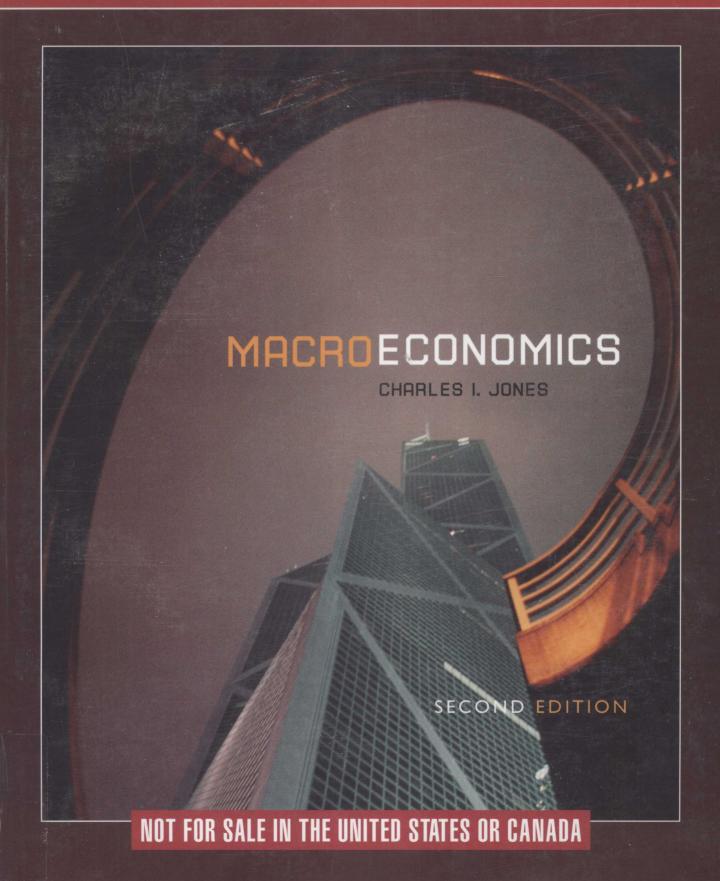
International Student Edition

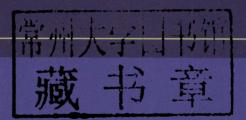


MACROECONOMICS

Second Edition

Charles I. Jones

Stanford University, Graduate School of Business





W. W. NORTON & COMPANY

W. W. Norton & Company has been independent since its founding in 1923, when William Warder Norton and Mary D. Herter Norton first published lectures delivered at the People's Institute, the adult education division of New York City's Cooper Union. The firm soon expanded its program beyond the Institute, publishing books by celebrated academics from America and abroad. By mid-century, the two major pillars of Norton's publishing program—trade books and college texts—were firmly established. In the 1950s, the Norton family transferred control of the company to its employees, and today—with a staff of four hundred and a comparable number of trade, college, and professional titles published each year—W. W. Norton & Company stands as the largest and oldest publishing house owned wholly by its employees.

Copyright © 2011, 2010, 2008 by W. W. Norton & Company All rights reserved Printed in the United States of America

Editor: Jack Repcheck

Developmental Editor: Susan Gaustad Managing Editor, College: Marian Johnson

Project Editor: Melissa Atkin

Production Manager: Christopher Granville Copyeditors: Richard Mickey, Carol Flechner

Emedia Editor: Dan Jost

Editorial Assistant: Jason Spears

Art Director: Rubina Yeh Artist: John McAusland Designer: Lissi Sigillo

Composition: Matrix Publishing Services Manufacturing: Courier Companies

Library of Congress Cataloging-in-Publication Data

Jones, Charles I. (Charles Irving)

Macroeconomics/Charles I. Jones.—2nd ed.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-393-93423-6 (hardcover)

