MACROECONOMICS

ABEL · BERNANKE · CROUSHORE

TENTH EDITION

Macroeconomics

Tenth Edition

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The Wharton School of the University of Pennsylvania

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Pearson

New York, NY

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Cover and Interior Art: Zhang Sheng/Shutterstock
Printer/Binder: LSC Communications, Inc./Willard
Cover Printer: Phoenix Color/Hagerstown

Library of Congress Cataloging-in-Publication Data

Names: Abel, Andrew B., author. | Bernanke, Ben, author. | Croushore, Dean Darrell, author.
Title: Macroeconomics / Andrew B. Abel, The Wharton School of the University of Pennsylvania, Ben S. Bernanke, Brookings Institution, Dean Croushore, Robins School of Business, University of Richmond.
Description: Tenth edition. | New York, NY : Pearson Education, 2020. | Includes index.
Identifiers: LCCN 2018046571 | ISBN 9780134896441
Subjects: LCSH: Macroeconomics. | United States—Economic conditions.
Classification: LCC HB172.5 .A24 2020 | DDC 339—dc23
LC record available at https://lccn.loc.gov/2018046571

1 18

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ISBN 10: 0-13-489644-0
ISBN 13: 978-0-13-489644-1

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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
$\bar{N}$	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
$\bar{Y}$	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
$\bar{u}$	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

Preface

New to This Edition

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

- Added material on data revisions (Chapter 2)
- New discussion of calculating growth rates (Chapter 2)
- New application on the gig economy (Chapter 3)
- New application on recent trends in labor supply (Chapter 3)
- Expanded discussion of gains and losses from increased international trade (Chapter 5)
- New discussion of trade balances and tariffs (Chapter 5)
- New application on waves of productivity growth over time (Chapter 6)
- Discussion of causes of productivity slowdown since 2008 (Chapter 6)
- New material discussing economic models, endogenous variables, and exogenous variables (Chapter 6)
- New application on the U.S. income distribution and how it has changed over time (Chapter 6)
- New application on Bitcoin and cryptocurrencies (Chapter 7)
- New application on whether expansions die of old age (Chapter 7)
- Added distinction between different types of lags in fiscal and monetary policies (Chapters 10, 11, and 14)
- Table comparing Keynesian and classical views (Chapter 11)
- Added discussion of costs of severe recessions (Chapter 12)
- Expanded discussion of Big Mac index to account for differences in real GDP per capita across countries (Chapter 13)
- Impact of United Kingdom withdrawal from European Union (Chapter 13)
- Discussion of bank regulation after the recent financial crisis (Chapter 14)
- New material on the tax cut of 2017 (Chapter 15)

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 tenth edition provides lively coverage of a broad spectrum of macroeconomic issues and ideas, including a variety of new and updated topics:

- *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 factors that determine long-run living standards and the productivity rebound of the 1990s.

Revised coverage: A discussion of waves of productivity growth over time and the implications for job displacement, causes of the productivity slowdown since 2008, and changes in the U.S. income distribution over time (Chapter 6).

- *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 expanded discussion of the gains and losses from increased international trade and a new discussion of trade balances and the impact of tariffs (Chapter 5), as well as a discussion of the United Kingdom's withdrawal from the European Union and an expanded discussion of the Big Mac index to account for differences in real GDP per capita across countries (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 a discussion of whether economic expansions die of old age (Chapter 8) and the costs of severe recessions (Chapter 12).

- *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: We distinguish between different lags in monetary and fiscal policy (Chapters 10, 11, and 14), add material on Dodd-Frank and bank regulation in response to the financial crisis (Chapter 14), and describe the tax cut of 2017 (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 coverage: The text now discusses the gig economy and looks at recent trends in the labor force participation rate (Chapter 3).

- *Data use.* Throughout the text, we emphasize macroeconomic data and how to use it and analyze it. Numerous boxes called In Touch with Data and Research provide descriptions of macroeconomic data. At the end of almost every chapter, problems in the Working with Macroeconomic Data section give students hands-on experience with manipulating data to help them understand macroeconomic theory and how it applies to the world.

  New coverage: We add material on data revisions and on calculating growth rates in different ways (Chapter 2).

- *Modeling.* The central theme of the textbook is to develop a complete macroeconomic model that students can use to understand the world's economies. We build the model in pieces in Part 2, Chapters 3–7, and put the pieces together in Part 3, Chapters 8–11.

