

INSTRUCTOR'S MANUAL

*Charles I. Jones*

# Macroeconomics

FOURTH EDITION

*Anthony Laramie*

BOSTON COLLEGE



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# CHAPTER 1

# Introduction to Macroeconomics

## CHAPTER OVERVIEW

This is a conventional first textbook chapter: it defines macroeconomics, it mentions a few interesting topics, it says what a model is, and it lays out the book's separation into Long Run, Short Run, and Applications and Microfoundations. It is quite a short chapter with few surprises, so rather than summarizing it, I will instead talk a little about what makes this book different and lay out a few different ways you can use it in your course.

## WHAT MAKES THIS BOOK DIFFERENT?

It offers solid long-run growth coverage—including endogenous growth—while simplifying the New Keynesian business cycle dramatically, and it does all this without any calculus. Chad shows how long-run macroeconomic growth models have evolved and how tweaking the assumptions of the model can lead to new and interesting insights and policy conclusions. Moreover, Chad easily deduces a short-run model from the long-run model and therefore links short-run and long-run economic analyses. By streamlining the coverage while teaching surprisingly solid microfoundations, Chad's text offers you a solid chance to spend more time on intelligent, model-driven policy discussions about growth and business cycles.

## HOW TO USE THIS TEXTBOOK

### CONVENTIONAL ONE-SEMESTER CLASS

In this day and age of assessment, we are ever conscious of what we teach, how we teach it, who our students are, what

our students learn, and how they learn. Most students who have recently had a principles course and who are comfortable with a little algebra should be able to handle Chapters 1–14 in a semester. How much time you spend on these chapters, whether you omit coverage of any of these chapters, and the nature and skill level of your students will influence your coverage of the later chapters.

Moreover, if you want to leave room for a few supplementary articles, a nontechnical book, or a major empirical project or two, then you might have to tread lightly over some of the math in the growth- and labor-market models, which are self-contained and don't directly come up again later in the semester. Advice on how to do this is given in later chapters of this manual.

This fourth edition of the book provides an innovative chapter on dynamic stochastic general equilibrium (DSGE) models. This chapter provides a bridge between long-run economic growth and short-run economic fluctuations, and it fits in nicely at the end of Part 3 of the textbook to remind us of the links between the long run and the short run. I'd recommend that you make time in the semester to include Chapter 15 as a capstone to a semester course.

### ONE-QUARTER COURSE OR ONE-SEMESTER COURSE WITH MANY OUTSIDE READINGS AND PROJECTS

Chapters 1–4 (Introduction through the basics of growth and productivity), 8–11, 15 (inflation, business cycles, and DSGE models), and two of the following: Chapters 5, 6.1–6.3, and 7; or 12–14 and 18–20.

### TWO-QUARTER COURSE OR TWO-SEMESTER COURSE

The entire book—one quarter on long-run growth, labor markets, inflation, consumption, and investment (Chapters 1–8,

16, and 17); one quarter on short-run business cycles, the Great Recession, monetary policy, the Phillips curve, fiscal policy, the aggregate demand/aggregate supply model, DSGE models, international trade, exchange rates, and international finance (Chapters 9–15, 18–21)—with enough time for a supplementary book each quarter and a few articles and data projects. This would be a great way to teach this course.

### CHAPTERS THAT MAY BE OMITTED

I include this list because instructors often want to know if they can leave out a chapter without omitting facts or theories that come back in later chapters. These chapters each build on previous chapters, but none are directly used in later chapters:

- 6 Growth and Ideas (the last growth chapter)
- 7 The Labor Market, Wages, and Unemployment
- 15 Dynamic Stochastic General Equilibrium (DSGE) Models
- 16 Consumption
- 17 Investment
- 18 The Government and the Macroeconomy
- 19 International Trade
- 20 Exchange Rates and International Finance
- 21 Parting Thoughts

In particular, the International Trade chapter (19) is independent of the Foreign Exchange chapter (20), so you can choose just one or the other depending upon your needs.

For math-averse students, Chapter 5 (Solow) may be omitted if necessary, while key parts of Chapter 6 (Growth and Ideas) may be covered without difficulty (Sections 6.1–6.3). This means instructors can still teach the economics of ideas (a largely math-free topic) yet avoid the math of the Solow model.

