

The background of the cover is an abstract composition of various colors and shapes. It features large, irregular shapes in shades of yellow, red, blue, purple, and green, separated by thick black lines. There are also numerous small black dots and splatters scattered across the background, giving it a textured, artistic feel.

N. Gregory Mankiw

MACROECONOMICS

10.

Tenth Edition

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MACROECONOMICS

TENTH EDITION

MACROECONOMICS

N. GREGORY MANKIW

Harvard University



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Jordi Cabré

N. Gregory Mankiw is the Robert M. Beren Professor of Economics at Harvard University. He began his study of economics at Princeton University, where he received an A.B. in 1980. After earning a Ph.D. in economics from MIT, he began teaching at Harvard in 1985 and was promoted to full professor in 1987. At Harvard, he has taught both undergraduate and graduate courses in macroeconomics. He is also author of the best-selling introductory textbook *Principles of Economics* (Cengage Learning).

Professor Mankiw is a regular participant in academic and policy debates. His research ranges across macroeconomics and includes work on price adjustment, consumer behavior, financial markets, monetary and fiscal policy, and economic growth. In addition to his duties at Harvard, he has been a research associate of the National Bureau of Economic Research, a member of the Brookings Panel on Economic Activity, a trustee of the Urban Institute, and an adviser to the Congressional Budget Office and the Federal Reserve Banks of Boston and New York. From 2003 to 2005, he was chair of the President's Council of Economic Advisers.

Professor Mankiw lives in Massachusetts with his wife, Deborah, and their children, Catherine, Nicholas, and Peter.

To Deborah

Those branches of politics, or of the laws of social life, in which there exists a collection of facts or thoughts sufficiently sifted and methodized to form the beginning of a science should be taught *ex professo*. Among the chief of these is Political Economy, the sources and conditions of wealth and material prosperity for aggregate bodies of human beings. . . .

The same persons who cry down Logic will generally warn you against Political Economy. It is unfeeling, they will tell you. It recognises unpleasant facts. For my part, the most unfeeling thing I know of is the law of gravitation: it breaks the neck of the best and most amiable person without scruple, if he forgets for a single moment to give heed to it. The winds and waves too are very unfeeling. Would you advise those who go to sea to deny the winds and waves—or to make use of them, and find the means of guarding against their dangers? My advice to you is to study the great writers on Political Economy, and hold firmly by whatever in them you find true; and depend upon it that if you are not selfish or hardhearted already, Political Economy will not make you so.

John Stuart Mill, 1867

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Media and Resources from Worth Publishers

Digital Resources for Students and Instructors



Worth Publishers' new online course system, SaplingPlus, combines Learning-Curve with an integrated e-book, robust homework, improved graphing, and fully digital end-of-chapter problems, including Work It Outs. Online homework helps students get better grades with targeted instructional feedback tailored to the individual. And it saves instructors time preparing for and managing a course by providing personalized support from a Ph.D. or master's level colleague trained in Sapling's system.

Worth Publishers has worked closely with Greg Mankiw and a team of talented economics instructors to assemble a variety of resources for instructors and students. We have been delighted by all of the positive feedback we have received.

For Instructors

Instructor's Resource Manual

Robert G. Murphy (Boston College) has revised the impressive resource manual for instructors. For each chapter of this book, the manual contains notes to the instructor, a detailed lecture outline, additional case studies, and coverage of advanced topics. Instructors can use the manual to prepare their lectures, and they can reproduce whatever pages they choose as handouts for students. Each chapter also contains a Moody's Analytics [Economy.com](http://www.economy.com) Activity (www.economy.com), which challenges students to combine the chapter knowledge with a high-powered business database and analysis service that offers real-time monitoring of the global economy.

Solutions Manual

Mark Gibson (Washington State University) has updated the *Solutions Manual* for all the Questions for Review

and Problems and Applications found in the text.

Test Bank

The Test Bank has been extensively revised and improved for the tenth edition. Based on reviewer feedback, Worth Publishers, in collaboration with Daniel Moncayo (Brigham Young University), has checked every question, retained only the best, and added fresh new questions. The Test Bank now includes more than 2,200 multiple-choice questions, numerical problems, and short-answer graphical questions to accompany each chapter. The Test Bank provides a wide range of questions appropriate for assessing students' comprehension, interpretation, analysis, and synthesis skills.