  New material: We add a discussion of economic models, endogenous variables, and exogenous variables (Chapter 6) and provide a contrast of Keynesian and classical views (Chapter 11).

MyLab Economics

- *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 auto-graded 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.

Program Introduction

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 the most recent ninth and tenth editions.

In preparing the tenth 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 these crises. 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 website 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.

To improve student results, we recommend pairing the text content with **MyLab Economics**, which is the teaching and learning platform that empowers you to reach every student. By combining trusted author content with digital tools and a flexible platform, MyLab personalizes the learning experience and will help your students learn and retain key course concepts while developing skills that future employers are seeking in their candidates. From **Animated Graphs to Real-time Data Analysis Exercises**, MyLab Economics helps you teach your course, your way. Learn more at *www.pearson.com/mylab/economics*.

Solving Teaching and Learning Challenges

The tenth edition builds on the strengths that underlie the book's lasting ability to help solve teaching and learning challenges for instructors and students alike, 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 tenth edition offers new applications as well as updates of the best applications and analyses of previous editions.
- *Broad modern coverage.* From its inception, *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.
- *Innovative pedagogy.* The tenth edition, like its predecessors, provides a variety of useful tools to help students study, understand, and retain the material. Features such as detailed full-color graphs that use color to demonstrate the shifts in curves, worked numerical problems at the end of selected chapters, real-world data that is regularly fed in from FRED, and end-of-chapter review and self-test material help encourage better comprehension and retention of the material.
- *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, which can make it difficult to determine the best method of presentation. Sometimes the controversies overshadow the broad common ground shared by both the classicals and Keynesians (of the old, new, and neo-varieties). 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.

Developing Employability Skills

For students to succeed in a rapidly changing job market, they should be aware of their career options and how to go about developing a variety of skills. With *Macroeconomics,* tenth edition and MyLab Economics, we focus on developing these skills in the following ways:

- *Working with Macroeconomic Data.* In nearly every chapter of *Macroeconomics*, tenth edition, end-of-chapter questions ask students to download data from macroeconomic databases and to manipulate the data to illustrate theoretical ideas. These questions give students the opportunity to get hands-on experience with data while doing a variety of empirical exercises, which provides experience that employers find valuable. In addition, MyLab Economics provides Real-Time Data Analysis Exercises, which use current macro data to help students understand the impact of changes in economic variables. Real-Time Data Analysis Exercises communicate directly with the Federal Reserve Bank of St. Louis FRED® site and update automatically as new data become available.
- *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.

A Flexible Organization

The tenth 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.

Instructor Teaching Resources

This program comes with the following teaching resources.

Supplements available to instructors at www.pearsonhighered.com	**Features of the Supplement**
Instructor's Manual authored by Dean Croushore from University of Richmond	• Chapter-by-chapter summaries • Teaching outlines • Suggested topics for class discussion • Solutions to end-of-chapter questions and problems in the book
Test Bank authored by Dean Croushore from University of Richmond	Over 1,600 multiple-choice, true/false, short- answer, and graphing questions with these annotations: • Difficulty level (1 for straight recall, 2 for some analysis, 3 for complex analysis) • Type (Multiple-choice and short-answer) • Topic (The section that covers the term or concept being tested) • Learning outcome
Computerized TestGen	TestGen allow instructors to: • Customize, save, and generate classroom tests • Edit, add, or delete questions from the Test Item Files • Analyze test results • Organize a database of tests and student results
PowerPoints authored by Dean Croushore from University of Richmond	Slides include all key text material including graphs, tables, and equations in the textbook. These PowerPoints meet accessibility standards for students with disabilities. Features include, but not limited to: • Keyboard and Screen Reader access • Alternative text for images • High color contrast between background and foreground colors

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 Ashley Bryan, Portfolio Manager and Nancy Freihofer, Content Producer for their superb work on the tenth edition. For their efforts, care, and craft, we also thank Allison Campbell, project manager from Integra; Melissa Honig, digital studio project manager; and Noel Lotz, digital content team lead.

