the strong upward trend in output over time, as well as sharp fluctuations during the Great Depression (1929–1940), World War II (1941–1945), and the recessions of 1973–1975, 1981–1982, 1990–1991, 2001, and 2007–2009.

Sources: Real GNP 1869–1928 from Christina D. Romer, “The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869–1908,” *Journal of Political Economy*, 97, 1 (February 1989), pp. 22–23; real GDP 1929 onward from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/GDP. Data from Romer were rescaled to 2005 prices.



But another significant factor is the increase in the amount of output that can be produced with a given amount of labor. The amount of output produced per unit of labor input—for example, per worker or per hour of work—is called **average labor productivity**. Figure 1.2 shows how average labor productivity, defined in this case as output per employed worker, has changed since 1900. In 2011, the average U.S. worker produced more than seven times as much output as the average worker at the beginning of the twentieth century, despite working fewer hours over the course of the year. Because today’s typical worker is so much more productive, Americans enjoy a significantly higher standard of living than would have been possible a century ago.

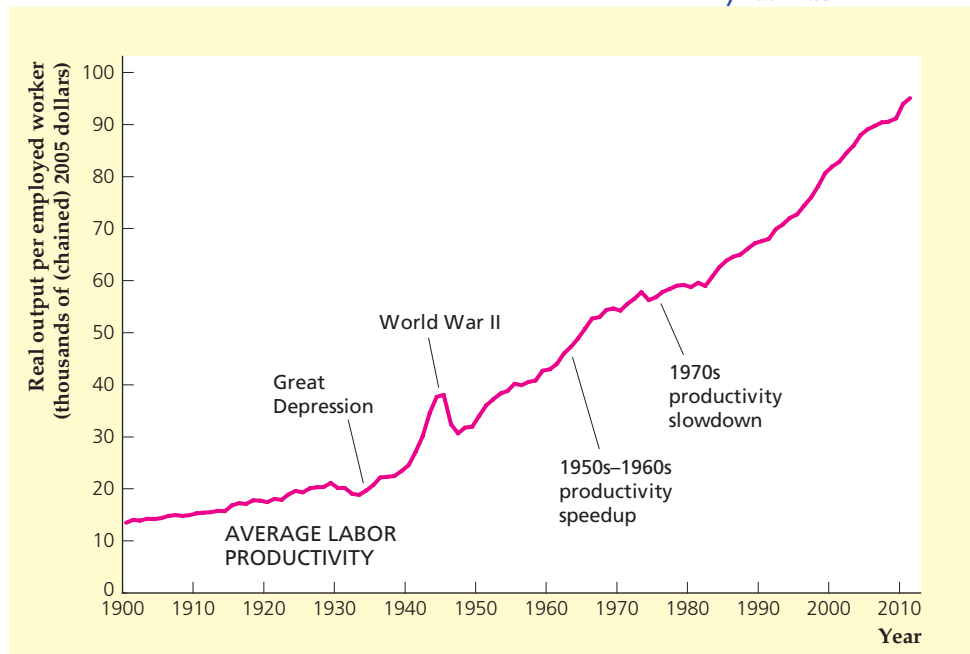
Although the long-term record of productivity growth in the U.S. economy is excellent, productivity growth slowed from the early 1970s to the mid-1990s and only recently has picked up. Output per worker grew about 2.5% per year from 1949 to 1973, but only 1.1% per year from 1973 to 1995. More recently, from 1995 to 2011, output per worker has increased 1.7% per year, a pace that has improved the health of the U.S. economy significantly.

Because the rates of growth of output and, particularly, of output per worker ultimately determine whether a nation will be rich or poor, understanding what determines growth is one of the most important goals of macroeconomics. Unfortunately, explaining why economies grow is not easy. Why, for example, did resource-poor Japan and Korea experience growth rates that transformed them in a generation or two from war-torn nations into industrial powers, whereas several resource-rich nations of Latin America have had erratic or even negative growth in recent years? Although macroeconomists have nothing close to a complete answer to the question of what determines rates of economic growth, they do have some ideas to offer. For example, as we discuss in some detail in this book, most macroeconomists believe that rates of saving and investment are important for growth. Another key determinant of growth we discuss is the rate at which technological change and other factors help increase the productivity of machines and workers.

