



Rudiger Dornbusch  
Stanley Fischer  
Richard Startz

# Macroeconomics

THIRTEENTH EDITION

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# MACROECONOMICS

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Thirteenth Edition

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Late of Massachusetts Institute of Technology  
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Education



## MACROECONOMICS, THIRTEENTH EDITION

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*To Rhoda and Shelly  
and to the memory of  
Rudi,  
teacher/colleague/friend*





# ABOUT THE AUTHORS

---

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*In order to avoid conflicts of interest with his position on the Board of Governors of the Federal Reserve, Dr. Fischer did not participate in the current revision and did not see the manuscript before publication.*

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# PREFACE

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The 13th edition of *Macroeconomics* is published 39 years after the first. We have been both amazed and flattered by the response our book has received over those years. Besides its use in the classrooms of many U.S. universities, it has been translated into many languages and used in many countries, from Canada to Argentina to Australia; all over Europe; in India, Indonesia, and Japan; and from China and Albania to Russia. Even before the Czech Republic gained independence from communism, an underground translation was secretly used in macroeconomics seminars at Charles University in Prague. There is no greater pleasure for teachers and textbook authors than to see their efforts succeed so concretely around the world.

We believe that the success of our textbook reflects the unique features it brings to the universe of undergraduate macroeconomics. These features can be summarized as follows:

- **“Compassionate Difficulty”** Through the years we have held the conviction that the best textbook is one written with an abiding respect for both student and instructor. What does this mean exactly? In practice it means that we explore more state-of-the-art research than is customary in undergraduate textbooks, allowing students a point of departure for deeper exploration into various topics, and teachers the flexibility to emphasize topics in greater detail. At the same time, however, we have reduced the book’s level of difficulty by providing straightforward explanations, emphasizing concepts over technique, and fitting difficult material into a larger framework so students can see its relevance. We also emphasize how empirical data can explain and test macroeconomic theory, by providing numerous illustrations that use real-world data.
- **Focus on Models** The best economists have a rich toolbox of simple models they can use to analyze various facets of the economy, and know when to apply the right model to answer specific questions. We have consistently focused our textbook on the presentation of a series of simple models relevant to particular issues. We strive to help students understand both the importance of a model-based approach to macroeconomic analysis, as well as how the various models are connected. Our goal is to produce students who have the capacity to analyze current economic issues in the context of an economic frame of reference, namely, a set of macroeconomic models.
- **International Perspective** It has always been important for students living in countries with highly open economies to understand the important links connecting foreign economies to their own. This is also becoming ever more true in the United States as international goods and financial markets become ever more intertwined. Recognizing this, we provide two detailed chapters discussing international linkages. The first, Chapter 13, provides a discussion of mainstream intermediate macroeconomic

topics. The second, Chapter 23, gives advanced students the opportunity to explore modern theories of balance-of-payments crises, determinants of exchange rates, and the choice of exchange rate regimes. These chapters give instructors the flexibility to adapt their curriculum to range from touching on a few international topics, to engaging in a more thorough discussion lasting several weeks.

- **Focus on Changing Times** We have strived to present updated data throughout the book, demonstrating key trends and presenting thorough discussions of how such trends might be explained by traditional macroeconomic models.

## WHAT'S NEW

The 13th edition of *Macroeconomics* is thoroughly updated to reflect the newest data, and the story of the Great Recession. Graphs, data tables, and empirical homework questions use the latest data available. In addition to many small- and medium-sized changes (detailed on the book website at [www.mhhe.com/dornbusch13e](http://www.mhhe.com/dornbusch13e)), we have added a number of new “History Speaks” and “What More Do We Know?” boxes. We hope these will help students better relate the material in the book to what they hear in the news, and in some cases we hope the new boxes will just be plain fun. These changes reflect suggestions from faculty teaching from previous editions. We are grateful to them.

## ORGANIZATIONAL ALTERNATIVES

A major goal in writing this textbook is to provide one that is comprehensive, yet flexible enough to allow teachers to focus a class on their particular interests and time constraints. Our personal preference is to begin at the beginning and work through the entire book (which is, of course, why we organized the material in the way we did), but a number of approaches can be taken to give a different emphasis or simply to reduce the breadth of material covered. Examples of these approaches include

