Macroeconomics

NINTH EDITION

ABEL . BERNANKE . CROUSHORE

Applying Macroeconomics to the Real World

Applications

In Touch with Data and Research

Symbols Used in This Book

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

Practice, Engage, and Assess

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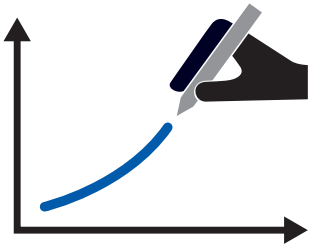

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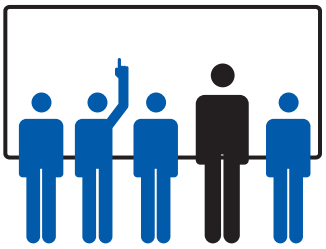

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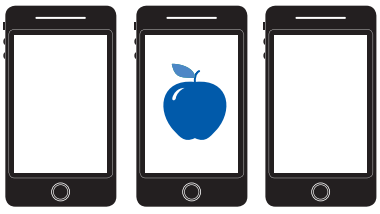

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- **Current News Exercises**—Every week, current microeconomic and macroeconomic news stories, with accompanying exercises, are posted to MyEconLab. Assignable and auto-graded, these multi-part exercises ask students to recognize and apply economic concepts to real-world events.

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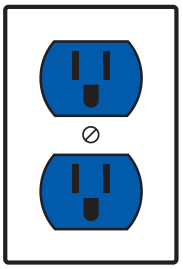

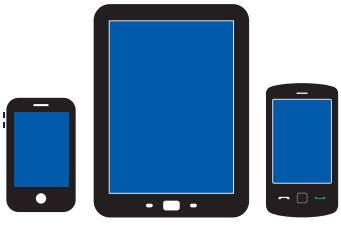

- **Mobile Ready**—Students and instructors can access multimedia resources and complete assessments right at their fingertips, on any mobile device.

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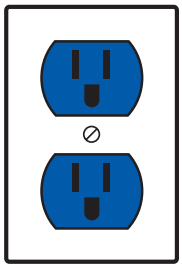

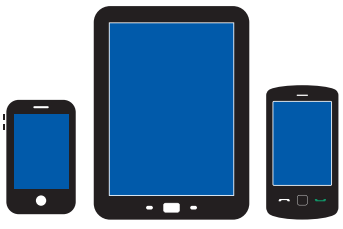

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Ninth Edition

Andrew B. Abel
The Wharton School of the
University of Pennsylvania

Ben S. Bernanke
Brookings Institution

Dean Croushore
Robins School of Business
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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–NYU Conference Series.

Ben S. Bernanke

Brookings Institution

Ben Bernanke is currently Distinguished Fellow in Residence with the Economic Studies Program at the Brookings Institution. From February 2006 to January 2014, he was Chairman of the Board of Governors of the Federal Reserve System. Before that, he served as Chair of the President's Council of Economic Advisors from June 2005 to January 2006 and was a Governor of the Federal Reserve System from August 2002 to June 2005. Prior to his work in public service, he was the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs at Princeton University. He 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 MIT 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*.

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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 5 years, he moved to the Federal Reserve Bank of Philadelphia, where he was vice president and economist. His duties during his 14 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

Detailed Contents

Summary Tables

Key Diagrams

Preface

From February 2006 to January 2014, Ben Bernanke was chairman of the Board of Governors of the Federal Reserve System. Federal ethics rules prohibited him from working on the sixth, seventh, and eighth editions, but he has returned to make substantive contributions to this, the ninth edition.

In preparing the ninth edition, we viewed our main objective to keep the book fresh and up-to-date, especially in light of the recent crises in the United States and Europe and the 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.

Listed below is a summary of the changes made in the textbook for the ninth edition. See the following section for further details on these changes.