FIGURE 1.2**Average labor productivity in the United States, 1900–2011**

Average labor productivity (output per employed worker) has risen over time, with a peak during World War II reflecting increased wartime production. Productivity growth was particularly strong in the 1950s and 1960s, slowed in the 1970s, and picked up again in the mid 1990s. For the calculation of productivity, output is measured as in Fig. 1.1.

Sources: Employment in thousands of workers 14 and older for 1900–1947 from *Historical Statistics of the United States, Colonial Times to 1970*, pp. 126–127; workers 16 and older for 1948 onward from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/CE16OV. Average labor productivity is output divided by employment, where output is from Fig. 1.1.

**Business Cycles**

If you look at the history of U.S. output in Fig. 1.1, you will notice that the growth of output isn't always smooth but has hills and valleys. Most striking is the period between 1929 and 1945, which spans the Great Depression and World War II. During the 1929–1933 economic collapse that marked the first major phase of the Great Depression, the output of the U.S. economy fell by nearly 30%. Over the period 1939–1944, as the United States entered World War II and expanded production of armaments, output nearly doubled. No fluctuations in U.S. output since 1945 have been as severe as those of the 1929–1945 period. However, during the postwar era there have been periods of unusually rapid economic growth, such as during the 1960s and 1990s, and times during which output actually declined from one year to the next, as in 1973–1975, 1981–1982, 1990–1991, and 2007–2009.

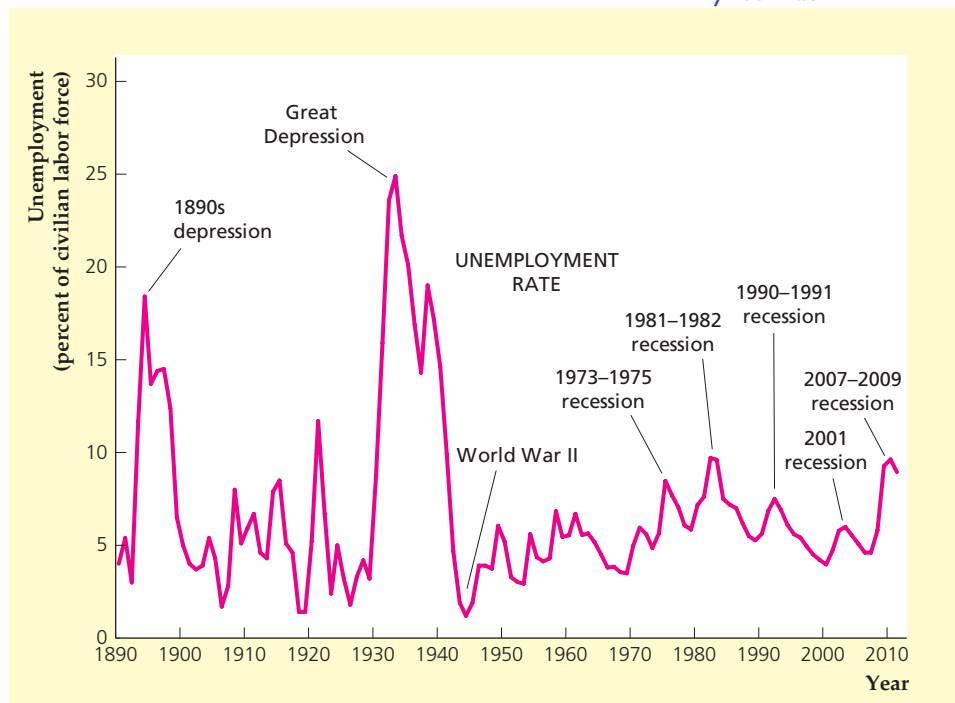
Macroeconomists use the term *business cycle* to describe short-run, but sometimes sharp, contractions and expansions in economic activity.² The downward phase of a business cycle, during which national output may be falling or perhaps growing only very slowly, is called a recession. Even when they are relatively mild, recessions mean hard economic times for many people. Recessions are also a major political concern because almost every politician wants to be reelected and the chances of reelection are better if the nation's economy is expanding rather than declining. Macroeconomists put a lot of effort into trying to figure out what causes business cycles and deciding what can or should be done about them. In this book we describe a variety of features of business cycles, compare alternative explanations for cyclical fluctuations, and evaluate the policy options that are available for affecting the course of the cycle.