Lecture Slides

Ryan Lee (Indiana University) has revised his lecture slides for the material in each chapter. They feature graphs with careful explanations and additional case studies, data, and helpful notes to the instructor. Designed to be customized or used as is, the slides include easy directions for instructors who have little PowerPoint experience.

End-of-Chapter Problems

The end-of-chapter problems from the text have been converted to an interactive format with answer-specific feedback. These problems can be assigned as homework assignments or in quizzes.

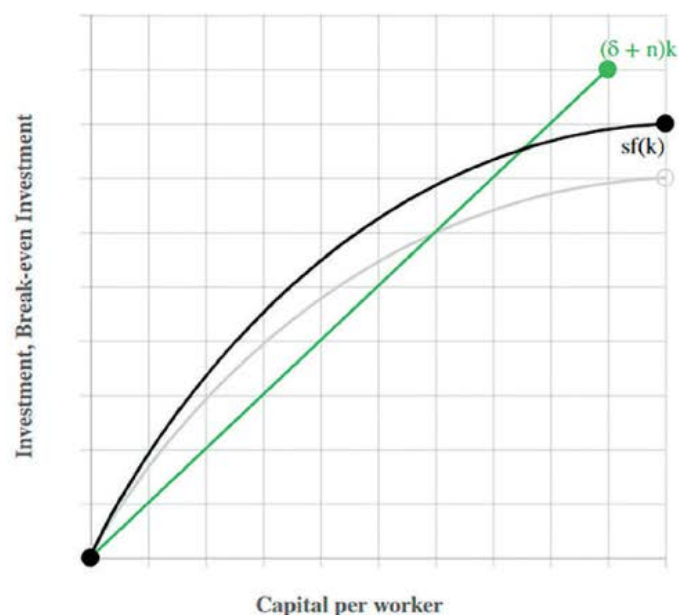
Graphing Questions

Powered by improved graphing, multi-step questions paired with helpful feedback guide students through the process of problem solving. Students are asked to demonstrate their understanding by simply clicking, dragging, and dropping a line to a predetermined location. The graphs have been designed so that students' entire focus is on moving the correct curve in the correct direction, virtually eliminating grading issues for instructors.

Economic Growth I — End of Chapter Problem

Use the accompanying graph to illustrate the impact on steady state capital per worker when a change in consumer preferences increases the saving rate.

To manipulate the graph, click on the endpoint of the curve you wish to pivot and place the endpoint in its proper location.



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Homework Assignments

Each chapter contains prebuilt assignments, providing instructors with a curated set of multiple-choice and graphing questions that can be easily assigned for practice or graded assessments.

For Students

LearningCurve

LearningCurve is an adaptive quizzing engine that automatically adjusts questions to a student's mastery level. With LearningCurve activities, each student follows a unique path to understanding the material. The more questions a student answers correctly, the more difficult the questions become. Each question is written specifically for the text and is linked to the relevant e-book section. LearningCurve also provides a personal study plan for students as well as complete metrics for instructors. LearningCurve, which has been proved to raise student performance, serves as an ideal formative assessment and learning tool.



The government budget is balanced when:

- $G + \text{Taxes} = \text{Transfers}.$
- $\text{Taxes} + \text{Transfers} = G.$
- $G + \text{Transfers} = \text{Taxes}.$
- $G - T = \text{Taxes} + \text{Transfers}.$

Need help on this question?


 [Read the ebook page on this topic](#)
(no penalty)

[Get a hint](#)
(fewer points)

[Show answer](#)
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Work It Out Tutorials

These skill-building activities pair sample end-of-chapter problems (identified with this icon:  **Work It Out**) with targeted feedback and video explanations to help students solve a similar problem step by step. This approach allows students to work independently, tests their comprehension of concepts, and prepares them for class and exams.

Fed Chairman Game

Created by the Federal Reserve Bank of San Francisco, the game allows students to become Chairman of the Fed and to make macroeconomic policy decisions based on news events and economic statistics. This fun-to-play simulation gives students a sense of the complex interconnections that influence the economy.