### HOW TO USE THIS INSTRUCTION MANUAL

Chad provides excellent summaries at the end of each chapter, and the student study guide performs much the same function. This instruction manual does something different: it is written to help you do a better job teaching with this innovative textbook.

In this manual, we walk through each chapter from beginning to end, discussing how you might approach topics that students often find troublesome—for instance, the Solow steady state, making sense of the three ways to measure gross domestic product (GDP), or what the Fisher equation really means.

Also, we sometimes recommend that you organize your lecture differently than the text does—some topics just flow together particularly well when you're up there at the chalkboard. We always try to point out which topics you can safely

gloss over or omit, and we often mention an illustration or two that might make your lectures a bit more relevant.

Every chapter in this manual also has a sample lecture that you can use, written on a topic with which students typically have a tough time. Finally, each chapter of this manual also contains a few case studies, often building on Chad's own case studies. In the case studies, we provide some additional facts or theories that might help to flesh out a lecture or provoke classroom discussion. We hope you find this manual useful in getting the most out of Charles Jones's *Macroeconomics*.

### SAMPLE LECTURE: GIVING YOU ALL THE ANSWERS UP FRONT

Of great concern to the economics profession is the economic literacy of our students. In particular, do our students really understand the subject matter or do they simply borrow an understanding for the course? One of my teaching objectives is to ensure, as much as possible, that students own an understanding of economics. To that end, I begin the introductory class with a set of unfolding questions. I start with the most basic question, What is economics? The better students respond with the textbook definition given in Principles, which is fine. But then I ask the question, Would your brother or sister, friend or parent understand that answer? Most students respond by saying no. Loosely following the late great Robert Heilbroner, I'll say that economics is the study of the economy (and I'll get a laugh) and students will relax. But then that compels the question, What is the economy? We go around on different definitions, and we work up to the point, again following Heilbroner, that the economy is a set of social institutions/relationships devised to produce and distribute goods and bads. Then we pull that definition apart (to produce—to transform nature into something useful; to distribute—to decide who gets what; the goods and the bads—things that are literally good and/or bad.)

So, the next question is, Why study economics? Because of the economic problem. What economic problem? Scarcity. What is scarcity? Not having enough resources or goods to meet needs and desires. What causes scarcity? Resource constraints inherent in nature and the process of social interaction that create wants and desires for goods. Again, via modified Heilbroner, How does a society, regardless of space and time, confront scarcity? People must be induced to work more when they want to work less; people must be induced to consume less when they want to consume more; and technology (the art of production) must be modified/improved. What economic system does most of the world use today to confront scarcity? Students will say capitalism or markets. What are markets? Markets are the process whereby buyers and sellers interact to determine prices and quantities. What two approaches do we have for studying markets? Microeco-

nomics, the study of the individual parts of the economy, and macroeconomics, the study of the economy as a whole with emphasis on factors like economic growth, economic fluctuations, unemployment, inflation, and international economic relations.

Microeconomics is rooted in the writings of Adam Smith in *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) (I like to say the full title—it sums up what most of economics is about). Smith showed that markets promote order and stability by allowing individuals to freely express self-interest through markets and that the expression of self-interest promotes the social good. (Most students will be familiar with the “invisible hand” but not familiar with its strong political implications.) Of course, if Smith is correct, then markets, as a set of institutions, become a set of goods that promote social welfare. Well, what about macroeconomics? Where did it come from?

Macroeconomics’ origins can be traced to the Great Depression, the writings of John Maynard Keynes, World War II, and the Employment Act of 1946. If anything, macroeconomics was the consequence of market failures as evidenced by the Great Depression. To illustrate the market failures, Keynes invoked fallacies of composition in reasoning, like the paradox of thrift (that wage deflation in isolation can stabilize a labor market, but wage deflation in the economy as a whole will do little to reduce unemployment and may actually destabilize the economy). Keynes’s ideas were too revolutionary to gain acceptance, but World War II taught my parents’ generation that government coordination of the economy to ensure high levels of spending and the national defense of the United States ended the Great Depression. The World War II generation, wanting to eliminate future unemployment, had the Employment Act of 1946 passed. According to this legislation, government should pursue policies to promote maximum employment, production, and purchasing power. In addition, this legislation created the Council of Economic Advisors and the Joint Economic Committee to advise the president and Congress on the economy. Subsequently, macroeconomics, along with microeconomics, became part of every core economics curriculum. Although there is little disagreement as to how to teach microeconomics, tension remains as to how to teach macroeconomics. In particular, conflict occurs over whether to emphasize the long run or the short run. Chad’s textbook gives you the flexibility of emphasizing either concept or both.