We also appreciate the contributions of the reviewers and colleagues who have offered valuable comments on succeeding drafts of the book in all ten 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, *Lindenwood University*

David Aschauer, *Bates College*

Martin A. Asher, *The Wharton School, University of Pennsylvania*

David Backus, *New York University*

Daniel Barbezat, *Amherst College*

Reza Bavafa, *University of Southern California*

Parantap Basu, *Durham University*

Valerie R. Bencivenga, *University of Texas*

Haskel Benishay, *Kellogg Graduate School of Management, Northwestern University*

Charles A. Bennett, *Gannon University*

John F. Berdell, *DePaul University*

Joydeep Bhattacharya, *Iowa State University*

David Black, *University of Toledo*

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Scott Bloom, *Missouri State University*

Bruce R. Bolnick, *Nathan Associates*

David Brasfield, *Murray State University*

Viacheslav Breusov, *Alliance Bernstein*

Audie Brewton, *Northeastern Illinois University*

Stacey Brook, *University of Iowa*

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Maureen Burton, *California Polytechnic University, Pomona*

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Stephen Cecchetti, *Brandeis University*

Paul Chambers, *University of Central Missouri*

Anthony Chan, *JPMorgan Chase*

Leo Chan, *Utah Valley University*

S. Chandrasekhar, *Indira Gandhi Institute of Development Research*

Henry Chappell, *American University of Sharjah*

Jen–Chi Cheng, *Wichita State University*

Menzie Chinn, *University of Wisconsin*

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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*

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Steven R. Cunningham, *University of Connecticut*

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Edward Day, *University of Central Florida*

Luis De Araujo, *Michigan State University*

Robert Dekle, *University of Southern California*

Greg Delemeester, *Marietta College*

Wouter J. Den Haan, *London School of Economics*

Johan Deprez, *Texas Tech University*

James Devine, *Loyola Marymount University*

Wael William Diab, *Broadcom*

Peter Dohlman, *International Monetary Fund*

Patrick Dolenc, *Keene State College*

David Doorn, *West Chester University of Pennsylvania*

Allan Drazen, *University of Maryland*

Robert Driskill, *Vanderbilt University*

Bill Dupor, *Federal Reserve Bank of St Louis*

Donald H. Dutkowsky, *Syracuse University*

James E. Eaton, *Bridgewater College*

Janice C. Eberly, *Northwestern University*

Andrew Economopoulos, *Ursinus College*

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Kirk Elwood, *James Madison University*

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Christopher Erickson, *New Mexico State University*

James Fackler, *University of Kentucky*

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David W. Findlay, *Colby College*

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Charles C. Fischer, *Pittsburg State University*

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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, *Congressional Budget Office*

William T. Ganley, *Buffalo State College*

Charles B. Garrison, *University of Tennessee, Knoxville*

Kathie Gilbert, *Mississippi State University*

Roger Goldberg, *Ohio Northern University*

Joao Gomes, *The Wharton School, University of Pennsylvania*

Fred C. Graham, *Federal Housing Finance Agency*

John W. Graham, *Rutgers University*

Stephen A. Greenlaw, *University of Mary Washington*

Alan F. Gummerson, *Florida International University*

A. R. Gutowsky, *California State University, Sacramento*

David R. Hakes, *University of Northern Iowa*

Michael Haliassos, *Goethe University Frankfurt*

George J. Hall, *Brandeis University*

John C. Haltiwanger, *University of Maryland*

James Hamilton, *University of California, San Diego*

David Hammes, *University of Hawaii*

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Robert Stanley Herren, *North Dakota University*

Charles Himmelberg, *Goldman Sachs*

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Christopher House, *University of Michigan*

E. Philip Howrey, *University of Michigan*

John Huizinga, *University of Chicago*

Nayyer Hussain, *Rockland Community College*

Syed Muhammad Hussain, *Virginia Commonwealth University*

Steven Husted, *University of Pittsburgh*

Matthew Hyle, *Winona State University*

Matteo Iacoviello, *Boston College*

Selo Imrohoroglu, *University of Southern California*

Kenneth Inman, *Neustar College*

Liana Jacobi, *University of Melbourne*

Zuzana Janko, *San Francisco State University*

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Nobuhiro Kiyotaki, *Princeton University*

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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, *Massachusetts Institute of Technology*

Spencer Pack, *Connecticut College*

Walter Park, *American University*

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David E. Spencer, *Brigham Young University*

Don Stabile, *St. Mary's College*

Richard Startz, *University of California, Santa Barbara*

Gabriel Talmain, *University of Glasgow*

Bryan Taylor, *Global Financial Data*

Susan Washburn Taylor, *Millsaps College*

M. Dek Terrell, *Louisiana 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, former 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.

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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 four 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 148 years, the annual output of U.S. goods and services has increased by more than 150 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

[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.