²A more exact definition is given in Chapter 8. Business cycles do not include fluctuations lasting only a few months, such as the increase in activity that occurs around Christmas.

FIGURE 1.3**The U.S. unemployment rate, 1890–2011**

The figure shows the percentage of the civilian labor force (excluding people in the military) that was unemployed in each year since 1890. Unemployment peaked during the depression of the 1890s and the Great Depression of the 1930s, and reached low points in 1920 and during World War II. Since World War II, the highest unemployment rates occurred during the 1981–1982 and 2007–2009 recessions.

Sources: Civilian unemployment rate (people aged 14 and older until 1947, aged 16 and older after 1947) for 1890–1947 from *Historical Statistics of the United States, Colonial Times to 1970*, p. 135; for 1948 onward from FRED database Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/UNRATE.



Unemployment

One important aspect of recessions is that they usually are accompanied by an increase in **unemployment**, or the number of people who are available for work and are actively seeking work but cannot find jobs. Along with growth and business cycles, the problem of unemployment is a third major issue in macroeconomics.

The best-known measure of unemployment is the unemployment rate, which is the number of unemployed divided by the total labor force (the number of people either working or seeking work). Figure 1.3 shows the unemployment rate in the United States over the past century. The highest and most prolonged period of unemployment occurred during the Great Depression of the 1930s. In 1933, the unemployment rate was 24.9%, indicating that about one of every four potential workers was unable to find a job. In contrast, the tremendous increase in economic activity that occurred during World War II significantly reduced unemployment. In 1944, at the peak of the wartime boom, the unemployment rate was 1.2%.

Recessions have led to significant increases in unemployment in the postwar period. For example, during the 1981–1982 recession the U.S. unemployment rate reached 10.8%.³ Even during periods of economic expansion, however, the unemployment rate remains well above zero, as you can see from Fig. 1.3. In 2000, after nine years of economic growth with no recession, the unemployment rate was still about 4%. Why the unemployment rate can remain fairly high even when the economy as a whole is doing well is another important question in macroeconomics.

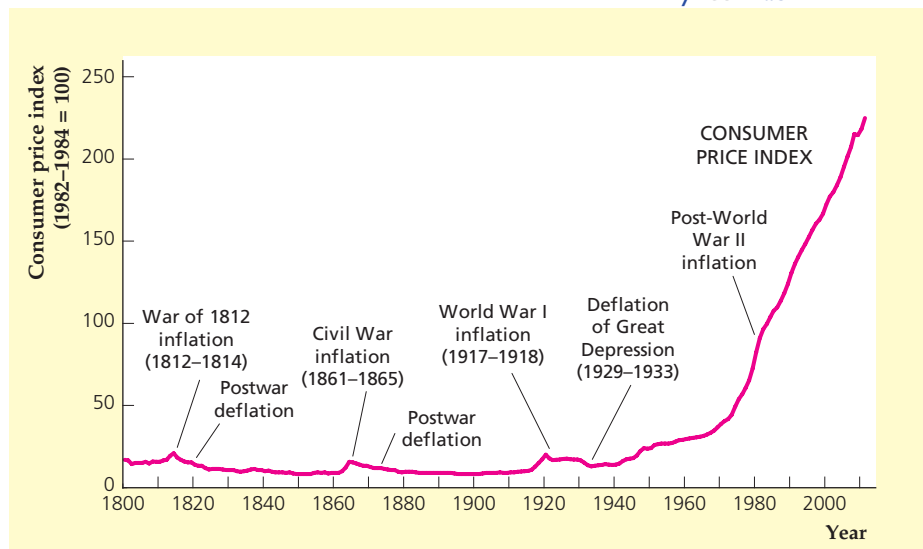
³The unemployment rate was 10.8% in November and December 1982. The unemployment rate plotted in Fig. 1.3 is not this high because the graph only shows annual data—the average unemployment rate over the 12 months of each year—which was 9.7% in 1982.

