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# Principles of **Macroeconomics**

THIRTEENTH EDITION

Karl E. Case

Ray C. Fair

Sharon M. Oster





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**Karl E. Case**

*Wellesley College*

**Ray C. Fair**

*Yale University*

**Sharon M. Oster**

*Yale University*

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*This edition is dedicated to Chip Case, a wonderful colleague and friend. He was the inspiration for this textbook some 30 years ago, and he served as an inspiration to study economics for thousands of students.*

# About the Authors



**Karl E. Case**, who passed away in July, 2016, was a Professor of Economics Emeritus at Wellesley College where he taught for 34 years, serving several tours of duty as Department Chair. He was a Senior Fellow at the Joint Center for Housing Studies at Harvard University and a founding partner in the real estate research firm of Fiserv Case Shiller Weiss, which produces the S&P Case-Shiller Index of home prices. He served as a member of the Index Advisory Committee of Standard and Poor's, and on the Academic Advisory Board of the Federal Reserve Bank of Boston.

Professor Case received his B.A. from Miami University in 1968, spent three years on active duty in the Army, and received his Ph.D. in Economics from Harvard University in 1976.

Professor Case's research was in the areas of real estate, housing, and public finance. He authored or coauthored five books, including *Principles of Economics*, *Economics and Tax Policy*, and *Property Taxation: The Need for Reform*, and published numerous articles in professional journals, focused on real estate markets and prices.

Chip, as he was known to his many friends and colleagues, contributed to this textbook throughout its many editions. In his honor and with respect for his substantial contributions to the text and the discipline of economics, his co-authors plan to keep his name on the text for all future editions.



**Ray C. Fair** is Professor of Economics at Yale University. He is a member of the Cowles Foundation at Yale and a Fellow of the Econometric Society. He received a B.A. in Economics from Fresno State College in 1964 and a Ph.D. in Economics from MIT in 1968. He taught at Princeton University from 1968 to 1974. Professor Fair has taught introductory and intermediate macroeconomics at Yale since 1974. He has also taught graduate courses in macroeconomic theory and macroeconometrics.

Professor Fair's research has primarily been in the areas of macroeconomics and econometrics, with particular emphasis on macroeconomic model building. He has also done work in the areas of finance, voting behavior, and aging in sports. His publications include *Specification, Estimation, and Analysis of Macroeconometric Models* (Harvard Press, 1984); *Testing Macroeconometric Models* (Harvard Press, 1994); *Estimating How the Macroeconomy Works* (Harvard Press, 2004), and *Predicting Presidential Elections and Other Things* (Stanford University Press, 2012).

Professor Fair's U.S. and multicountry models are available for use on the Internet free of charge. The address is <http://fairmodel.econ.yale.edu>. Many teachers have found that having students work with the U.S. model on the Internet is a useful complement to an introductory macroeconomics course.



**Sharon M. Oster** is the Frederic Wolfe Professor of Economics and Management and former Dean of the Yale School of Management. Professor Oster joined Case and Fair as a coauthor in the ninth edition of this book. Professor Oster has a B.A. in Economics from Hofstra University and a Ph.D. in Economics from Harvard University.

Professor Oster's research is in the area of industrial organization. She has worked on problems of diffusion of innovation in a number of different industries, on the effect of regulations on business, and on competitive strategy. She has published a number of articles in these areas and is the author of several books, including *Modern Competitive Analysis* and *The Strategic Management of Nonprofits*.

Prior to joining the School of Management at Yale, Professor Oster taught for a number of years in Yale's Department of Economics. In the department, Professor Oster taught introductory and intermediate microeconomics to undergraduates as well as several graduate courses in industrial organization. Since 1982, Professor Oster has taught primarily in the Management School, where she teaches the core microeconomics class for MBA students and a course in the area of competitive strategy. Professor Oster also consults widely for businesses and nonprofit organizations and has served on the boards of several publicly traded companies and nonprofit organizations.