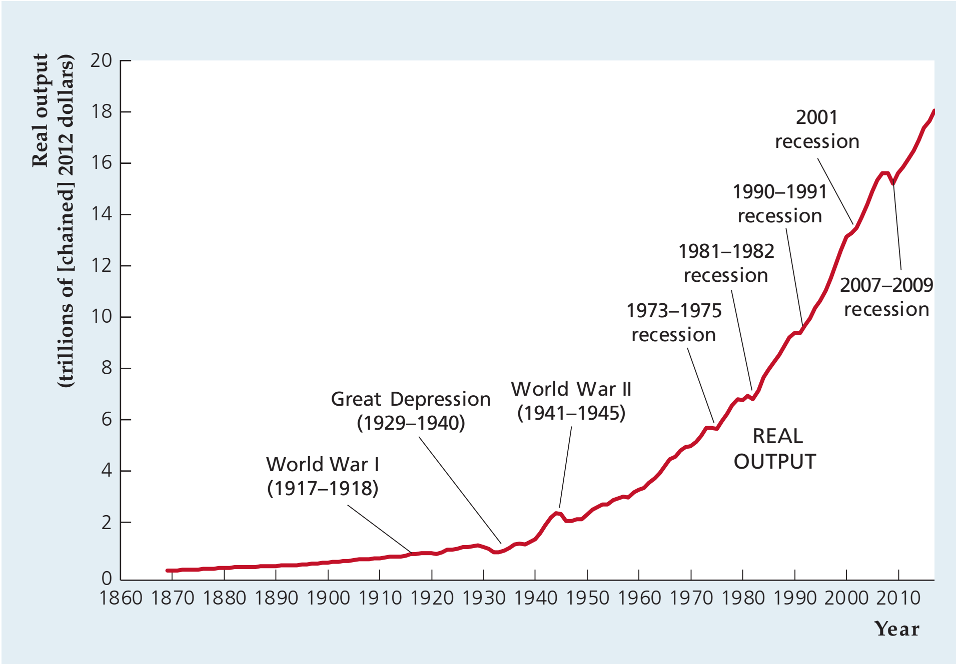


FIGURE 1.1

Output of the U.S. economy, 1869–2017

In this graph the output of the U.S. economy is measured by real gross domestic product (real GDP) for the period 1929–2017 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, *fred.stlouisfed.org/series/GDPCA*. Data from Romer were rescaled to 2009 prices.

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 2017, 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 1.0% per year from 2007 to 2017.

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.

FIGURE 1.2

Average labor productivity in the United States, 1900–2017

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, *fred.stlouisfed.org/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 contracting. 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.

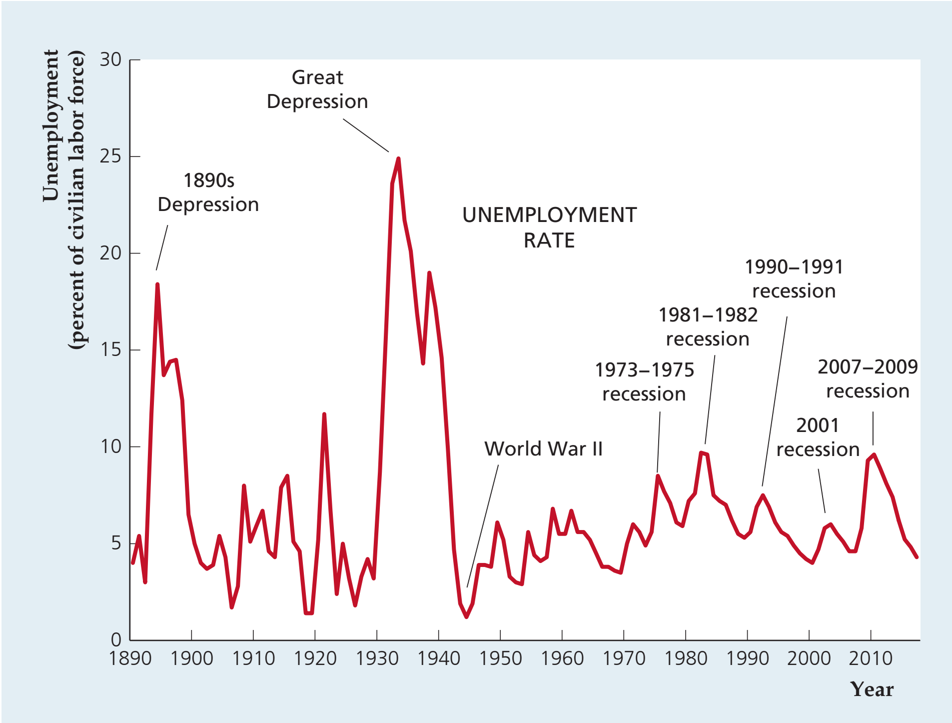
[2]A more exact definition is given in Chapter 8. Business cycles do not include fluctuations lasting only a few months, such as the increase in activity that occurs around Christmas.