- **An Overview Course** An overview course should contain what we feel is the core of the textbook: Chapters 1 and 2, which introduce the book and provide details on national income accounting; Chapter 5, which gives an overview of aggregate supply and demand; Chapter 6, which presents the aggregate supply curve in more detail; Chapters 7 and 8, which discuss the headline issues of inflation and unemployment; Chapter 9, which gives a media-level view on stabilization policy; and Chapters 10, 11, and 12, which introduce the goods market, asset market, and some basics of monetary and fiscal policy. One might also decide to include Chapter 20, on the debt, in an overview course. Beyond these core chapters, the course can be shortened substantially by omitting chapters that focus on the microeconomic detail beneath macroeconomic theory—Chapters 14–17, 19, and 24, for example, which supply such detail for consumption, investment, money markets, and certain advanced topics, respectively. And Chapters 18, 21, and 22, which detail several current issues in policymaking, can either be omitted or covered only in part. In the United States, Chapters 4, 13, and 23, which present many basic issues of international interdependence and

growth policy, might also be omitted (although everyone should probably cover Sections 13-1 and 13-2).

- **A Traditional Aggregate Demand-Oriented Course** For a Keynesian, short-run treatment of the course, the core chapters for the overview course should be emphasized and Chapter 18, which discusses policy, should be added. Chapters 20, 21, and 22, which discuss big macroeconomic events, can be moved ahead of Chapter 14. Chapters 3 and 4, on growth and policies to promote growth, can be moved to the end of the course. And for advanced students, the sections on New Keynesian economics and DSGE models in Chapter 24 might be included.
- **A Classical “Supply-Side” Course** For a classical treatment of the course, the core chapters for the overview course can be shortened by de-emphasizing the *IS-LM* material in Chapters 10–12. And in the early chapters, greater emphasis might be given to Chapters 3 and 4 on long-run growth. The microeconomics of macroeconomic theory in Chapters 14–16 might also be emphasized, as might the discussion of hyperinflation in Chapter 22. Advanced students may wish to explore the sections on the random walk in GDP and on real business cycles as well as DSGE models in Chapter 24.
- **A Business School Course** In addition to the core chapters for the overview course, a business school course should emphasize Chapters 17 and 19, which deal with the Federal Reserve and financial markets. And, Chapters 3 and 4 on growth can be de-emphasized, while the advanced topics in Chapter 24 can be omitted. For students with an international perspective, Chapter 13 and parts of Chapter 23, especially the discussion of exchange rate determination, might be emphasized.

Throughout the book, we have labeled some material that is technically difficult as “optional.” Many of the optional sections will be fun for students who enjoy a technical challenge, but the instructor should specify clearly which of these sections are required, and which are truly optional.

## COURSESMART

CourseSmart is a new way for faculty to find and review eTextbooks. It’s also a great option for students interested in accessing their course materials digitally. CourseSmart offers thousands of the most commonly adopted textbooks across hundreds of courses from a wide variety of higher education publishers. It is the only place for faculty to review and compare the full text of a textbook online. At CourseSmart, students can save up to 50 percent off the cost of a print book, reduce their impact on the environment, and gain access to powerful Web tools for learning including full-text search, notes and highlighting, and email tools for sharing notes between classmates. Your eBook also includes tech support in case you ever need help. Finding your eBook is easy. Visit [www.CourseSmart.com](http://www.CourseSmart.com) and search by title, author, or ISBN.



## SUPPLEMENTARY MATERIAL

There are several learning and teaching aids that accompany the thirteenth edition of *Macroeconomics*. These resources can be found on the text website at



[www.mhhe.com/dornbusch13e](http://www.mhhe.com/dornbusch13e). Instructor supplements reside under a password-protected section of the text website.

For instructors, an *Instructor's Manual* and a *Test Bank* to accompany the text have been prepared. The Instructor's Manual includes chapter summaries, learning objectives, solutions to the end-of-chapter problems, and many additional problems (and their solutions) that can be used for class discussion, homework assignments, or examination questions. The Test Bank contains over 1,000 multiple-choice questions and is available in Word document format.

Also available for instructors are *PowerPoint Presentations*, prepared by Alice Kassens of Roanoke College. The slide presentations contain charts, graphs, examples, and discussion of chapter contents, and can be edited to meet instructor, classroom, and reader needs.

For students, a *Study Guide*, also prepared by Dr. Kassens, is available along with *Multiple-Choice Quizzes* for each chapter. The Study Guide contains chapter summaries, key terms, and a wide range of questions and problems, starting from the very easy and progressing in each chapter to material that will challenge the more advanced student. Multiple-Choice *Quizzes* are available for each chapter, and each quiz contains 10 auto-gradable questions.