FIGURE 1.4

Consumer prices in the United States, 1800–2011

Prior to World War II, the average level of prices faced by consumers remained relatively flat, with periods of inflation (rising prices) offset by periods of deflation (falling prices). Since World War II, however, prices have risen more than tenfold. In the figure, the average level of prices is measured by the consumer price index, or CPI (see Chapter 2). The CPI measures the cost of a fixed set, or basket, of consumer goods and services relative to the cost of the same goods and services in a base period—in this case, 1982–1984. Thus a CPI of 224.90 in 2011 means that a basket of consumer goods and services that cost \$100 in 1982–1984 would cost \$224.90 in 2011.

Sources: Consumer price index, 1800–1946 (1967 = 100) from *Historical Statistics of the United States, Colonial Times to 1970*, pp. 210–211; 1947 onward (1982–1984 = 100) from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/CPIAUCSL. Data prior to 1971 were rescaled to a base with 1982–1984 = 100.

**Inflation**

When the prices of most goods and services are rising over time, the economy is said to be experiencing **inflation**. Figure 1.4 shows a measure of the average level of prices faced by consumers in the United States over the past two centuries.⁴ Note that prior to World War II inflation usually occurred only during wartime, such as during the War of 1812, the Civil War, and World War I. These wartime periods of inflation were followed by periods of **deflation**, during which the prices of most goods and services fell. The result of these offsetting periods of inflation and deflation was that, over the long run, the level of prices was fairly constant. For example, prices at the end of World War I (1918) stood at about the same level as in 1800, more than a century earlier.

The last significant deflation in the United States occurred during 1929–1933, the initial phase of the Great Depression. Since then, inflation, without offsetting deflation, has become the normal state of affairs, although inflation was fairly low in the 1990s and 2000s. Figure 1.4 shows that consumer prices have risen significantly since World War II, with the measure of prices shown increasing tenfold.

The percentage increase in the average level of prices over a year is called the inflation rate. If the inflation rate in consumer prices is 10%, for example, then on average the prices of items that consumers buy are rising by 10% per year. Rates of inflation may vary dramatically both over time and by country, from 1 or 2 percent per year in low-inflation countries (such as Switzerland) to 1000% per year or more in countries (such as a number of the former Soviet republics in the early 1990s) that are experiencing hyperinflations, or extreme inflations. When the inflation rate reaches an extremely high level, with prices changing daily or hourly, the economy

⁴This measure is called the consumer price index, or CPI, which is discussed in Chapter 2. Conceptually, the CPI is intended to measure the cost of buying a certain fixed set, or “basket,” of consumer goods and services. However, the construction of a consumer price index over a period as long as two centuries involves many compromises. For instance, the basket of goods and services priced by the CPI is not literally the same over the entire period shown in Fig. 1.4 but is periodically changed to reflect the different mix of consumer goods and services available at different times.

tends to function poorly. High inflation also means that the purchasing power of money erodes quickly. This situation forces people to scramble to spend their money almost as soon as they receive it.

The International Economy

Today every major economy is an **open economy**, or one that has extensive trading and financial relationships with other national economies. (In contrast, a **closed economy** doesn't interact economically with the rest of the world.) Macroeconomists study patterns of international trade and borrowing to understand better the links among national economies. For example, an important topic in macroeconomics is how international trade and borrowing relationships can help transmit business cycles from country to country.