1. Macroeconomics. I. Title.

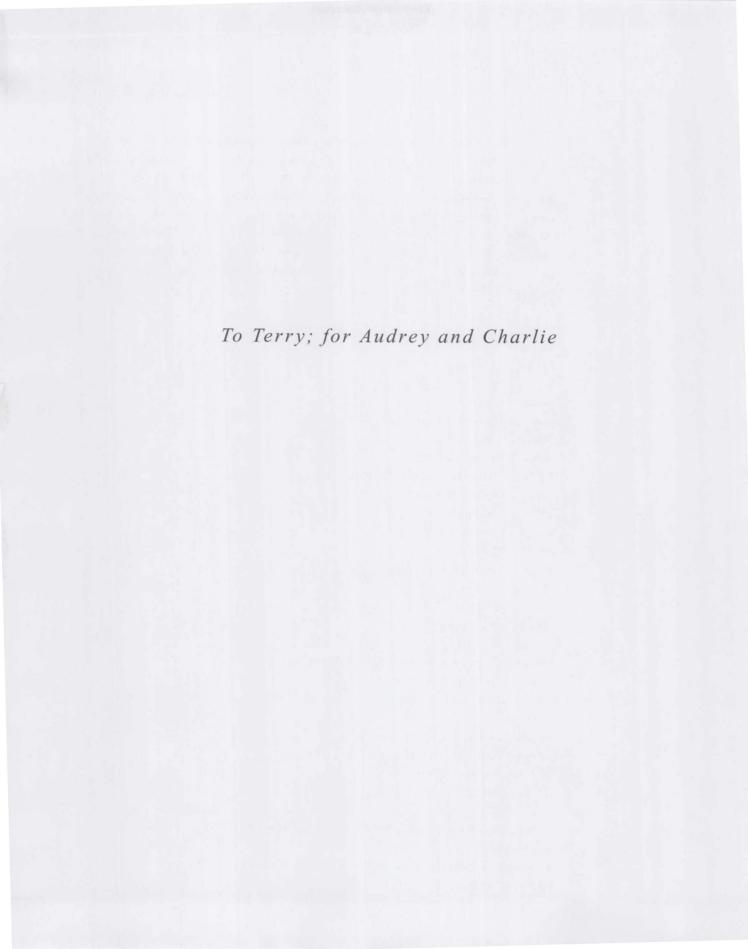
HB172.5.J65 2011

339—dc22

W. W. Norton & Company, Inc., 500 Fifth Avenue, New York, NY 10110 wwnorton.com

W. W. Norton & Company Ltd., Castle House, 75/76 Wells Street, London W1T 3QT 1 2 3 4 5 6 7 8 9 0

2010041083



PREFACE TO THE SECOND EDITION

he macroeconomic events of the last several years are truly breathtaking—a once-in-a-lifetime (we hope) occurrence. While the basics of how economists understand the macroeconomy remain solid, the global financial crisis and the Great Recession take us into waters that, if not uncharted, at least haven't been visited in recent decades. The remarkable collapse in housing prices, the large rise in the financial risk premium, the massive expansion of the Federal Reserve's balance sheet, and the global nature of the financial crisis are among the novel changes in the macroeconomy.

It was just last year that we published the "Economic Crisis Update" to the first edition, introducing two new chapters to address the financial crisis and the global recession that ensued. But the rest of the text was untouched. This second edition features revisions throughout the text, including updates to the two chapters on the Great Recession, two entirely new chapters on consumption (Chapter 15) and investment (Chapter 16), many new case studies and exercises, extensive updates to tables and figures to reflect the most current data, and improvements on nearly every page in the text.

It is a fascinating time to study macroeconomics, and I look forward to sharing astounding facts about the macroeconomy with you and to discussing the Nobel-caliber ideas that help us understand them.

1. Innovations

(This section will make the most sense to readers with some familiarity with macroeconomics, especially instructors. Students new to the subject might skip to the Guided Tour.)

The most popular textbooks for teaching intermediate macroeconomics were first written fifteen or twenty years ago. Our understanding of the macroeconomy has improved substantially since then. This textbook provides an accessible and yet modern treatment. Its order and structure will feel familiar to instructors, but the execution, examples, and pedagogy have been updated to incorporate the best that macroeconomics instruction has to offer.

What's special about this book? Innovations occur throughout, but the key ones are described below.

Two Chapters on the Great Recession

The global financial crisis and the Great Recession that followed are obviously the most important macroeconomic events in decades. While these events are discussed throughout the section of the book devoted to the short-run, two chapters explicitly focus on recent events. Chapter 10 (The Great Recession: A First Look) follows immediately after the fist introductory chapter on the short-run, exposing students to the facts of the last several years and to critical concepts like leverage, balance sheets, and securitization. Chapter 14 (The Great Recession and the Short-Run Model) is the last chapter of the short-run section of the book. It provides a detailed application of the short-run model to recent events, explaining in the process the unconventional aspects of monetary and fiscal policy that have been featured prominently in the government's response to the crisis.