- We add a new graph that illustrates the uses-of-saving identity (Chapter 2).
- We discuss alternative measures of the unemployment rate (Chapter 3).
- We simplify the measurement of the current account balance to reflect recent changes in government accounting methods, changing the term *capital and financial account balance* to the new measure *financial account balance* (Chapter 5).
- We extend our discussion of the global savings glut (Chapter 5).
- We introduce the concept of the break-even inflation rate in discussing expected inflation (Chapter 7).
- We discuss the idea that the Great Moderation may not have ended with the Great Recession (Chapter 8).
- We add a discussion of the 2008 oil price shock (Chapter 9).
- We discuss the problems that arise if inflation is too low (Chapter 12).
- We introduce the concept of an optimum currency area and discuss whether either the United States or Europe fit the criteria (Chapter 13).

- We expand our discussion of central banks performing a function as the lender of last resort (Chapter 14).
- We ask whether there really is a zero lower bound on nominal interest rates (Chapter 14).
- We expand our discussion of quantitative easing and forward guidance (Chapter 14).
- We introduce the Laffer curve in discussing supply-side economics (Chapter 15).
- We ask whether quantitative easing is likely to cause inflation to rise (Chapter 15).
- 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 ninth 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 the new tools the Fed has used for monetary policy, especially quantitative easing and forward guidance. We also discuss the role of central banks in acting as lenders of last resort. Finally, we also discuss whether zero really is a lower bound on nominal interest rates.
- *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 rebound of the 1990s. *Revised coverage*: Updated data and a discussion of how the uses-of-savings identity can be used to illustrate the shocks to the world economy in the 2007–2009 recession.
- *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 introduces the concept of an optimum currency area and whether Europe is, in fact, an optimum currency area (Chapter 13), as well as a discussion of the global savings glut (Chapter 5).

- *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 a discussion of whether the Great Moderation ended with the Great Recession (Chapter 8).
- *Monetary and 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 the Laffer curve and whether quantitative easing is likely to cause higher future inflation (Chapter 15).
- *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 alternative measures of the unemployment rate (Chapter 3).
- *Enhanced Pearson eText: A New Way of Learning.* The Pearson eText gives students access to their textbook anytime, anywhere. In addition to notetaking, highlighting, and bookmarking, the Pearson eText offers interactive and sharing features. Students actively read and learn, through embedded and autograded practice, real-time data-graphs, animations, author videos, and more. Instructors can share comments or highlights, and students can add their own, for a tight community of learners in any class.

MyEconLab

A Solid Foundation

The ninth 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 of 2007–2011 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 ninth 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 classicals 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 classicals 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 ninth 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 ninth 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 ninth 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), the 2008 oil price shock (Chapter 9), calibrating the business cycle (Chapter 10), inflation targeting, the lender of last resort, and whether there is a zero lower bound on nominal interest rates (Chapter 14), and supply-side economics (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), alternative measures of unemployment (Chapter 3), 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.