Prelude: Celebrating the Tenth Edition

I started writing the first edition of this book in 1988. My department chair had asked me to teach intermediate macroeconomics, a required course for Harvard economics majors. I happily accepted the assignment and continued teaching intermediate macro for the next 15 years. (I stepped away only when asked to take over the principles course.) As I prepared for the course by surveying existing texts, I realized that none of them fully satisfied me. While many were excellent books, I felt that they did not provide the right balance between long-run and short-run perspectives, between classical and Keynesian insights. And some were too long and comprehensive to be easily taught in one semester. Thus, this book was born.

Since its initial publication in 1991, the book has found an eager audience. My publisher tells me that it has been the best-selling intermediate macroeconomics text throughout most of its life. That is truly heartening. I am grateful to the numerous instructors who have adopted the book and, over many editions, have helped me improve it with their input. Even more heartening are the letters and emails from students around the world, who tell me how the book helped them navigate the exciting and challenging field of macroeconomics.

Over the past 30 years, macroeconomics has evolved as history has presented new questions and research has offered new answers. When the first edition came out, no one had heard of digital currencies such as bitcoin, Europe did not have a common currency, John Taylor had not devised his eponymous rule for monetary policy, behavioral economists like David Laibson and Richard Thaler had not proposed new ways to explain consumer behavior, and the economics profession had yet to be forced by the events of 2008 to focus anew on financial crises. Because of these and many other developments, I have updated this book every three years to ensure that students always have access to state-of-the-art thinking.

We macroeconomists still have much to learn. But the current body of macroeconomic knowledge offers students much insight into the world in which they live. Nothing delights me more than knowing that this book has helped convey this insight to the next generation.

Preface

An economist must be “mathematician, historian, statesman, philosopher, in some degree . . . as aloof and incorruptible as an artist, yet sometimes as near to earth as a politician.” So remarked John Maynard Keynes, the great British economist who could be called the father of macroeconomics. No single statement summarizes better what it means to be an economist.

As Keynes suggests, students learning economics must draw on many disparate talents. The job of helping students develop these talents falls to instructors and textbook authors. My goal for this book is to make macroeconomics understandable, relevant, and (believe it or not) fun. Those of us who have chosen to be macroeconomists have done so because we are fascinated by the field. More important, we believe that the study of macroeconomics can illuminate much about the world and that the lessons learned, if properly applied, can make the world a better place. I hope this book conveys not only our profession’s wisdom but also its enthusiasm and sense of purpose.

This Book’s Approach

Macroeconomists share a common body of knowledge, but they do not all have the same perspective on how that knowledge is best taught. Let me begin this new edition by recapping my objectives, which together define this book’s approach to the field.

First, I try to offer a balance between short-run and long-run topics. All economists agree that public policies and other events influence the economy over different time horizons. We live in our own short run, but we also live in the long run that our parents bequeathed us. As a result, courses in macroeconomics need to cover both short-run topics, such as the business cycle and stabilization policy, and long-run topics, such as economic growth, the natural rate of unemployment, persistent inflation, and the effects of government debt. Neither time horizon trumps the other.

Second, I integrate the insights of Keynesian and classical theories. Keynes’s *General Theory* is the foundation for much of our understanding of economic fluctuations, but classical economics provides the right answers to many questions. In this book I incorporate the contributions of the classical economists before Keynes and the new classical economists of the past several decades. Substantial coverage is given, for example, to the loanable-funds theory of the interest rate, the quantity theory of money, and the problem of time inconsistency. At the same time, the ideas of Keynes and the new Keynesians are necessary for understanding fluctuations. Substantial coverage is also given to the *IS–LM* model of aggregate demand, the short-run tradeoff between inflation and unemployment, and modern models of business cycle dynamics.

Third, I present macroeconomics using a variety of simple models. Instead of pretending that there is one model complete enough to explain all facets of the economy, I encourage students to learn how to use a set of prominent models. This approach has the pedagogical value that each model can be kept simple and presented within one or two chapters. More important, this approach asks students to think like economists, who always keep various models in mind when analyzing economic events or public policies.

Fourth, I emphasize that macroeconomics is an empirical discipline, motivated and guided by a wide array of experience. This book contains numerous case studies that use macroeconomic theory to shed light on real-world data and events. To highlight the broad applicability of the theory, I have drawn the case studies both from current issues facing the world's economies and from dramatic historical episodes. They teach the reader how to apply economic principles to issues from fourteenth-century Europe, the island of Yap, the land of Oz, and today's newspaper.