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# Preface

## New to this Edition

Updates for this edition of *Principles of Macroeconomics* include:

- It is our hope that students will come to see both how broad the tools of economics are and how exciting is much of the new research in the field. The 13<sup>th</sup> edition has continued the changes in the *Economics in Practice* boxes that we began several editions ago. In these boxes, we aim to bring economic thinking to the concerns of the typical student. In many cases, we do this by spotlighting recent research, much of it by young scholars. Here are some examples of the topics we cover in the new boxes:
  - Research on the role weather plays in reducing school achievement in rural India by changing the importance of child labor in agriculture (Chapter 1, “The Scope and Method of Economics”).
  - The strength of the economics major in helping students avoid unemployment in a recession, showing how the skills students learn in an economics class can benefit them regardless of the career path they choose (Chapter 1, “The Scope and Method of Economics”).
- We have reworked some of the chapters to streamline them and to improve readability. In the discussions of supply and demand and the discussions of perfect and imperfect competition, we have added simple algebraic material to the graphical, numeric and verbal explanations to aid in clarity of understanding.
  - In Chapter 32, “Alternative Views in Macroeconomics,” a discussion of behavioral macroeconomics has been added to the Alternative views of macroeconomics.
- We continue to be very excited about Chapter 36, “Critical Thinking About Research.” This material is unique in an introductory economics text. This chapter covers the research methodology of economics, where we highlight some of the key concerns of empirical economics: selection issues, causality, statistical significance, and regression analysis. Methodology is a key part of economics these days, and we have tried to give the introductory student a sense of what this methodology is and how to apply it in class and beyond.
- All of the macro data have been updated through 2018. The slow recovery from the 2008–2009 recession is still evident in these data. This gives students a good idea of what has been happening to the economy since they left high school.
- Many end-of-chapter problems have been revised.
- We have added Critical Thinking questions to most Economics in Practice boxes and each end-of-chapter section, to reinforce the underlying economic principles and to give students practical application of what they’ve learned.

## The *Principles of Macroeconomics* Program

Our goal in the 13<sup>th</sup> edition, as it was in the first edition, is to instill in students a fascination with both the functioning of the economy and the power and breadth of economics. The first line of every edition of our book has been “The study of economics should begin with a sense of wonder.” We hope that readers come away from our book with a basic understanding of how market economies function, an appreciation for the things they do well,

and a sense of the things they do poorly. We also hope that readers begin to learn the art and science of economic thinking and begin to look at some policy, and, even personal decisions, in a different way. We have prepared this edition of the text and MyLab Economics with this in mind. 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 **Digital Interactives** to **Real-Time Data Analysis Exercises**, MyLab Economics helps you teach your course, your way. Learn more at [www.pearson.com/mylab/economics](http://www.pearson.com/mylab/economics).

## Solving Teaching and Learning Challenges

As authors and teachers, we understand the challenges of the principles of economics course. The foundational themes of *Principles of Macroeconomics*, 13<sup>th</sup> edition, are to introduce the discipline of economics and to provide a basic understanding of how economies function. This requires a blend of economic theory, institutional material, and real-world applications. We have maintained a balance between these ingredients in every chapter. There is such volume of material for teachers to cover, and for students to understand. We address this learning challenge through: (1) A three-tiered approach of explaining key concepts through relevant stories, graphs and equations (2) Pedagogical features in the text and accompanying digital resources in MyLab Economics that illustrate and reinforce key concepts through real-world examples and applications that are relevant to students; (3) Graphs and animations; and (4) A wide variety of questions and problems.

### Three-Tiered Explanations: Stories-Graphs-Equations

Professors who teach principles of economics are faced with a classroom of students with different abilities, backgrounds, and learning styles. For some students, analytical material is difficult no matter how it is presented; for others, graphs and equations seem to come naturally. The problem facing instructors and textbook authors alike is how to convey the core principles of the discipline to as many students as possible without selling the better students short. Our approach to this problem is to present most core concepts in the following three ways.

First, we present each concept in the context of a simple intuitive **story** or example in words often followed by a table. Second, we use a **graph** in most cases to illustrate the story or example. And finally, in many cases where appropriate, we use an **equation** to present the concept with a mathematical formula. In this edition, we have strengthened this element without greatly increasing mathematical levels needed for the class. For students who would benefit from a math review, MyLab Economics offers math skills review Chapter R, accessible from the assignment manager and containing over 150 graphing, algebra, and calculus exercises for homework, quiz, and test use.

### *Economics in Practice*

We know that students are best motivated when they see the relevance of what they're learning to the world they live in. We've created *Economics in Practice* with a focus on recent research or events that support a key concept in the chapter and help students think about the broad and exciting applications of economics to their lives and the world around them. Each box contains a Critical Thinking question or two to further connect the material they are learning with their lives.



## ECONOMICS IN PRACTICE

## Are Christie's Brokerage Services Counted in GDP?

Christie's is the world's oldest and largest auction house, dealing in fine art, antiques, jewelry, and real estate with 85 offices in over 43 countries. In 2017, seven out of the top-notch ten art works were sold at this British auction house. Each item is simultaneously bid for via a live platform, online, and through phone orders.