Rich Treatment of Economic Growth

Economic growth is the first major topic explored in the book. After an overview chapter describes

the facts and some tools, Chapter 4 presents a (static) model based on a Cobb-Douglas production function. Students learn what a model is with this simple structure, and they see it applied to understanding the 50-fold differences in the per capita GDP that we see across countries. Chapter 5 presents the Solow model but with no technological change or population growth—which simplifies the presentation. Instead, students learn Robert Solow's insight that capital accumulation cannot serve as the engine for long-run economic growth.

Chapter 6 then offers something absent in most other intermediate macro books: a thorough exposition of the economics of ideas and Paul Romer's insight that the discovery of new ideas can drive long-run growth.

The approach taken here is to explain the macroeconomics of the long run before turning to the short run. It is much easier to understand fluctuations in macroeconomic aggregates when one understands how those aggregates behave in normal times.

Familiar Yet Updated Short-Run Model

The "modern" version of the short-run AS/AD model is the crowning achievement of the short-run section. By modern, I mean several things. First and foremost, the AS/AD graph is drawn with inflation on the vertical axis rather than the price level—perfect for teaching students about the threat of deflation that has reared its head following the Great Recession, the Volcker disinflation, and the Great Inflation of the 1970s. All the short-run analysis—including explicit dynamics—can be performed in this single graph.

Another innovation in getting to the AS/AD framework is a focus on interest rates and the absence of an LM curve. The central bank sets the interest rate in Chapter 12. Chapter 13 introduces a simple version of John Taylor's monetary policy rule to get the AD curve.

A final innovation in the short-run model is that it features an open economy from the start. Business cycles in the rest of the world are one source of shocks to the home economy. To keep things simple, however, the initial short-run model does not include exchange rates.

Interplay Between Models and Data

A tight connection between models and data is a feature of modern macroeconomics, and this connection pervades the book. Many exercises ask students to work with real data. Some of this is available in the book itself; some is obtained by using the online *Economic Report of the President*; and some is available in a new data tool I've put together: Country Snapshots. This is a pdf file available from www.norton.com/college/econ/macroeconomics2/snapshots.aspx that contains a page of graphs for each country in the world. The data underlying the graphs can be obtained as a spreadsheet simply by clicking on a link at the top of each page.

Worked Exercises at the End of Each Chapter

One of the most effective ways to learn is by working through problems, and a carefully chosen collection of exercises is included at the end of each chapter. From among these, one or two are selected and worked out in detail. Students are encouraged to attempt these exercises on their own before turning to the full solution.

More Emphasis on the World Economy

Relative to many intermediate macro books, this text features more emphasis on the world economy. This occurs in three ways. First, the longrun growth chapters are a main emphasis in the book, and these inherently involve international comparisons. Second, the short-run model features an open economy (albeit without exchange rates) from the very beginning. Finally, the book includes two international chapters in Part 4: in addition to the standard international finance chapter that appears as Chapter 19, Chapter 18 is entirely devoted to international trade.

Better Applications and Microfoundations

Part 4 includes five chapters of applications and microfoundations. The basic structure of this part is traditional; there is a chapter for each component of the national income identity: consumption, investment, the government, and the international economy. However, the material inside this part is modern and novel. For example, the

consumption chapter (Chapter 15) is centered around the famous Euler equation that lies at the heart of today's macroeconomics. The investment chapter (Chapter 16) highlights the strong parallels between investment in physical capital and financial investments in the stock market, using the "arbitrage equation" approach. The chapter on the government and the macroeconomy (Chapter 17) includes an application to what I call "The Fiscal Problem of the Twenty-First Century"—how to finance the growing expenditures on health care. And, as mentioned above, the international section features two chapters, one on international trade and one on international finance. These chapters are not essential, and some instructors may wish to skip one or both of them depending on time constraints.

A Guided Tour

The book consists of three main parts: The Long Run, The Short Run, and Applications and Microfoundations. Surrounding these are an introductory section (Preliminaries) and a concluding chapter (Parting Thoughts).