What's New in the Tenth Edition?

Here is a brief rundown of the notable changes in this edition:

- ▶ *Scraping the barnacles.* tl;dr. For those not familiar with Internet slang, this abbreviation means “too long, didn't read.” Sadly, many students take this approach to textbooks. My main goal in this revision, therefore, has been a renewed commitment to brevity. In particular, I took up the task of scraping off the barnacles that have accumulated over many editions. More important than what has been added to this edition is what has been taken out. This task has benefited from surveys of instructors who use the book. I have kept what most instructors consider essential and taken out what most consider superfluous.
- ▶ *Streaming coverage of consumption and investment.* The material on the microeconomic foundations of consumption and investment has been condensed into a single, more accessible chapter.
- ▶ *New topic in [Chapter 9](#).* The role of culture in economic growth.
- ▶ *New topic in [Chapter 12](#).* The curious case of negative interest rates.
- ▶ *New topic in [Chapter 18](#).* The stress tests that regulators are using to evaluate banks' safety and soundness.
- ▶ *New assessment tool.* This edition includes a new pedagogical feature. Every chapter concludes with a Quick Quiz of six multiple-choice questions. Students can use these quizzes to immediately test their understanding of the core concepts in the chapter. The quiz answers are available at the end of each chapter.
- ▶ *Updated data.* As always, the book has been fully updated. All the data are as current as possible.

Despite these changes, my goal remains the same as in previous editions: to offer students the clearest, most up-to-date, most accessible course in macroeconomics in the fewest words possible.

The Arrangement of Topics

My strategy for teaching macroeconomics is first to examine the long run, when prices are flexible, and then to examine the short run, when prices are sticky. This approach has several advantages. First, because the

classical dichotomy permits the separation of real and monetary issues, the long-run material is easier for students. Second, when students begin studying short-run fluctuations, they understand the long-run equilibrium around which the economy is fluctuating. Third, beginning with market-clearing models clarifies the link between macroeconomics and microeconomics. Fourth, students learn first the material that is less controversial. For all these reasons, the strategy of beginning with long-run classical models simplifies the teaching of macroeconomics.

Let's now move from strategy to tactics. What follows is a whirlwind tour of the book.

Part One, Introduction

The introductory material in Part One is brief so that students can get to the core topics quickly. [Chapter 1](#) discusses the questions that macroeconomists address and the economist's approach of building models to explain the world. [Chapter 2](#) introduces the data of macroeconomics, emphasizing gross domestic product, the consumer price index, and the unemployment rate.

Part Two, Classical Theory: The Economy in the Long Run

Part Two examines the long run, over which prices are flexible. [Chapter 3](#) presents the classical model of national income. In this model, the factors of production and the production technology determine the level of income, and the marginal products of the factors determine its distribution to households. In addition, the model shows how fiscal policy influences the allocation of the economy's resources among consumption, investment, and government purchases, and it highlights how the real interest rate equilibrates the supply and demand for goods and services.

Money and the price level are introduced next. [Chapter 4](#) examines the monetary system and the tools of monetary policy. [Chapter 5](#) begins the discussion of the effects of monetary policy. Because prices are assumed to be flexible, the chapter presents the ideas of classical monetary theory: the quantity theory of money, the inflation tax, the Fisher effect, the social costs of inflation, and the causes and costs of hyperinflation.

The study of open-economy macroeconomics begins in [Chapter 6](#). Maintaining the assumption of full employment, this chapter presents models that explain the trade balance and the exchange rate. Various policy issues are addressed: the relationship between the budget deficit and the trade deficit, the macroeconomic impact of protectionist trade policies, and the effect of monetary policy on the value of a currency in the market for foreign exchange.

[Chapter 7](#) relaxes the assumption of full employment, discussing the dynamics of the labor market and the natural rate of unemployment. It examines various causes of unemployment, including job search, minimum-wage laws, union power, and efficiency wages. It also presents some important facts about patterns of unemployment.