Today, the global economy continues to recover from the Great Recession—the greatest recession since the Great Depression. Clearly the emphasis in policy has shifted to the short run, but long-run concerns remain. The U.S. unemployment rate rose from 4.6 percent in 2007 to 5.8 percent in 2008 and 9.6 percent in 2010 (the year after the Great Recession officially ended); it declined from 7.4 percent in 2013 to 5.3 in 2013 and 4.9 percent in June 2016. While the financial markets have largely recovered, still fresh in the public’s

mind is that the Dow Jones Industrial stock index, along with many other stock indexes, lost 40 percent of its value in a matter of weeks; housing prices in many markets collapsed; record numbers of bankruptcies and foreclosures were recorded; banks, insurance companies, and brokerage houses became insolvent as their assets proved insufficient to cover their liabilities; and a chain of bankruptcies threatened the strength and stability of the United States and global economies. Prior to the financial crisis, the price of crude oil rose from under \$70 in August 2007 to over \$140 by July 2008. Two of the big three U.S. automakers were on the brink of bankruptcy. Unprecedented steps were taken by the Federal Reserve and the U.S. Treasury to bail out the financial sector and to save the automakers. An economic stimulus bill was passed that included tax credits for first-time homebuyers, cash for clunkers, tax cuts, and funding for so-called shovel-ready projects (to name a few). The economic stimulus bill, combined with the War on Terrorism and the downturn in the economy, subsequently increased the federal government budget deficit from around \$160 billion in 2007 to about \$460 billion in 2008 and over \$1.5 trillion in 2010 to almost \$1.4 trillion in 2011. Moreover, despite bailouts and the stimulus, we have seen the money supply (M2) grow by 8 percent in 2009, 2.5 percent in 2010, 7.3 percent in 2011, 8.5 percent in 2012, and about 6 percent in 2015. The threat of worldwide recession remains even as oil prices have collapsed, and the Federal Reserve contemplates the speed at which short-term interest rates should increase as corporate profits remain weak. Even as of this writing in 2016, the recovery remains slow and fragile, and the debate over austerity versus stimulus continues to rage (see John Cassidy, “The Reinhart and Rogoff Controversy: A Summing Up,” *New Yorker*, available at <http://www.newyorker.com/online/blogs/johncassidy/2013/04/the-rogooff-and-reinhart-controversy-a-summing-up.html>). This experience, now compounded by the Greek financial crisis, the European refugee crisis, and Brexit, has taken the economics profession by surprise and is currently causing us to reevaluate what we think about how economies work.

In this course, we’ll spend the first half of the semester talking about why some countries are richer than others and why the average person today lives so much better than someone one or two hundred years ago. A generation ago, such topics would barely have been mentioned, but with the rise of globalization, the spread of markets around the world, and a new concern about global growth prospects, a new emphasis in economics has emerged.

In the second half of the semester, we’ll talk about economic busts and booms, which economists often call the “business cycle” or “economic fluctuations.” The book’s goal is to provide a framework for understanding the nature, causes, and solutions to both short-run and long-run fluctuations.

A generation ago, the business cycle section would’ve been almost the whole course. Back then, many macroeconomists

thought they could control the overall level of GDP on a year-to-year basis. That's certainly what the textbooks taught back then. In those days, we spent the semester talking about how to control the demand for goods and services in the economy. Back then, we thought we actually *could* control things.