This organization reflects an increasing appreciation in the profession of the importance of longrun macroeconomics. In addition, it makes sense from a pedagogical standpoint to put the long run first: this way students understand what it is that the economy fluctuates around when we get to the short-run chapters.

A brief overview of each part follows.

Part 1: Preliminaries

We begin with an overview of macroeconomics: what kind of questions macroeconomics addresses and how it goes about its business. A second chapter then discusses the data of macroeconomics in more detail, with a focus on national income accounting.

Part 2: The Long Run

The second part of the book consists of Chapters 3 through 8, and these chapters consider the macroeconomy in the long run. Chapter 3 presents an overview of the facts and tools that economists use to study long-run macroeconomics, with special

attention to economic growth. Chapter 4 introduces the Cobb-Douglas production function as a way to understand the enormous differences in standards of living that we see across countries. The interplay between theory and data that is central to macroeconomics makes a starring appearance in this chapter.

Chapter 5 considers the Solow model of economic growth, one of the workhorse models of macroeconomics. We study the extent to which the Solow model can help us understand (a) why some countries are rich while others are poor, and (b) why people in the advanced countries of the world are so much richer today than they were a hundred years ago. Somewhat to our surprise, we will see that the model does not do a good job of explaining long-run economic growth.

For this explanation, we turn in Chapter 6 to the Romer model, which emphasizes the role played by the discovery of new ideas. Thinking about the economics of ideas leads to profound changes in the way we understand many areas of economics.

Chapter 7 studies the most important market in modern economies, the labor market. We learn about the determination of the unemployment rate in the long run and discover that many readers of this book are already, in some sense, millionaires.

Chapter 8 concludes the long-run portion of the book by considering inflation. The quantity theory of money provides a long-run theory of inflation, which, according to Milton Friedman, occurs because of "too much money chasing too few goods."

Part 3: The Short Run

Part 3 is devoted to the branch of macroeconomics that students are probably most familiar with: the study of booms, recessions, and the rise and fall of inflation in the short run. The five chapters of this part form a tight unit that develops our short-run model and applies it to current events.

Chapter 9 provides an overview of the macroeconomy in the short run, summarizing the key facts and providing an introduction to the shortrun model that will explain these facts. Chapter 10 provides a "first look" at the financial crisis and the Great Recession, carefully laying out the facts of how the crisis evolved and introducing the important concepts of "leverage" and "balance sheets."

The next three chapters then develop the short-run model. Chapter 11 introduces the IS curve, a key building block of the short-run model. The IS curve reveals that a fundamental determinant of output in the short run is the real interest rate. Chapter 12 shows how the central bank in an economy can move the interest rate in order to keep the economy close to full employment. Chapter 12 also provides the link between the real economy and inflation, called the Phillips curve.

Chapter 13 looks at our short-run model in an aggregate supply/aggregate demand (AS/AD) framework. This framework allows the complete dynamics of the economy in the short run to be studied in a single graph. Using this framework, the chapter emphasizes the key roles played by expectations, credibility, and time consistency in modern macroeconomic policymaking.

Chapter 14 culminates the short-run section of the book. It uses the short-run model to help us understand the financial crisis and the Great Recession and discusses the macroeconomic prospects going forward.

Part 4: Applications and Microfoundations

Part 4 includes five chapters of applications and microfoundations. While it may be unapparent to the student new to macroeconomics, the organization of these chapters follows the "national income identity," a concept discussed early in the book. These chapters include a number of important topics. For example, Chapter 15 studies how individuals make their lifetime consumption plans. Chapter 16 considers the pricing of financial assets, such as stocks and houses, in the context of a broader chapter on investment.

Chapter 17 studies the role played by the government in the macroeconomy, including the role of budget deficits and the government's budget constraint. The chapter also considers a key problem that governments around the world will face in coming decades: how to finance the enormous increases in health spending that have occurred for the last fifty years and that seem likely to continue.

Both the long-run and the short-run parts of

the book place the study of macroeconomics in an international context. Indeed, the short-run model includes open economy forces from the very beginning. The final two applications of the book, however, go even farther in this direction.

Chapter 18 focuses on international trade. Why do countries trade? Are trade deficits good or bad? How have globalization and outsourcing affected the macroeconomy? Chapter 19 studies international finance, including the determination of the exchange rate.

Parting Thoughts

Chapter 20 concludes our study of macroeconomics. We summarize the important lessons learned in the book, and we offer a brief guide to the key questions that remain less than well understood.