Another issue for which international considerations are central is trade imbalances. Figure 1.5 shows the historical behavior of the imports and exports of goods and services by the United States. U.S. imports are goods and services produced

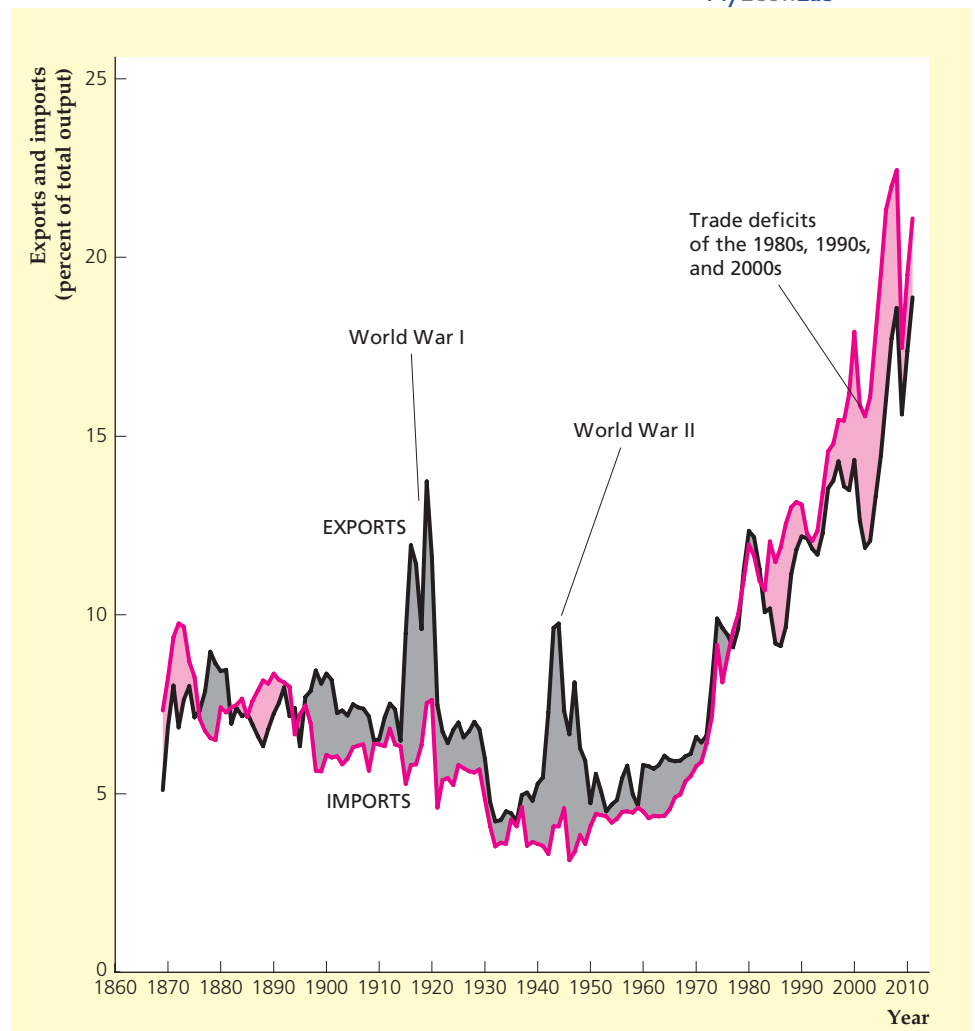
MyEconLab Real-time data

FIGURE 1.5

U.S. exports and imports, 1869–2011

The figure shows U.S. exports (black) and U.S. imports (red), each expressed as a percentage of total output. Exports and imports need not be equal in each year: U.S. exports exceeded imports (shaded gray) during much of the twentieth century. During the 1980s, 1990s, and 2000s, however, U.S. exports were smaller than U.S. imports (shaded pink).