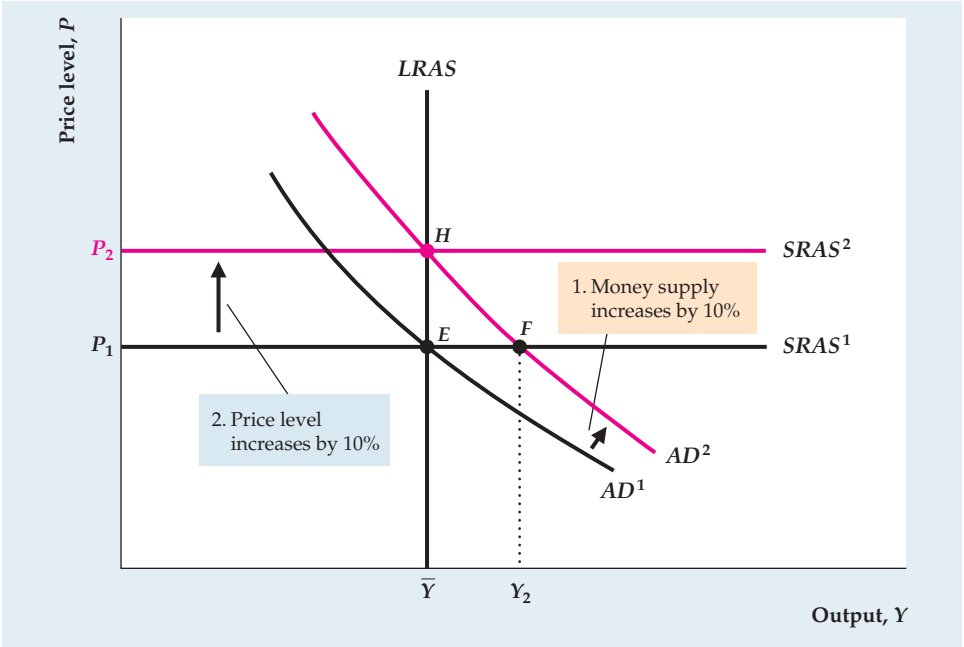
Learning Features

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. 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. 100, or the *AD–AS* diagram, p. 350) 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.

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 $\overline{Y}$, and the price level P_2 is 10% higher than the initial price level P_1. Thus money is neutral in the long run.



- *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 students to test their knowledge and instructors to manage all assessment needs in one program. Students and instructors can register, create, and access all of their MyLab courses, regardless of discipline, from one convenient online location: *www.pearsonmylab.com*.

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- MyEconLab Videos—Key figures and diagrams from the textbook are presented in step-by-step animations with audio explanations of the action.
- *Web Links*—A Web Links section at the end of each chapter in the enhanced eText includes links to videos of Ben Bernanke, blog entries covering trending economic topics, and additional resources from other Economists.
- *Math Review Exercises in MyEconLab*—MyEconLab now offers a rich array of assignable and auto-graded exercises covering fundamental math concepts geared specifically to principles and intermediate economics students. Aimed at increasing student confidence and success, our new math skills review Chapter R is accessible from the assignment manager and contains more than 150 graphing, algebra, and calculus exercises for homework, quiz, and test use. Offering economics students warm-up math assignments, math remediation, or math exercises as part of any content assignment has never been easier!
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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.

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Chapter 1

Introduction to Macroeconomics

1.1 What Macroeconomics Is About

Summarize the primary issues addressed in 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 1870, 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, whereas 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 18-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?

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.

- *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. From 2007 to 2009, when the U.S. economy fell into a deep decline, most of the rest of the world followed. 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 criticized 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 145 years, the annual output of U.S. goods and services has increased by more than 140 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. But another significant factor is the increase in the amount of output that can be produced

[1]Output is measured in Fig. 1.1 by two very similar concepts, real gross national product (real GNP) prior to 1929 and real gross domestic product (real GDP) since 1929, both of which measure the inflation-adjusted amount of production in each year. We discuss the measurement of output in detail in Chapter 2.