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Stanley Fischer  
Richard Startz



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# CHAPTER 1

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## Introduction

### CHAPTER HIGHLIGHTS

- Each chapter starts off with “Chapter Highlights,” giving you a guide to the chapter’s most important points. In this chapter, we emphasize three linked models that collectively describe the macroeconomy.
- The *very long run* behavior of the economy is the domain of growth theory, which focuses on the growth of productive capacity—the amount of output the economy can produce when (capital and labor) resources are fully employed.
- Over the *long-run* horizon, the productive capacity of the economy can be treated as largely fixed. Output and the price level are thus determined by the intersection of aggregate supply and aggregate demand. Large-scale inflation is almost always the result of changing aggregate demand.
- In the *short run*, the price level is essentially fixed and changes in aggregate demand generate changes in output, resulting in booms and recessions.
- In technical terms, the “very long run” is described entirely by movements of the aggregate supply curve over time; the “long run” is described by a vertical, but motionless, aggregate supply curve; and the “short run” is described by a horizontal aggregate supply curve, so that economic outcomes depend on aggregate demand.

**Jobs were scarce in the United States in 2013. In contrast, in 2006 jobs were relatively plentiful and times were good. In 1933 bread lines had been the order of the day. In 2013 a call at a pay phone cost 50 cents (if you were lucky enough to find a pay phone). A call in 1933 was a dime (if you were lucky enough to have a dime). Why are jobs plentiful in some years and scarce in others? What drives up prices over time? Macroeconomists answer these questions as they seek to understand the state of the economy—and seek methods to improve the economy for us all.**

Macroeconomics is concerned with the behavior of the economy as a whole—with booms and recessions, the economy's total output of goods and services, the growth of output, the rates of inflation and unemployment, the balance of payments, and exchange rates. Macroeconomics deals with both long-run economic growth and the short-run fluctuations that constitute the business cycle.

Macroeconomics focuses on the economic behavior and policies that affect consumption and investment, the dollar and trade balances, the determinants of changes in wages and prices, monetary and fiscal policies, the money stock, the federal budget, interest rates, and the national debt.

In brief, macroeconomics deals with the major economic issues and problems of the day. To understand these issues, we have to reduce the complicated details of the economy to manageable essentials. *Those essentials lie in the interactions among the goods, labor, and assets markets of the economy and in the interactions among national economies that trade with each other.*

In dealing with the essentials, we go beyond details of the behavior of individual economic units, such as households and firms, or the determination of prices in particular markets, which are the subject matter of microeconomics. In macroeconomics we deal with the market for goods as a whole, treating all the markets for different goods—such as the markets for agricultural products and for medical services—as a single market. Similarly, we deal with the labor market as a whole, abstracting from differences between the markets for, say, unskilled labor and doctors. We deal with the assets market as a whole, abstracting from differences between the markets for Microsoft shares and for Rembrandt paintings. The benefit of the abstraction is that it facilitates increased understanding of the vital interactions among the goods, labor, and assets markets. The cost of the abstraction is that omitted details sometimes matter.

It is only a short step from studying how the macroeconomy works to asking how to make it perform better. The fundamental question is, *Can* the government, and *should* the government intervene in the economy to improve its performance? The great macroeconomists have always enjoyed a keen interest in the application of macrotheory to policy. This was true in the case of John Maynard Keynes and is true of American leaders in the field, including members of the older Nobel laureate generation such as the late Milton Friedman of the University of Chicago and the Hoover Institution, the late Franco Modigliani and Robert Solow of MIT, and the late James Tobin of Yale University. The next generation's leaders, such as Robert Barro, Martin Feldstein, and N. Gregory Mankiw of Harvard University, Nobel laureate Robert Lucas of the University of Chicago, Olivier Blanchard of MIT, Federal Reserve chairman Ben Bernanke, Robert Hall, Paul Romer, and John Taylor of Stanford University, and Thomas Sargent

of NYU, despite being more—and in some cases altogether—skeptical about the wisdom of active government policies, also have strong views on policy issues.

Because macroeconomics is closely related to the economic problems of the day, it does not yield its greatest rewards to those whose primary interest is abstract. Macrotheory is a little untidy at the edges. But then the world is a little untidy around the edges. This book uses macroeconomics to illuminate economic events from the Great Depression of the 1930s through the twenty-first century. We refer continually to real-world events to elucidate the meaning and the relevance of the theoretical material.

*There is a simple test for determining whether you understand the material in this book: Can you apply the material to understand current discussions about the national and international economy?* Macroeconomics is an applied science. It is rarely beautiful, but it is overwhelmingly important to the well-being of nations and peoples.