Sources: Imports and exports of goods and services: 1869–1959 from *Historical Statistics of the United States, Colonial Times to 1970*, pp. 864–865; 1960 onward from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/BOPX and [BOPM](https://research.stlouisfed.org/fred2/series/BOPM); nominal output: 1869–1928 from Christina D. Romer, “The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869–1908,” *Journal of Political Economy*, 97, 1 (February 1989), pp. 22–23; 1929 onward from FRED database, series *GDPA*.



abroad and purchased by people in the United States; U.S. exports are goods and services produced in the United States and sold to people in other countries. To give you a sense of the relative importance of international trade, Fig. 1.5 expresses exports and imports as percentages of total U.S. output. Currently, both exports and imports are larger fractions of U.S. output than they were during the 1950s and 1960s, reflecting both the recovery of trade from the disruptions of the Great Depression and World War II and the trend toward greater economic interdependence among nations. Note, though, that a century ago exports and imports already were important relative to the size of the overall economy.

Figure 1.5 demonstrates that exports and imports need not be equal in each year. For example, following World War I and World War II, U.S. exports outstripped U.S. imports because the country was sending large quantities of supplies to countries whose economies had been damaged by war. When exports exceed imports, a **trade surplus** exists. In the 1980s, however, U.S. exports declined sharply relative to imports, a situation that has persisted through the 1990s, 2000s, and into the 2010s, as you can see from Fig. 1.5. This recent excess of imports over exports, or **trade deficit**, has received considerable attention from policymakers and the news media. What causes these trade imbalances? Are they bad for the U.S. economy or for the economies of this country's trading partners? These are among the questions that macroeconomists try to answer.

Macroeconomic Policy

A nation's economic performance depends on many factors, including its natural and human resources, its capital stock (buildings, machines, and software), its technology, and the economic choices made by its citizens, both individually and collectively. Another extremely important factor affecting economic performance is the set of macroeconomic policies pursued by the government.

Macroeconomic policies affect the performance of the economy as a whole. The two major types of macroeconomic policies are fiscal policy and monetary policy. **Fiscal policy**, which is determined at the national, state, and local levels, concerns government spending and taxation. **Monetary policy** determines the rate of growth of the nation's money supply and is under the control of a government institution known as the central bank. In the United States, the central bank is the Federal Reserve System, or the Fed.

One of the main macroeconomic policy issues of recent years in the United States has been in the realm of fiscal policy. Large Federal budget surpluses emerged in the late 1990s, but these gave way to large Federal budget deficits, averaging 2% of GDP from 2001 to 2008, and over 9% of GDP from 2009 to 2011. The recent behavior of the Federal budget is put into a long-term perspective in Figure 1.6, which presents data on Federal government spending and tax revenues for the past century and a third.⁵ Again, so that their importance relative to the economy as a whole is indicated, spending, tax collections, and government budget deficits and surpluses are expressed as percentages of total output.

Two obvious features of Fig. 1.6 are the peaks in government spending and deficits that resulted from military buildups in World War I and World War II. At its high point during World War II, Federal government spending exceeded 43%