In 2017, the auction art sales at Christie's broke its own worldwide sales record of €5.8 billion. The most significant art piece sold that year was Leonardo da Vinci's masterpiece, *Sabator Mundi* or Savior of the World, which was sold by Russian collector Dmitry Rybolovlev to Louvre Abu Dhabi for over \$450 million at Christie's New York auction house. This is the highest price ever paid for an art piece at any auction.

So which country's GDP should da Vinci's sixteenth century masterpiece count be a part of—France, Abu Dhabi, Russia, the United States, or the United Kingdom? Since the painting was commissioned in the early sixteenth century by the French monarch, Louis XII, it was counted as part of France's GDP in the year when it was painted, i.e., 1,500. The sale does not affect either Abu Dhabi or Russia's GDP. However, since Christie's services were rendered on U.S. soil by the British auction house via its New York branch, it would have been recorded as a service brokerage fee in the United States' GDP in 2017. As we shall study later in the chapter, once the brokerage income fee is remitted to the United Kingdom, it is recorded under its



national income or gross national product (GNP). So although masterpieces like these date way back to the early sixteenth century and its valuation does not contribute to current GDP, the cost of getting together interested buyers and getting a lucrative price for it does indeed get counted.

## CRITICAL THINKING

1. Would a contemporary painting completed in 2017 and sold by Christie's in the same year be recorded in GDP of 2017? What about a painting painted in 2015?

To further promote the relevance of economics, *Current News Exercises* provide a turn-key way to assign gradable news-based exercises in MyLab Economics. Each week, Pearson scours the news, finds a current microeconomics and macroeconomics news article or video, creates exercises around these news articles, and then automatically adds them to MyLab Economics. Assigning and grading current news-based exercises that deal with the latest micro and macro events and policy issues has never been more convenient.

**Pearson Economic News** Home About

## Macroeconomic Weekly News Update

August 25, 2018 – August 31, 2018

What's Really Going On With China's Economy?

China / economic growth / exports / GDP / international trade

## Microeconomic Weekly News Update

August 25, 2018 – August 31, 2018

Inside the High-Stakes Business of Tracking Space Junk

externalities / market failure / public goods / space trash / tragedy of the commons

SEARCH

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CATEGORIES

01. Introductory Concepts (scarcity, opportunity cost, comparative advantage, and economic models)
02. Supply Demand and Market Equilibrium (applications of supply/demand model)
03. Market Efficiency and Surplus; Market Failure and Public Goods
04. Factors of Production, Labor, Technology and Costs
05. Market Structure (pricing, advertising, and game theory)
06. Macroeconomic Variables and Policy Goals
07. Growth, Development, and Financial Markets (long run)
08. Monetary Policy (short-run fluctuations)
09. Fiscal Policy (short-run fluctuations)
10. International Economics (trade and finance)

### Concept Checks

Giving students the opportunity to practice what they are learning along the way is critical to their success in the principles of economics course. New for this edition, each section and

subsection of each learning objective, and select key figures, is reinforced with a Concept Check in the eText of MyLab Economics that contains one or two multiple choice, true/false, or fill-in questions. These checks act as “speed bumps” that encourage students to stop and check their understanding of fundamental terms and concepts before moving on to the next section. The goal is to help students assess their progress on a section-by-section basis, so they can be better prepared for homework, quizzes, and exams.

The screenshot shows a homework question titled "Concept Check 2.3". The question asks: "Assuming it chooses to produce, a profit-maximizing firm in a perfectly competitive industry will produce output where". There are four multiple-choice options:
 

- A. marginal cost equals average total cost.
- B. the difference between marginal revenue and marginal cost is the greatest.
- C. marginal revenue equals marginal cost.
- D. marginal revenue equals average total cost.

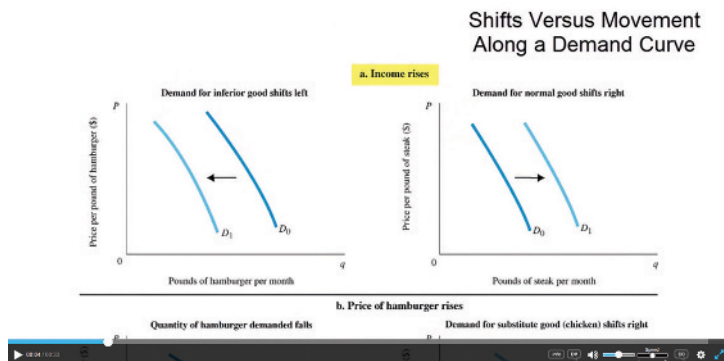
 The interface includes a "Save" button, a progress indicator showing "1 of 3 (0 complete)", a "HW Score: 0%, 0 of 3 pts", and a "Check Answer" button at the bottom. A progress bar shows "1 part remaining".