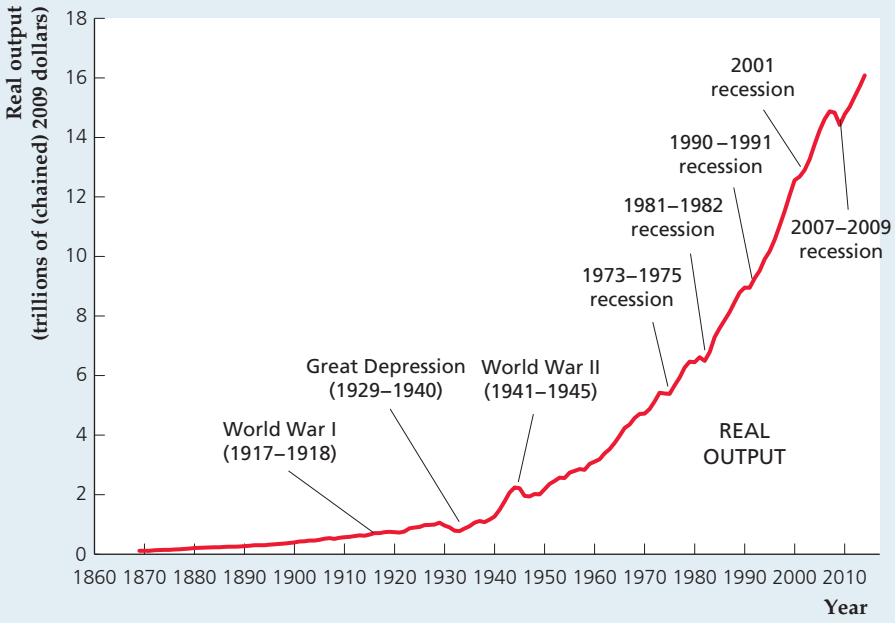
MyEconLab Real-time data

FIGURE 1.1

Output of the U.S. economy, 1869–2014

In this graph the output of the U.S. economy is measured by real gross domestic product (real GDP) for the period 1929–2014 and by real gross national product (real GNP) for the period prior to 1929, with goods and services valued at their 2009 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/GDPCA*. Data from Romer were rescaled to 2009 prices.



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 2014, 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 varies significantly over time. Output per worker grew about 2.6% per year from 1949 to 1973, but only 1.1% per year from 1973 to 1995. More recently, from 1995 to 2007, output per worker increased 1.9% per year, but grew only 1.1% per year from 2007 to 2014.

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 decades? 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.

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FIGURE 1.2

Average labor productivity in the United States, 1900–2014
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,* p. 126; 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.

[2]A 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.

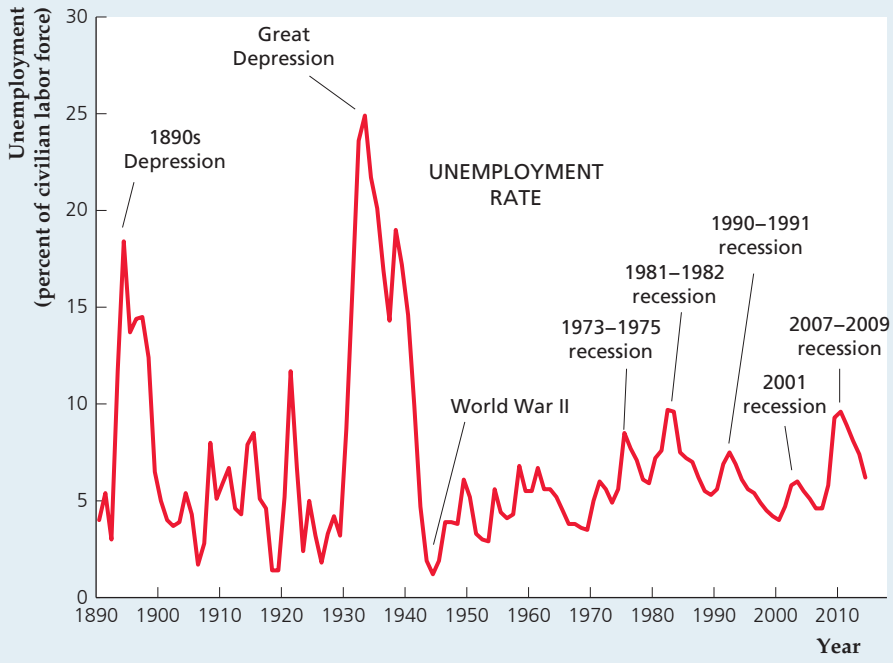
MyEconLab Real-time data

FIGURE 1.3

The U.S. unemployment rate, 1890–2014

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 and a quarter. 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% and during the 2007–2009 recession it rose to 10.0%.[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.

[3]The 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.