Part Three, Growth Theory: The Economy in the Very Long Run

Part Three makes the classical analysis of the economy dynamic with the tools of growth theory. [Chapter 8](#) introduces the Solow growth model, emphasizing capital accumulation and population growth. [Chapter 9](#) then adds technological progress to the Solow model. It uses the model to discuss growth experiences around the world as well as public policies that influence the level and growth of the standard of living. [Chapter 9](#) also introduces students to the modern theories of endogenous growth.

Part Four, Business Cycle Theory: The Economy in the Short Run

Part Four examines the short run, when prices are sticky. It begins in [Chapter 10](#) by examining the key facts that describe short-run fluctuations in economic activity. The chapter then introduces the model of aggregate supply and aggregate demand, as well as the role of stabilization policy. Subsequent chapters refine the ideas introduced in this chapter.

[Chapters 11](#) and [12](#) look more closely at aggregate demand. [Chapter 11](#) presents the Keynesian cross and the theory of liquidity preference and uses these models as building blocks for the *IS–LM* model. [Chapter 12](#) uses the *IS–LM* model to explain economic fluctuations and the aggregate demand curve, concluding with an extended case study of the Great Depression.

The discussion of short-run fluctuations continues in [Chapter 13](#), which focuses on aggregate demand in an open economy. This chapter presents the Mundell–Fleming model and shows how monetary and fiscal policies affect the economy under floating and fixed exchange-rate systems. It also discusses the question of whether exchange rates should be floating or fixed.

[Chapter 14](#) looks more closely at aggregate supply. It examines various approaches to explaining the short-run aggregate supply curve and discusses the short-run tradeoff between inflation and unemployment.

Part Five, Topics in Macroeconomic Theory and Policy

Once students have a solid command of standard models, the book offers them various optional chapters that dive deeper into macroeconomic theory and policy.

[Chapter 15](#) develops a dynamic model of aggregate demand and aggregate supply. It builds on ideas that students have already encountered and uses those ideas as stepping-stones to take students closer to the frontier of knowledge about short-run fluctuations. The model presented here is a simplified version of modern dynamic, stochastic, general equilibrium (DSGE) models.

[Chapter 16](#) considers the debate over how policymakers should respond to short-run fluctuations. It emphasizes two questions: Should monetary and fiscal policy be active or passive? Should policy be conducted by rule or discretion? The chapter presents arguments on both sides of these questions.

[Chapter 17](#) focuses on debates over government debt and budget deficits. It gives a broad picture of the magnitude of government indebtedness, discusses why measuring budget deficits is not always straightforward, recaps the traditional view of the effects of government debt, presents Ricardian equivalence as an alternative view, and examines various other perspectives on government debt. As in the previous chapter, students are not handed conclusions but are given tools to evaluate alternative viewpoints on their own.

[Chapter 18](#) discusses the financial system and its linkages to the overall economy. It begins by examining what the financial system does: financing investment, sharing risk, dealing with asymmetric information, and fostering growth. It then discusses the causes of financial crises, their macroeconomic impact, and the policies that might mitigate their effects and reduce their likelihood.

[Chapter 19](#) analyzes some of the microeconomics behind consumption and investment decisions. It discusses various theories of consumer behavior, including the Keynesian consumption function, Modigliani's life-cycle hypothesis, Friedman's permanent-income hypothesis, Hall's random-walk hypothesis, and Laibson's model of instant gratification. It also examines the theory behind the investment function, focusing on business fixed investment and including topics such as the cost of capital, Tobin's q , and the role of financing constraints.

Epilogue

The book ends with an epilogue that reviews the broad lessons about which most macroeconomists agree and some important open questions. Regardless of which chapters an instructor covers, this capstone chapter can be used to remind students how the many models and themes of macroeconomics relate to one another. Here and throughout the book, I emphasize that despite the disagreements among macroeconomists, there is much that we know about how the economy works.