Learning Aids

- Overview: The opening page of each chapter provides an overview of the main points that will be covered.
- *Boxes around key equations*: Key equations are boxed to highlight their importance.
- Graphs and tables: The main point of each figure is summarized in an accompanying text box. Tables are used to summarize the key equations of a model.
- Guide to notation: The inside back cover contains a guide to notation, listing each symbol, its meaning, and the chapter in which it first appears.
- *Case studies*: Case studies in each chapter highlight items of interest.
- Chapter summaries in list form: The main points of each chapter are listed for easy reference and review.
- *Key concepts*: Important economic concepts are presented in bold type when they first appear. At the end of the chapter, they are listed together for review.
- Review questions: Review questions allow students to quiz themselves on what they've learned.
- Exercises: Carefully chosen exercises reinforce the material from the chapter

and are intended to be used for homework assignments. These exercises include many different kinds of problems. Some require graphical solutions, others use numbers. Some ask you to look for economic data online and interpret it in a particular way. Others ask you to write a position paper for a presidential candidate or to pretend you are advising the chair of the Federal Reserve.

- Worked exercises: From the exercises, one or two are selected and worked out in detail at the end of each chapter. These exercises are indicated by the "worked exercise" icon in the margin. You will find these answers most helpful if you consult them only after you have tried to work through each exercise on your own.
- Glossary: An extensive glossary at the end of the book defines terms and provides page numbers where more information can be found.

Supplements for Students

Student Studyspace

David Agrawal, University of Michigan www.wwnorton.com/college/econ/ macroeconomics2/

The student StudySpace for Macroeconomics is a free and open resource for students to review key concepts and test themselves prior to midterms and finals. It contains a link to the SmartWork homework problems.

The StudySpace offers the following features:

- Chapter Outlines
- Quiz+ Assessment: Quiz+ presents students with a targeted study plan that offers specific page references, links to the ebook, and other online learning tools.
- Interactive Graphs: interactive versions of the graphs presented in the text
- Data Plotter: a set of tools to compare and contrast real economic data to better understand trends and concepts related to data models
- Interactive Concept Tutorials: These interactive tutorials provide students with

the extra help they need to learn the most challenging concepts in the course, and they offer opportunities for students to demonstrate critical-thinking skills and comprehension to their instructors.

- Short-Answer Review Questions
- An Economics in the News RSS feed

COUNTRY SNAPSHOTS

www.wwnorton.com/college/econ/ macroeconomics2/snapshots.aspx

To accompany the book, I've put together a resource containing data from more than 200 countries. Each page of the file snapshots.pdf corresponds to a country and provides graphs of that country's key macroeconomics statistics. Moreover, the data underlying the graphs can be obtained as a spreadsheet simply by selecting a link at the top of each page. Whenever you read about a particular country in the newspaper or in this book, detailed macroeconomics statistics are only a click away.

Supplements for Instructors

SmartWork

Online Homework and Tutorial Program with an Integrated Ebook.

Developed by university educators, SmartWork is the most intuitive online tutorial and homeworkmanagement system available for the intermediate macroeconomics course. The powerful assessment engine supports a wide range of questions, including multiple-choice, interactive graphing, and macroeconomics equations.

Answer-specific feedback, tutorial questions, and hints coach students through solving problems, while links to the integrated ebook encourage active reading and provide easy reference to the concepts discussed in the text. Assigning, editing, and administering homework is easy with SmartWork's intuitive authoring tools, which allow instructors to modify existing problems or create their own.

Completely revised and updated, the new Smart-Work course for Macroeconomics Second Edition features new homework questions, more worked solutions, additional answer-specific feedback, and more algorithmically-generated questions. The entire SmartWork system has been updated with an improved user interface that is more intuitive for both instructors and students.

SmartWork highlights:

- An intuitive and easy-to-use interface with extensive hinting and answer-specific feedback, including multistep guided tutorial problems
- A wide range of question types, including interactive graphs, multiple-choice questions, and economics equations
- Intuitive authoring tools that give instructors an easy-to-use environment for modifying existing problems or creating their own
- An easy-to-use math palette for composing graphs and mathematical expressions
- Algorithmically generated variables so each student sees a slightly different version of the same problem
- An at-a-glance gradebook that offers a visual summary of students' work
- A full complement of tools for managing assignments and grades

Lecture PowerPoints

This set of PowerPoint slides includes every graph and table from the text, along with insightful annotations and suggestions for lecture content. It also contains PowerPoint slides covering each key concept presented in the chapter, thus providing a lecture-ready resource for the instructor.