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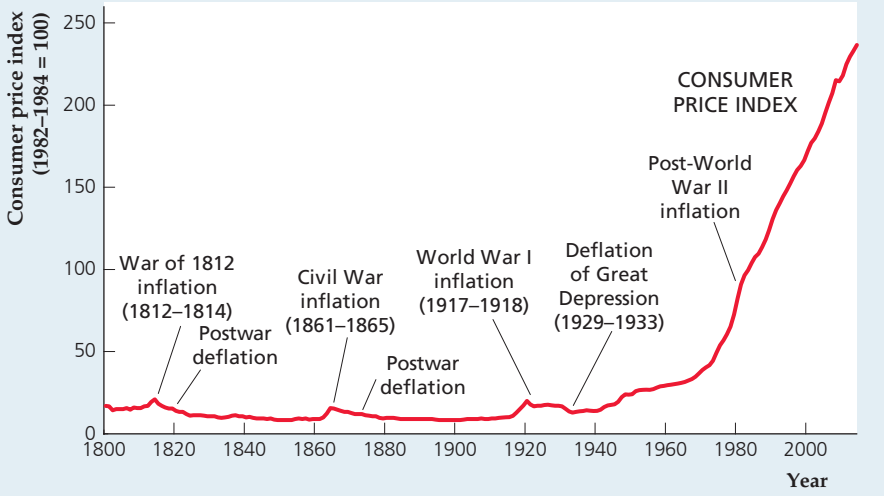

FIGURE 1.4

Consumer prices in the United States, 1800–2014

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 236.71 in 2014 means that a basket of consumer goods and services that cost $100 in 1982–1984 would cost $236.71 in 2014.

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 some period, often a year, is called the *inflation rate*. If the inflation rate in consumer prices is 10% per year, 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

[4]This 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 changed from time to time to reflect the different mix of consumer goods and services available at different times.

prices changing daily or hourly, the economy 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

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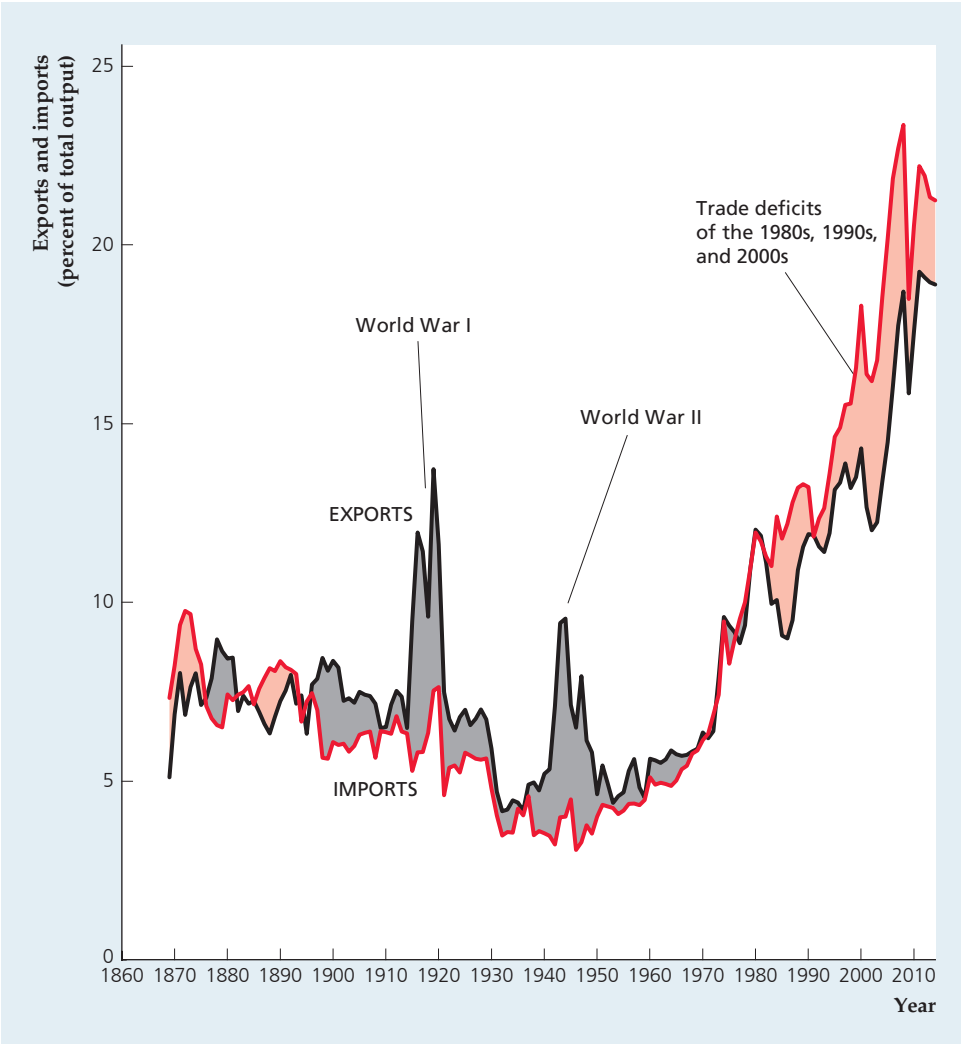