FIGURE 1.3

The U.S. unemployment rate, 1890–2017

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, *fred.stlouisfed.org/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.

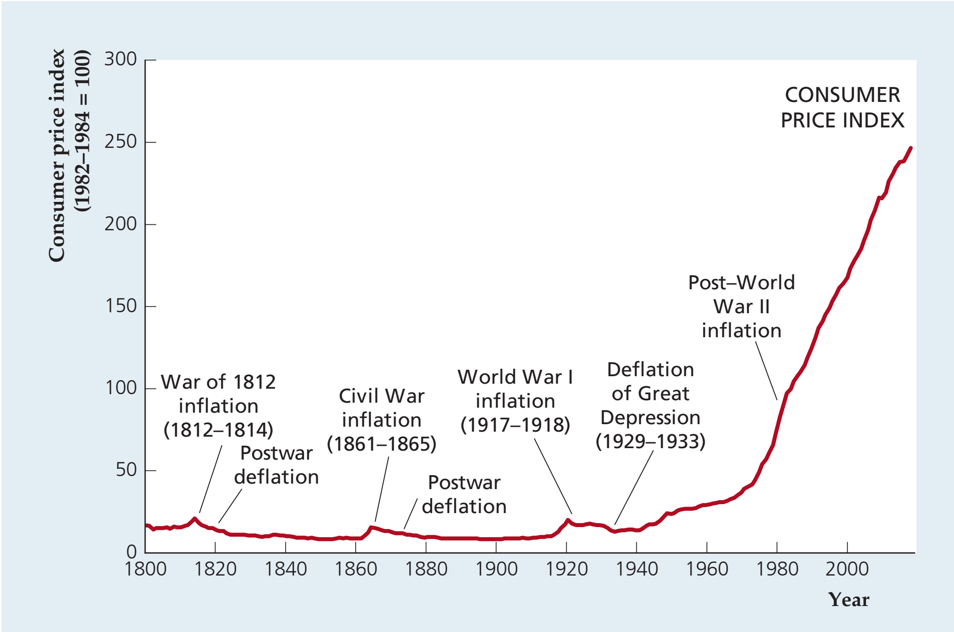


FIGURE 1.4

Consumer prices in the United States, 1800–2017 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 245.1 in 2017 means that a basket of consumer goods and services that cost $100 in 1982–1984 would cost $245.10 in 2017.

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, *fred.stlouisfed.org/series/CPIAUCSL*. Data prior to 1947 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

[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.

extreme inflations. When the inflation rate reaches an extremely high level, with 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 of