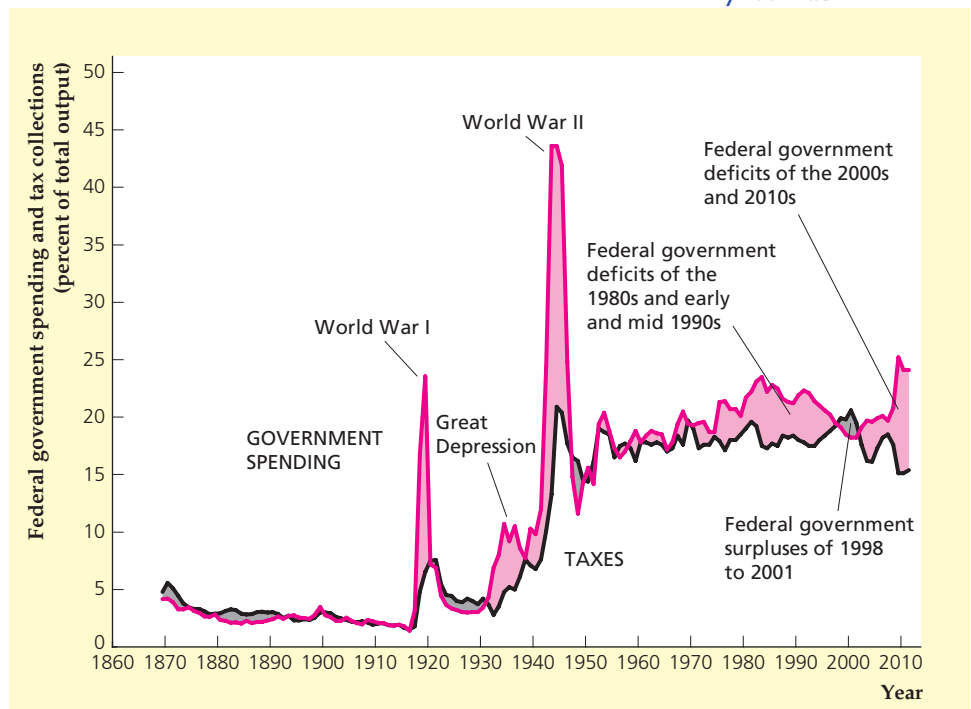
⁵Government spending includes both government purchases of goods and services, such as purchases of military equipment and the salaries of government officials, and government benefits paid to individuals, such as Social Security payments.

FIGURE 1.6

U.S. Federal government spending and tax collections, 1869–2011

U.S. Federal government spending (red) and U.S. Federal government tax collections (black) are shown as a percentage of total output. Deficits (excesses of spending over tax collections) are shaded pink, and surpluses (excesses of taxes over spending) are shaded gray. The government sector's share of the economy has grown since World War II. Large deficits occurred during the two world wars, the Great Depression, and during most of the period since the mid-1970s, except for 1998–2001, when the government ran large surpluses.

Sources: Federal spending and receipts for 1869–1929 from *Historical Statistics of the United States, Colonial Times to 1970*, p. 1104; GNP 1869–1928 from Christina D. Romer, “The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869–1908,” *Journal of Political Economy*, 97, 1 (February 1989), pp. 22–23; GNP for 1929 from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/GDPA; Federal spending and receipts as percentage of output, 1930–2011 from *Historical Tables, Budget of the U.S. Government*, Table 1.2.



of total output. Significant deficits also occurred during the Great Depression of the 1930s because the government increased its spending on various programs designed to help the economy, such as government-financed jobs programs. Also shown clearly is the increase in the size of the government sector since World War II, an increase reflected in the major upward shift in government spending and in tax collections relative to national output that occurred in about 1940 as well as the mild upward trend in both variables that has occurred since then.

The large and persistent Federal budget deficits of the 1980s and early and mid 1990s were historically unusual in that they occurred during a period of peace and relative prosperity. The emergence of large Federal deficits in the 1980s coincided with the emergence of large trade deficits (see Fig. 1.5). Indeed, the Federal budget deficit and the trade deficit have been called the “twin deficits.” Are these deficits related? If so, what can be done about them? These questions also fall within the purview of macroeconomics.

The possible link between the government’s budget deficit and the trade imbalance illustrates an important aspect of macroeconomics: Macroeconomic issues and problems are frequently interconnected. For this reason, studying one macroeconomic question, such as the effects of the government budget deficit, in isolation generally is not sufficient. Instead, macroeconomists usually study the economy as a complete system, recognizing that changes in one sector or market may affect the behavior of the entire economy.

Aggregation

Macroeconomics is one of two broad areas within the field of economics; the other is microeconomics. Macroeconomics and microeconomics have many basic economic ideas and methods in common; the difference between them is the level