## Graphs Animations

Graphs are the backbone of introductory economics, but many students struggle to understand and work with them. The Chapter 1 Appendix, “How to Read and Understand Graphs,” shows readers how to interpret the over 200 graphs featured in this book. To make interpreting graphs easier for students, we use red curves to illustrate the behavior of firms, blue curves to show the behavior of households, and a different shade of red and blue to signify a shift in a curve.

The figures in the book are also an integral part of our three-tiered approach to explain concepts in words, equations and graphs. They promote learning as students read an example or story, followed by a mathematical representation, and then see a graphical representation.

Select numbered figures in the text have a supporting animated version in MyLab Economics. The goal is to help students understand shifts in curves, movements along curves, and changes in equilibrium values by bringing graphs to life. Having an animated version of a graph helps students who have difficulty interpreting the static version in the printed text. Graded practice exercises are included with the animations to give students practice reading and interpreting graphs.



## Real-Time Data

Currency is imperative in economics, particularly macroeconomics. We achieve this with real-time data analysis figures and exercises. Many of the key figures in the text have been updated in the MyLab with real-time data from the Federal Reserve's Economic Data (FRED™) — a comprehensive, up-to-date data set maintained by the Federal Reserve Bank of St. Louis. These animated graphs help students understand shifts in curves, movements along curves, and changes in equilibrium values. Easy to assign and automatically graded, Real-Time Data Analysis exercises use up-to-the-minute, real-time macroeconomic data. These exercises communicate directly with the Federal Reserve Bank of St. Louis's FRED™ site, so every time FRED posts new data, students see it.

The screenshot shows a homework assignment interface. At the top, it says 'Homework: Homework' with a 'Save' button. Below that, it shows 'Score: 1 of 1 pt' and 'HW Score: 33.33%, 1 of 3 pts'. The assignment title is 'RTDA+: Unemployment'. The main content is a 'Real-time data analysis exercise' that asks students to use FRED data to calculate unemployment rates. A table provides the following data:

| Title  | Series ID   | Value   |
|--|-------------|---------|
| Unemployed   | UNEMPLOY    | 6,234   |
| Civilian Labour force                              | CLF16OV     | 161,776 |
| Employment level-part-time for economic reasons... | LNS12032195 | 2,551   |

Below the table, the exercise asks for two unemployment rates: the civilian unemployment rate (3.89%) and the civilian unemployment rate including persons who are underemployed (5.43%). The interface also shows 'Question is complete' and a 'Try Again' button.

## Critical Thinking Questions

Throughout the course, and after graduation, students need to demonstrate critical thinking skills in their work and careers. To help develop these essential skills, we've added a new section of Critical Thinking questions to give students practice in higher-order thinking. Available in MyLab Economics, each end-of-chapter problem set ends with a *Critical Thinking Questions* section. These questions ask students to think more deeply about the concepts they've learned in the chapter when answering them. These assignable essay questions can be used on homework, tests, or quizzes. They require manual scoring; however, each essay question includes a sample correct answer to make grading easy.

### CRITICAL THINKING QUESTIONS

**QUESTION 1** When an unemployed individual gives up looking for work and leaves the labor force, she is no longer considered unemployed. What happens to the unemployment rate as a result? Does this mean that the unemployment rate understates or overstates the problem of joblessness?

**QUESTION 2** According to the Efficiency Wage Theory, employers occasionally pay workers more than the equilibrium wage in the market in order to increase productivity. Explain how this would lead to reduced turnover.

## Problems and Solutions

Each chapter and appendix ends with a problem set that asks students to think about and apply what they've learned in the chapter. These problems are not simple memorization questions. Rather, they ask students to perform graphical analysis or to apply economics to a

real-world situation or policy decision. More challenging problems are indicated by an asterisk. Many problems have been updated. These problems can be assigned and auto-graded in MyLab Economics and are available with optional just-in-time learning aids to help students when they need it the most. Students can also practice these problems in the Study Plan. The Study Plan gives students personalized recommendations, practice opportunities, and learning aids to help them stay on track.

## 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 the many skills they will need to do so. We focus on developing these skills in a variety of ways.

In the text, the *Economics in Practice* boxes help students think deeply about concepts and make connections between what they learn in class and how it can apply to their job in the real world. Chapter 1's *Economics in Practice* box explores how majoring in economics can help make students less vulnerable to recession. Chapter 11's *Economics in Practice* boxes highlight investment banking, the stock market, and investing strategies, topics of particular interest and relevance to students studying economics and finance.