Alternative Routes Through the Text

Instructors of intermediate macroeconomics have different preferences about the choice and organization of topics. I kept this in mind while writing the book so that it would offer a degree of flexibility. Here are a few ways that instructors might consider rearranging the material:

- ▶ Some instructors are eager to cover short-run economic fluctuations. For such a course, I recommend covering [Chapters 1](#) through [5](#) so that students are grounded in the basics of classical theory and then jumping to [Chapters 10](#), [11](#), [12](#), and [14](#) to cover the model of aggregate demand and aggregate supply.
- ▶ Some instructors are eager to cover long-run economic growth. These instructors can cover [Chapters 8](#) and [9](#) immediately after [Chapter 3](#).
- ▶ An instructor who wants to defer (or even skip) open-economy macroeconomics can put off [Chapters 6](#) and [13](#) without loss of continuity.
- ▶ An instructor who wants to emphasize macroeconomic policy can skip [Chapters 8](#), [9](#), and [15](#) in order to get to [Chapters 16](#), [17](#), and [18](#) more quickly.
- ▶ An instructor who wants to stress the microeconomic foundations of macroeconomics can cover [Chapter 19](#) early in the course, even after [Chapter 3](#).

The successful experiences of hundreds of instructors with previous editions suggest this text nicely complements a variety of approaches to the field.

Learning Tools

I am pleased that students have found the previous editions of this book user-friendly. I have tried to make this tenth edition even more so.

Case Studies

Economics comes to life when it is applied to understanding actual events. Therefore, the numerous case studies are an important learning tool, integrated closely with the theoretical material presented in each chapter. The frequency with which these case studies occur ensures that a student does not have to grapple with an overdose of theory before seeing the theory applied. Students report that the case studies are their favorite part of the book.

FYI Boxes

These boxes present ancillary material “for your information.” I use these boxes to clarify difficult concepts, to provide additional information about the tools of economics, and to show how economics impacts our daily

lives.

Graphs

Understanding graphical analysis is a central part of learning macroeconomics, and I have worked hard to make the figures easy to follow. I often use comment boxes within figures to describe and draw attention to the key points that the figures illustrate. The pedagogical use of color, detailed captions, and comment boxes makes it easier for students to learn and review the material.

Mathematical Notes

I use occasional mathematical footnotes to keep difficult material out of the body of the text. These notes make an argument more rigorous or present a proof of a mathematical result. They can be skipped by students who have not been introduced to the necessary mathematical tools.

Quick Quizzes

Every chapter ends with six multiple-choice questions, which students can use to test themselves on what they have just read. The answers are provided at the end of each chapter. These quizzes are new to this edition.

Chapter Summaries

Every chapter includes a brief, nontechnical summary of its major lessons. Students can use the summaries to place the material in perspective and to review for exams.


Key Concepts

Learning the language of a field is a major part of any course. Within the chapter, each key concept is in **boldface** when it is introduced. At the end of the chapter, the key concepts are listed for review.

Questions for Review

Students are asked to test their understanding of a chapter's basic lessons in the Questions for Review.

Problems and Applications

Every chapter includes Problems and Applications designed for homework assignments. Some are numerical applications of the theory in the chapter. Others encourage students to go beyond the material in the chapter by addressing new issues that are closely related to the chapter topics. In most of the core chapters, a few problems are identified with this icon:  **Work It Out**. For each of these problems, students can find a Work It Out tutorial on SaplingPlus for *Macroeconomics*, 10e: <https://macmillanlearning.com/sapling>.

Chapter Appendices

Several chapters include appendices that offer additional material, sometimes at a higher level of mathematical sophistication. These appendices are designed so that instructors can cover certain topics in greater depth if they wish. The appendices can be skipped altogether without loss of continuity.

Glossary

To help students become familiar with the language of macroeconomics, a glossary of more than 250 terms is provided at the back of the book.

International Editions

The English-language version of this book has been used in dozens of countries. To make the book more accessible for students around the world, editions are (or will soon be) available in 17 other languages: Armenian, Chinese (Simplified and Complex), French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Portuguese, Romanian, Russian, Spanish, Ukrainian, and Vietnamese. In addition, a Canadian adaptation coauthored with William Scarth (McMaster University) and a European adaptation coauthored with Mark Taylor (University of Warwick) are available. Instructors who would like information about these versions of the book should contact Worth Publishers.

Acknowledgments

Since I started writing the first edition of this book, I have benefited from the input of many reviewers and colleagues in the economics profession. Now that the book is in its tenth edition, these people are too

numerous to list in their entirety. However, I continue to be grateful for their willingness to have given up their scarce time to help me improve the economics and pedagogy of this text. Their advice has made this book a better teaching tool for hundreds of thousands of students around the world.

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M. Gregory Mankiw

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