Today's macroeconomics is largely about teaching macroeconomists—myself and my colleagues—to be humble. We'll learn that the Federal Reserve can have an impact on the average rate of inflation. There are increases in the overall price level, but at the same time we'll see that the Federal Reserve has a limited impact on reducing the average rate of unemployment—the fraction of workers who can't find jobs. (The Federal Reserve might be able to temporarily reduce the unemployment rate below some “natural” rate but subsequently risk high inflation without any long-run reduction in the unemployment rate.)

One point to take away from the semester is this: the Federal Reserve might be able to smooth out the bumps in the road—emphasis on “might”—but it can't make the trip go any faster. For the average American to have a better standard of living in the long run, we must focus on something other than interest-rate policy.

That's why we'll spend quite a bit of time in the first half of the semester on the “supply side” of the economy: the supply of people willing to work; the supply of machines, equipment, and natural resources; and the supply of useful, practical ideas. Economists tend to think that if you have a good supply of those four things—people, machines, natural resources, and ideas—then in a market economy, those “inputs” will usually get combined to create “outputs” that we really want, like cars and movies and doctor's appointments and books and vacations and food. By spending time in the first half of the semester talking about the supply side, the hope is that when you're voting or when you're serving in government, you'll remember that how well people live doesn't depend on whether there's a *demand* for goods—as you learned in Principles or by talking with your friends, people's demands are basically unlimited. The key problem of economics is scarcity—and the miracle of long-term economic growth is that most of the things people want are a little bit less scarce each year.

### SAMPLE LECTURE: MODELS AND THEIR SOLUTIONS

In section 1.2, Chad offers the four-step approach that unifies macroeconomics: document the facts, develop a model, compare the predictions of the model with the original facts, and use the model to make additional predictions. Students in intermediate theory still can be a little uncertain and ill at ease in developing models. One possible way to make students comfortable in the process of developing models is to

remind them that central to their study in Principles was the supply and demand (the market) model. A quick review of that supply and demand model goes a long way in clearing up the vocabulary used throughout much of the text (and economics, in general). For example, describing the market model as a process whereby buyers and sellers interact to determine price and quantity provides a structural model where the buyer's behavior is modeled as a demand equation, the seller's behavior is modeled as a supply equation, and the model of solved is by specifying an equilibrium equation, that is, in general functional form (an idea that is good to introduce early on) where demand is  $Q_d = Q_d(P, \text{NPDs})$ , supply is  $Q_s = Q_s(P, \text{NPDs})$  (where the NPDs = the relevant nonprice determinants of demand or supply and where an example or two of the respective NPDs quickly refreshes students' memories), and where equilibrium is  $Q_d = Q_s$ . After specifying the model, remind students that the model has to be signed (and explain what that means)—putting a “–” under “P” in the demand equation and a “+” under P in the supply equation—meanwhile explaining what the signs mean. A quick graph illustrates the equilibrium solution; the equilibrium price and quantity are shown as endogenous variables; and the NPDs are the exogenous variables that determine equilibrium levels. As a further example, you might consider moving the market analysis into specific functional form, where  $Q_d = a - bP$  and  $Q_s = \alpha + \beta P$ , the NPDs are reflected in the slope and intercept parameters, and the equilibrium price and quantities are  $P^* = (a - \alpha)/(b + \beta)$  and  $Q_d^* = a - bP^*$  and  $Q_s^* = \alpha + \beta P^*$ . Students quickly learn that much of what they were doing in principles is nicely summarized in Figure 1.6: the parameters/exogenous variables determine the solutions to the endogenous variables, equilibrium price, and quantity, and tweaking those parameters/exogenous variables modifies the solutions to the models.

### CASE STUDY: HOW MUCH WOULD YOU PAY TO GET RID OF RECESSIONS?

Given that the U.S. economy has just emerged from the so-called Great Recession and is perhaps teetering on the brink of another recession, Nobel Prize–winner Robert Lucas's question, How much would you pay to get rid of recessions? remains apropos. Lucas's answer to this question was, “Not much.”

As is well described in “After the Blowup” by John Cassidy (*New Yorker*, January 11, 2010), Lucas won the Nobel Prize, in part, for reinventing the notion that markets are self-regulating. So Lucas's answer is not surprising. Lucas noticed that consumer spending—the part of our incomes we use to buy happiness—doesn't really change that much for the average person from year to year. It only fluctuates from year to year by about 1.5 percent (aside: that's the standard deviation of real consumption) for the average person. There's



a strong annual upward trend of about 2 percent, but around that trend there's a small wiggle, averaging about 1.5 percent per year.