Instructor's Resouce Site

Downloadable resources will include the test bank in rich-text, Blackboard, and ExamView formats, graphs in jpeg format and as PowerPoints, lecture PowerPoints, and chapter quizzes in WebCT and Blackboard format.

Instructor's Manual

Anthony Laramie, Boston College, with contributions from Pavel Kapinos, Carleton College, and Kenneth Kuttner, Williams College

This valuable instructor's resource includes for each chapter an overview, a suggested approach to the chapter lecture, expanded case studies, additional case studies, and complete answers to the end-of-chapter problems. Updated for the second edition, the instructor's manual now includes numerical examples and simulations, as well as Excel-based problems that will make an excellent supplement to any lecture.

Test Bank

Robert Sonora, Fort Lewis College, with contributions from Todd Knoop, Cornell College, and Dietrich Vollrath, University of Houston

Available on CD-ROM or for download in richtext, Blackboard Learning System, and *Exam-View® Assessment Suite* formats, the updated test bank includes over 1,800 carefully constructed true/false and multiple-choice questions. And, new for the second edition, over 100 short answer/numerical questions.

ACKNOWLEDGMENTS

This book could not have been written without the tremendous support, encouragement, and assistance that I have received from many people. I am especially grateful to my colleagues in the economics profession for many insights, comments, and suggestions for improving the manuscript:

David Aadland

University of Wyoming

Yamin S. Ahmad

University of Wisconsin, Whitewater

Ehsan Ahmed

James Madison University

Francisco Alvarez-Cuadrado

McGill University

William Bennett Loyola University

Jules van Binsbergen Stanford University

Peter Bondarenko
University of Chicago

Ronald Britto

Ringhamton SUNY

Binghamton, SUNY
Robin Burgess

London School of Economics

Miki Brunyer

West Virginia University

Colleen M. Callahan *American University*

Gabriele Camera

Purdue University

Tiago Cavalcanti Purdue University

Betty C, Daniel *University of Albany, SUNY*

Steven Davis

University of Chicago, Booth School

of Business

A. Edward Day

University of Texas, Dallas

Robert J. Derrell

Manhattanville College

Robert A. Driskill Vanderbilt University

Ryan Edwards

Queens College, CUNY

J. Peter Ferderer Macalester College

John Fernald

Federal Reserve Bank of San

Francisco

Edward N. Gamber Lafayette College

David H. Gillette

Truman State University

Pierre-Olivier Gourinchas

University of California, Berkeley

Kristin Harnett

Univeristy of Pittsburgh

William R. Hauk, Jr. Washington University

Williams Hawkins

University of Rochester

Denise Hazlett Whitman College

Ryan Herzog Gonzaga University

Christopher L. House *University of Michigan*

Chang-Tai Hsieh

University of Chicago, Booth School of Business

Murat F. Iyigun

University of Colorado, Boulder

Garett B. Jones

George Mason University

Louis D. Johnston

College of Saint Benedic/ Saint John's University

Oscar Jorda

University of California, Davis

Pavel Kapinos, Carleton College Cem Karayalcin

Florida International University

John W. Keating Kansas University

Manfred Keil

Claremont McKenna College

Young Se Kim

University of North Texas

Miles Kimball

University of Michigan

Pete Klenow Stanford University

Ken Kletzer

University of California, Santa Cruz

Todd Knoop Cornell College

Per Krusell

Princeton University

Corinne M. Krupp Duke University

James Kwak

Baseline Scenario

George Langelett

South Dakota State University

Man-Lui Lau

University of San Francisco

Junsoo Lee

University of Alabama

Dennis Patrick Leyden

University of North Carolina,

Greensboro

Shu Lin

University of Oklahoma

Stephen A. McCafferty *Ohio State University*

Ken McCormick

University of Northern Iowa

Ted Miguel

University of California, Berkeley

Fabio Milani

University of California, Irvine

Jenny A. Minier *University of Kentucky*

Sergey Mityakov Clemson University Bruck M. Mizrach Rutgers University

John A. Neri

University of Maryland
Phacharaphot Nuntramas
San Diego State University

Ann Owen

Hamilton College

Christakis Papageorgiou Louisiana State University

Bruce Preston Gérard Roland

University of California, Berkeley

David Romer

University of California, Berkeley

Paul Romer

Stanford University

Benjamin Russo

University of North Carolina,

Charlotte

John E. Sabelhaus

Congressional Budget Office and University of Maryland

Dean Scrimgeour

Colgate University
Mark V. Siegler

California State University,

Sacramento

Robert I. Sonora

Fort Lewis College

Eric Swanson

Federal Reserve Bank of San

Francisco

Kevin F. Sylwester

Southern Illinois University

Timothy D. Terrell

Wofford College

Victor J. Valcarcel
Texas Tech University

Dietrich Vollrath

University of Houston

Andre Watteyne

Katholieke Universiteit Leuven

John Williams

Federal Reserve Bank of San

Francisco

Wei Xiao

University of New Orleans

Steven Yamarik

Tufts University

Several research and teaching assistants helped in many ways, including David Agrawal, Mark Borgschulte, Dean Scrimgeour, Josie Smith, Luke Stein, and William Vijverberg. El Lee and Tina Bernard provided excellent advice and assistance on many facets of the book.

The people at W. W. Norton & Company have been exceptionally supportive, dedicated, and thorough. For the second edition, I am once again most indebted to Jack Repcheck, my editor, for his constant enthusiasm and excellent suggestions. Melissa Atkin expertly coordinated all our efforts as managing editor and kept us solidly on track. The stellar Norton team again did a tremendous job, for which I am extremely grateful: Christopher Granville, Lorraine Klimowich, Jason Spears, and Rubina Yeh.

For the first edition, I am most grateful to Jack Repcheck, who did an outstanding job spearheading the project; I could not ask for a better editor. Marian Johnson was magnificent as managing editor. Thanks also to Susan Gaustad for her developmental editing. I would also like to thank Matt Arnold, Mik Awake, Christopher Granville, Richard Mickey, Dan Jost, John McAusland, Brian Sisco, Jason Spears, and Rubina Yeh for their excellent work. I am also extremely grateful to my colleagues who prepared the superb supplements for students and instructors: David Agrawal, Elias Aravantinos, Ryan Edwards, David Gillette, Anthony Laramie, and Robert Sonora.

Finally, I would like to thank my family, near and far, for everything.

ABOUT THE AUTHOR



CHARLES I. JONES (Ph.D. MIT, 1993) is the STANCO 25 Professor of Economics at the Stanford University Graduate School of Business and a Research Associate of the National Bureau of Economic Research. Professor Jones's main research contributions are to the study of long-run economic growth. In particular, he has examined theoretically and empirically the fundamental sources of growth in per capita income over time and the reasons underlying the enormous differences in standards of living across countries. In recent years, he has used his expertise in macroeconomic methods to study the economic causes of the rise in health spending and longevity. He is the author of *Introduction to Economic Growth*, Second Edition, also published by W. W. Norton & Company.

BRIEF CONTENTS

PART 1 PRELIMINARIES

- 1 Introduction to Macroeconomics 4
- 2 Measuring the Macroeconomy 18

PART 2 THE LONG RUN

- 3 An Overview of Long-Run Economic Growth 40
- 4 A Model of Production 66
- 5 The Solow Growth Model 97
- 6 Growth and Ideas 132
- 7 The Labor Market, Wages, and Unemployment 170
- 8 Inflation 198

PART 3 THE SHORT RUN

- 9 An Introduction to the Short Run 226
- 10 The Great Recession: A First Look 247
- 11 The IS Curve 269
- 12 Monetary Policy and the Phillips Curve 299
- 13 Stabilization Policy and the AS/AD Framework 334
- 14 The Great Recession and the Short-Run Model 373

PART 4 APPLICATIONS AND MICROFOUNDATIONS

- 15 Consumption 402
- 16 Investment 425
- 17 The Government and the Macroeconomy 452
- 18 International Trade 476
- 19 Exchange Rates and International Finance 502
- 20 Parting Thoughts 534

