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Macroeconomics

TENTH EDITION

Andrew B. Abel • Ben S. Bernanke • Dean Croushore



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\$4	10	9
\$5	15	10
\$6	20	15
\$1	25	25

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Macroeconomics

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Global Edition

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University of Pennsylvania*

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Symbols Used in This Book

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

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

- *Pearson eText: A New Way of Learning.* Available through Pearson MyLab Economics, the Pearson eText gives students access to their textbook anytime, anywhere. In addition to notetaking, highlighting, and bookmarking, the Pearson eText also offers sharing features. 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 production function of the European Union (Chapter 3), the macroeconomic consequences of the boom and bust in stock prices (Chapter 4), how investors respond to tax incentives (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), the effects of dollarization (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.pearsonglobaleditions.com	Features of the Supplement
Instructor's Manual authored by Dean Croushore from University of Richmond	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Keyboard and Screen Reader access • Alternative text for images • High color contrast between background and foreground colors

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Introduction to Macroeconomics

1.1 What Macroeconomics Is About

Summarize the primary issues addressed in macroeconomics.

Learning Objectives

1.1 Summarize the primary issues addressed in macroeconomics.

1.2 Describe the activities and objectives of macroeconomists.

1.3 Differentiate between the classical and Keynesian approaches to macroeconomics.

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

- *What determines a nation's long-run economic growth?* In 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?

- *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

¹Output 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.