So how much would you, personally, be willing to pay for an insurance policy that promised that you'd never risk those 1.5 percent up-and-down shocks to your consumer spending?

Lucas ran some estimates and found that the average person would be willing to pay about 0.06 percent per year for an insurance policy like that. For a person earning \$50,000 per year, it would cost \$30 annually to guarantee a steady growth in his or her standard of living. Even when considering that it is hard to buy goods when you lose your job—you just might not be able to borrow the money to put food on the table—he found that in the United States, unemployment insurance benefits are usually good enough that the average person still wouldn't want to pay a lot for insurance to get rid of his or her consumption risk. This suggests that modern unemployment insurance is pretty good insurance already.

Quite possibly, the average poor person in the United States would pay more than \$30 per year for that kind of insurance policy. For poorer people, every dollar counts more. But Lucas was trying to come up with an *average* estimate of how much the *typical* American would pay to get rid of business cycles. And he just couldn't find a way to make that number look big.

Economists David Romer and Lawrence Ball<sup>1</sup> think that Lucas is missing the point entirely. They think that the big cost of economic fluctuations isn't the fact that you can't go to restaurants as often during a recession but that you might not have a job. They've run some estimates based on what they think the average person is like and they find that economic fluctuations have a much higher cost than Lucas believes. They agree that the average person doesn't get hit hard on the consuming side during a recession, but they think that people really don't like going in and out of the workforce. They find that people would rather work a steady 40-hour week than work 45 hours most of the time with some random layoffs thrown in. And of course, surveys and common sense do show that people hate being out of work.

Over the course of fifty years, the economics profession has gone from the notion that business cycles could be tamed (Samuelson and the Keynesians) to the ideas of Lucas and others that markets are self-regulating and that government intervention has ill or nil effects. In light of current events, you will be challenged throughout this course with questions regarding what should be done to end recessions and reduce unemployment.

For a nice review of the current debate, see the aforementioned *New Yorker* article.

1. Laurence Ball and David Romer, "Real Rigidities and the Non-neutrality of Money," *Review of Economic Studies* 57, no. 2 (April 1990): 183–203.

## CASE STUDY: THE OECD REPORT ON INCOME INEQUALITY AND ECONOMIC GROWTH

Chad, in section 1.1, examines some of the big questions in macroeconomics. Some students might be wondering where income inequality fits into macroeconomics, as, in recent years, the issue of income inequality has risen to the forefront of both political and economic discussions. A good primer on this topic can be found in the report published in December 2015 by the OECD, *Income Inequality: The Gap Between Rich and Poor* (see: <http://www.oecd.org/social/income-inequality-9789264246010-en.htm>). In section 4.1 of the report, a summary of what economists "think about inequality is provided." First, the Kuznets hypothesis is discussed. Economic growth, through industrialization and the development specializations, raises living standards above the subsistence levels and generates ever-widening gaps in the income distribution that are then moderated by redistributive fiscal policies. With economic development, over time, inequality is expected to rise and then fall. However, in looking back over the last 100 years or so, as economies have developed, inequality has fallen, then increased. Second, in attempting to provide a link between economic growth and inequality, a "complex and dynamic" relationship is considered that depends upon (where Sara Voitchovsky's insights are mentioned) how different income groups behave and how different income groups interact. For example, inequality affects how the poor invest in education, how the middle class demand goods and services, or how the rich save and investment and alter the direction of public investment or services. Inequality also affects the way groups interact by altering trust (which impacts transaction costs), social capital (creating insider and outsider networks), social unrest (increasing governance costs), and volatility (generating sudden policy shifts). In short, the report hedges on the issue of income equality, arguing that inequality is the by-product of an incentives-driven process that stimulates growth while recognizing the rising income inequality can generate underinvestment in education and skills, as, for example, evidenced in the decline in numeracy skills of low-income people as income inequality increases. The OECD suggests that the solution to the dual problem of growth and income inequality is a radical rethink of the educational process: providing more equal and meaningful educational opportunity to the poor.