In MyLab Economics, the *Critical Thinking Questions* and *Current News* exercises encourage application of skills that will contribute toward success in this course and in the future, regardless of each student's career path.

## Table of Contents Overview

### Macroeconomic Structure

We remain committed to the view that it is a mistake simply to throw aggregate demand and aggregate supply curves at students in the first few chapters of a principles book. To understand the AS and AD curves, students need to know about the functioning of both the goods market and the money market. The logic behind the simple demand curve is wrong when it is applied to the relationship between aggregate demand and the price level. Similarly, the logic behind the simple supply curve is wrong when it is applied to the relationship between aggregate supply and the price level. We thus build up to the AS/AD model slowly.

The goods market is discussed in Chapters 23 and 24 (the IS curve). The money market is discussed in Chapter 25 (material behind the Fed rule). Everything comes together in Chapter 26, which derives the AD and AS curves and determines the equilibrium values of aggregate output, the price level, and the interest rate. This is the core chapter and where the Fed rule plays a major role. Chapter 27 then uses the model in Chapter 26 to analyze policy effects and cost shocks. Chapter 28 then brings in the labor market. Figure V.1 on page 167 gives you an overview of this structure.

One of the big issues in the organization of the macroeconomic material is whether long-run growth issues should be taught before short-run chapters on the determination of national income and countercyclical policy. In the last four editions, we moved a significant discussion of growth to Chapter 22, "Unemployment, Inflation, and Long-Run Growth," and highlighted it. However, while we wrote Chapter 31, the major chapter on long-run growth, so that it can be taught before or after the short-run chapters, we remain convinced that it is easier for students to understand the growth issue once they have come to grips with the logic and controversies of short-run cycles, inflation, and unemployment.

## Instructor Teaching Resources

The instructor supplements are designed to make teaching and testing flexible and easy and are available for *Micro*, *Macro*, and *Economics* volumes.

This program comes with the following teaching resources:

| Supplements available to instructors at <a href="http://www.pearsonglobaleditions.com">www.pearsonglobaleditions.com</a> | Features of the Supplement   |
|--|--|
| <b>Instructor's Manual</b><br>authored by Tony Lima of California State University, East Bay                             | <ul style="list-style-type: none"> <li>• Detailed Chapter Outlines include key terminology, teaching notes, and lecture suggestions.</li> <li>• Topics for Class Discussion provide topics and real-world situations that help ensure that economic concepts resonate with students.</li> <li>• Unique Economics in Practice features that are not in the main text provide extra real-world examples to present and discuss in class.</li> <li>• Teaching Tips provide tips for alternative ways to cover the material and brief reminders on additional help to provide students. These tips include suggestions for exercises and experiments to complete in class.</li> <li>• Extended Applications include exercises, activities, and experiments to help make economics relevant to students.</li> <li>• Solutions are provided for all problems in the book.</li> </ul> |
| <b>Test Bank</b><br>authored by Randy Methenitis of Richland College and Richard Gosselin of Houston Community College   | <ul style="list-style-type: none"> <li>• Multiple-choice, true/false, short-answer, and graphing questions with these annotations:</li> <li>• Difficulty level (1 for straight recall, 2 for some analysis, 3 for complex analysis)</li> <li>• Type (Multiple-choice, true/false, short-answer, essay)</li> <li>• Topic (The term or concept the question supports)</li> <li>• Learning outcome</li> <li>• AACSB learning standard (Written and Oral Communication; Ethical Understanding and Reasoning; Analytical Thinking; Information Technology; Interpersonal Relations and Teamwork; Diverse and Multicultural Work; Reflective Thinking; Application of Knowledge)</li> </ul>  |
| <b>Computerized TestGen</b>  | TestGen allows instructors to: <ul style="list-style-type: none"> <li>• Customize, save, and generate classroom tests</li> <li>• Edit, add, or delete questions from the Test Item Files</li> <li>• Analyze test results</li> <li>• Organize a database of tests and student results.</li> </ul>   |
| <b>PowerPoints</b><br>authored by Jim Lee of Dickinson State University  | <ul style="list-style-type: none"> <li>• Slides include all the graphs, tables, and equations in the textbook.</li> </ul>  |

## Acknowledgments

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We also owe a debt of gratitude to those who reviewed and checked the 13<sup>th</sup> edition for accuracy. They provided us with valuable insight as we prepared this edition and its supplement package.

## Reviewers of the 13<sup>th</sup> Edition

Tom Beveridge, Durham Technical Community College  
 Mike Brandl, Ohio State