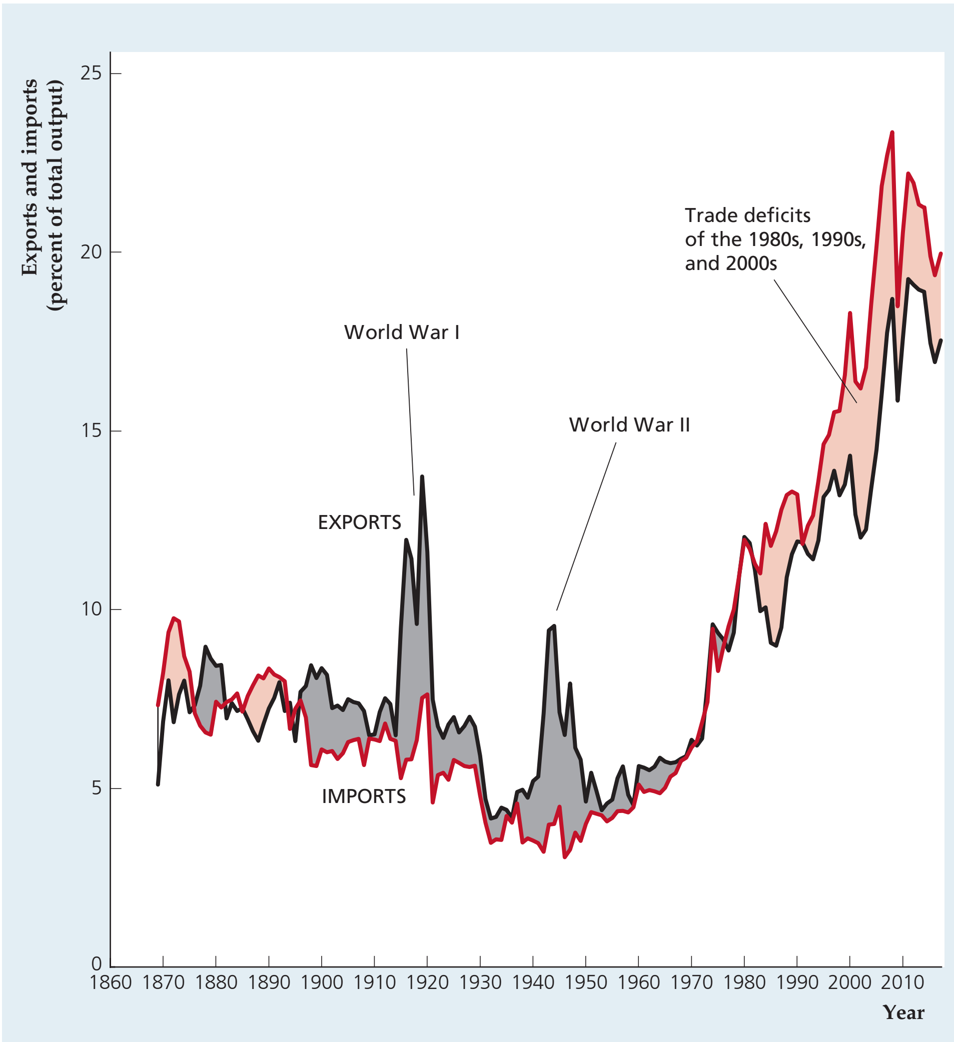


FIGURE 1.5

U.S. exports and imports, 1869–2017

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, *fred.stlouisfed.org/series/GDPA*.

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 149 years.[5] Again, so that their

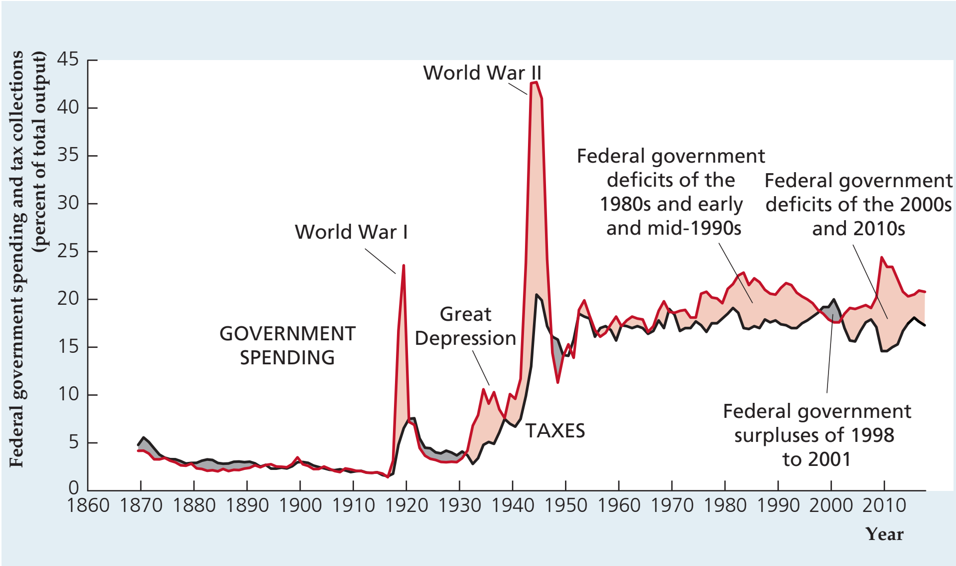
[5]Government spending includes both government purchases of goods and services, such as purchases of military equipment and the salaries of government officials, and government benefits paid to individuals, such as Social Security payments.

FIGURE 1.6

U.S. Federal government spending and tax collections, 1869–2017

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, 1930–2017 from *Historical Tables, Budget of the U.S. Government*, Table 1.2, *www.whitehouse.gov/omb/historical-tables*.



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% 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.