FIGURE 1.5

U.S. exports and imports, 1869–2014

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 International Transactions Accounts, U.S. Bureau of Economic Analysis, *bea.gov/iTable/index_ita.cfm*, Table 1.1; 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*.

of goods and services by the United States. U.S. imports are goods and services produced 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, software, and intellectual property), 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 gross domestic product (GDP) from 2001 to 2008, and more than 8% 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 145 years.[5] Again, so that their importance relative to the economy as a whole is indicated, spending, tax

[5]Government 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

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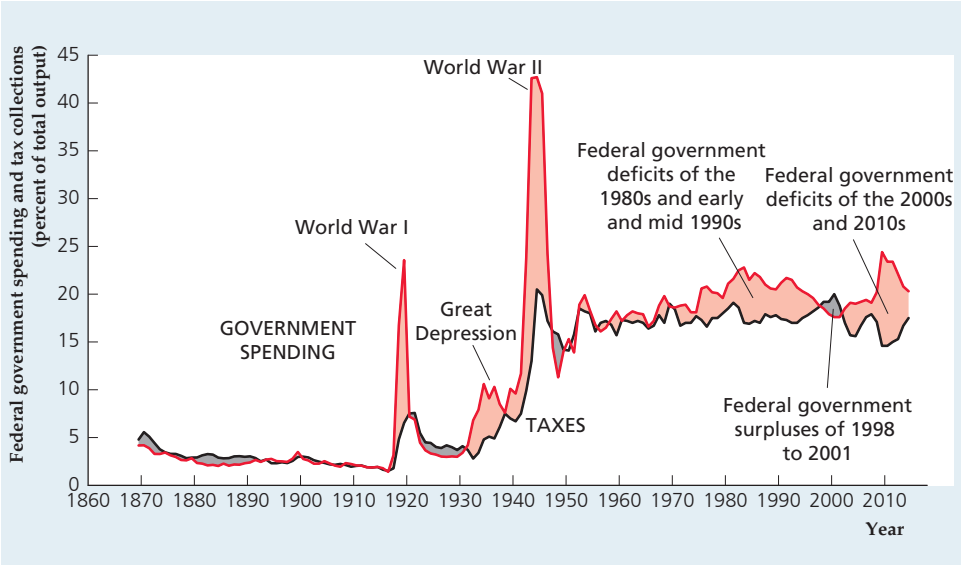

U.S. Federal government spending and tax collections, 1869–2014

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; nominal output, 1869–1929: same as in Fig. 1.5; Federal spending and receipts as percentage of output, 1930–2014 from *Historical Tables, Budget of the U.S. Government*, Table 1.2.

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% 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.