CONTENTS

Preface xix

Acknowledgments xxv

About the Author xxix

PART 1 PRELIMINARIES

- 1 Introduction to Macroeconomics 4
 - 1.1 What Is Macroeconomics? 5
 - 1.2 How Macroeconomics Studies Key Questions 9
 - 1.3 An Overview of the Book 11
 The Long Run 12
 The Short Run 12
 Issues for the Future 13

Summary 14
Key Concepts 14
Review Questions 15
Exercises 15
Worked Exercises 17

- Measuring the
 Macroeconomy 18
 - 2.1 Introduction 19
 - 2.2 Measuring the State of the Economy 19
 Production = Expenditure = Income 20
 The Expenditure Approach to GDP 21
 The Income Approach to GDP 24
 The Production Approach to GDP 25
 What Is Included in GDP and What Is Not? 26

2.3 Measuring Changes over Time 27
 A Simple Example: Where Real GDP Doesn't Change 28
 A Second Example: Where Real GDP Changes 29
 Quantity Indexes: Laspeyres, Paasche, and

Chain Weighting 29
Price Indexes and Inflation 31
Using Chain-Weighted Data 31

2.4 Comparing Economic Performance across Countries 32

Summary 34
Key Concepts 35
Review Questions 35
Exercises 35
Worked Exercises 37

PART 2 THE LONG RUN

- 3 An Overview of Long-Run Economic Growth 40
 - 3.1 Introduction 41
 - 3.2 Growth over the Very Long Run 41
 - 3.3 Modern Economic Growth 43

 The Definition of Economic Growth 43

 A Population Growth Example 45

 The Rule of 70 and the Ratio Scale 46

 U.S. GDP on a Ratio Scale 48

 Calculating Growth Rates 49
 - 3.4 Modern Growth around the World 50A Broad Sample of Countries 51
 - 3.5 Some Useful Properties of Growth Rates 54

3.6 The Costs of Econo	mic Growth 57
------------------------	---------------

- 3.7 A Long-Run Roadmap 57
- 3.8 Additional Resources 58

Summary 59 Growth Rules 60 Key Concepts 60 Review Question 60 Exercises 61 Worked Exercises 64

4 A Model of Production 66

- 4.1 Introduction 67
- 4.2 A Model of Production 68 Setting Up the Model 68 Allocating Resources 69 Solving the Model: General Equilibrium 72 Interpreting the Solution 74
- 4.3 Analyzing the Production Model 77 Comparing Models with Data 77 The Empirical Fit of the Production Model 78 Productivity Differences: Improving the Fit of the Model 82
- 4.4 Understanding TFP Differences 86 Human Capital 86 Technology 87 Institutions 87 Misallocation 89
- 4.5 Evaluating the Production Model 91

Summary 91 Key Concepts 92 Review Questions 92 Exercises 93 Worked Exercises 95

5 The Solow Growth Model 97

- 5.1 Introduction 98
- 5.2 Setting Up the Model 99 Production 99 Capital Accumulation 100 Labor 101

Investment 102 The Model Summarized 102

- 5.3 Prices and the Real Interest Rate 103
- 5.4 Solving the Solow Model 104 Using the Solow Diagram 106 Output and Consumption in the Solow Diagram 107 Solving Mathematically for the Steady State 107
- 5.5 Looking at Data through the Lens of the Solow Model 109 The Capital-Output Ratio 109 Differences in Y/L 109
- 5.6 Understanding the Steady State 111
- 5.7 Economic Growth in the Solow Model 112 Meanwhile, Back on the Family Farm 112
- 5.8 Some Economic Experiments 113 An Increase in the Investment Rate 114 A Rise in the Depreciation Rate 115 Experiments on Your Own 117
- 5.9 The Principle of Transition Dynamics 118 Understanding Differences in Growth Rates 119
- 5.10 Strengths and Weaknesses of the Solow Model 123

Summary 124 Key Concepts 125 Review Questions 125 Exercises 125 Worked Exercises 128

- 6 Growth and Ideas 132
 - 6.1 Introduction 133
 - 6.2 The Economics of Ideas 134 Ideas 134 Nonrivalry 135 Increasing Returns 136 Problems with Pure Competition 138
- 6.3 The Romer Model 141 Solving the Romer Model 144 Why Is There Growth in the Romer Model? 145 Balanced Growth 146 Experiments in the Romer Model 147 Growth Effects versus Level Effects 149 Recapping Romer 150