### REVIEW QUESTIONS

1–3. Based on personal preference.

4. Ingredients: Inputs, the model itself, and outputs. We can call these "exogenous variables," "equations or words," and "endogenous variables," respectively. The best short summary of the power of models is Robert Lucas's speech "What Economists Do." It is available widely on the Web.

This is possibly his best line: “I’m not sure whether you will take this as a confession or a boast, but we are basically storytellers, creators of make-believe economic systems.” Lucas explains that if you want to be a matter-of-fact person who understands how the world works, you actually need to be creative and imaginative.

## EXERCISES

1–2. Based on personal preference.

3. (a) From [www.stanford.edu/~chadj/snapshots.pdf](http://www.stanford.edu/~chadj/snapshots.pdf) (data is available through 2010):

Ethiopia: 1.9 percent  
India: 8.9 percent  
Mexico: 28.5 percent  
Japan: 75.6 percent

(b) Botswana’s per capita growth rate between 1960 and 2010 was about 6.07 percent. China’s per capita growth rate was somewhere between 4.38 percent (as reported on “Snapshots,” from 1953 to 2010) and about 6.02 percent (between 1960 and 2010, if calculated from the data provided by Chad on the related Excel spreadsheet).

(c) Population as of 2010, biggest to smallest: USA (313.7 million), Indonesia (242.3 million), Brazil (196.7 million), Nigeria (162.5 million), Bangladesh (156.5 million), Russia (148.2 million).

(d) Government purchases are larger in poor countries, while investment expenditures are higher in rich countries.

(e) Although there are many exceptions, it appears that money in poorer countries has less value per unit compared to rich countries. This is largely because some poor countries have a history of high inflation, so that one unit of their currency becomes worth very little compared to the dollar. High inflation is rare in rich countries and much more common in poor countries.

4. Based on personal preference.

5. This is a worked exercise. Please see the text for the solution.

6. (a)  $\bar{a}$  tells us how the quantity of labor supplied responds to wages. Informally, it tells us how sensitive workers are to wages when deciding how much to work.

(b) This is the same as in 5: quantity of labor supplied, quantity of labor demanded, equilibrium labor supply, and

the wage. (Of course, you could just collapse this to equilibrium labor supply and equilibrium wage without losing much interest.)

$$(c) \quad w^* = (\bar{f} - \bar{\ell}) / (1 + \bar{a}) \\ L^* = (\bar{f} - w^*)$$

Now might be a good time to review the importance of the associative rule—students often forget about the importance of parentheses when doing algebra.

(d) If  $\bar{\ell}$  increases, the wage falls, and the equilibrium quantity of labor increases. This is just what we expect: the labor supply increased exogenously, and workers were willing to work the same hours at a lower wage. In equilibrium, firms decided to hire more workers at a new, lower wage.

(e) This is an increase in demand: the quantity and wage of labor will both rise in equilibrium. The wage rises a bit, to which workers respond by supplying more labor.

7. (a)  $Q^D$  = demand for computers =  $F(P, \bar{X})$

$\bar{X}$  is exogenous and captures consumers’ understanding of how to use computers.

$Q^S$  = supply of computers =  $G(P, \bar{Y})$

$\bar{Y}$  is exogenous and captures the manufacturing skill of the computer industry.

In equilibrium  $Q^S = Q^D = Q^*$ , so this model is really two equations and two variables. If the demand and supply functions are straight lines, then there must be a unique solution.

(b)  $Q^D$  = demand for classical music =  $F(P, \bar{X})$

$\bar{X}$  is exogenous and captures consumers’ interest in classical music.

$Q^S$  = supply of classical music =  $G(P, \bar{Y})$

$\bar{Y}$  is exogenous and captures the technology for recovering and cleaning up old classical music recordings.

(c)  $Q^D$  = demand for dollars =  $F(P, \bar{X})$

$\bar{X}$  is exogenous and captures the domestic and foreign beliefs about the relative safety of the dollar versus the yen, the euro, and the pound.

$Q^S$  = supply of dollars =  $G(P, \bar{Y})$

$\bar{Y}$  is exogenous and captures the Federal Reserve’s supply of currency.