## 1-1

### MACROECONOMICS ENCAPSULATED IN THREE MODELS

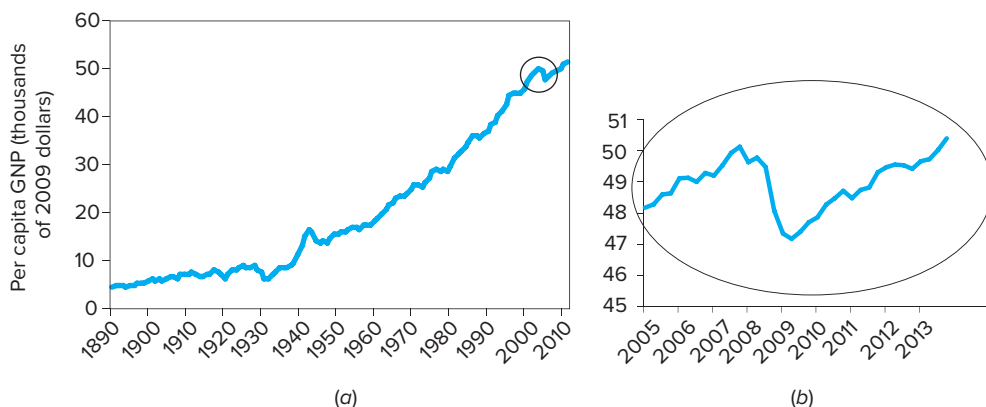
**Macroeconomics is very much about tying together facts and theories.** We start with a few grand facts and then turn to models that help us explain these and other facts about the economy.

- Over a time span of decades, the U.S. economy grows rather reliably at 2 or 3 percent a year.
- In some decades, the overall price level has remained relatively steady. In the 1970s prices roughly doubled.
- In a bad year, the unemployment rate is twice what it is in a good year.

The study of macroeconomics is organized around three fundamental models that describe the world, each model having its greatest applicability in a different time frame. The *very long run* behavior of the economy is the domain of growth theory, which focuses on the growth of the economy's capacity to produce goods and services. The study of the very long run centers on the historical accumulation of capital and improvements in technology. In the model we label the *long run*, we take a snapshot of the very long run model. At that moment, the capital stock and the level of technology can be taken to be relatively fixed, although we do allow for temporary shocks. Fixed capital and technology determine the productive capacity of the economy—we call this capacity “potential output.” In the long run, the supply of goods and services equals potential output. Prices and inflation over this horizon are determined by fluctuations in demand. In the *short run*, fluctuations in demand determine how much of the available capacity is used and thus the level of output and unemployment. In contrast to the long run, in the short run prices are relatively fixed and output is variable. It is in the realm of the short-run model that we find the greatest role for macroeconomic policy.

Nearly all macroeconomists subscribe to these three models, but opinions differ as to the time frame in which each model is best applied. Everyone agrees that behavior over decades is best described by the growth theory model. There is less agreement over the applicable time scope for the long-run versus the short-run model.





**FIGURE 1-1** PER CAPITA GNP, 1890–2011 (THOUSANDS OF 2009 DOLLARS).

The diagram includes an exploded view of the period 2005–2013. (Note that the scales of the two panels differ.) Source: U.S. Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1970*; Federal Reserve Economic Data [FRED]; Census Bureau; and Bureau of Economic Analysis.

This chapter is largely devoted to outlining the three models with a broad brush. The remainder of the text paints in the details.

#### VERY LONG RUN GROWTH

The very long run behavior of the economy is the domain of *growth theory*. Figure 1-1a illustrates the growth of income per person in the United States over more than a century. We see a fairly smooth growth curve, averaging 2 or 3 percent a year. In studying growth theory, we ask how the accumulation of inputs—investment in machinery, for example—and improvements in technology lead to an increased standard of living. We ignore recessions and booms and related short-run fluctuations in employment of people and other resources. We assume that labor, capital, raw materials, and so on are all fully employed.

How can a model that ignores fluctuations in the economy possibly tell us anything sensible? Fluctuations in the economy—the ups and downs of unemployment, for example—tend to average out over the years. Over very long periods, all that matters is how quickly the economy grows on average. Growth theory seeks to explain growth rates averaged over many years or decades. Why does one nation’s economy grow at 2 percent a year while another nation’s grows at 4 percent a year? Can we explain growth miracles such as the 8 percent annual growth in Japan in the early postwar period and China’s even more impressive growth over the last few decades? What accounts for growth debacles such as Zimbabwe’s zero—and even negative—growth over many decades?

Chapters 3 and 4 examine the causes of economic growth and of differences in growth rates among nations. In industrialized countries, changes in the standard of living depend primarily on the development of new technology and the accumulation

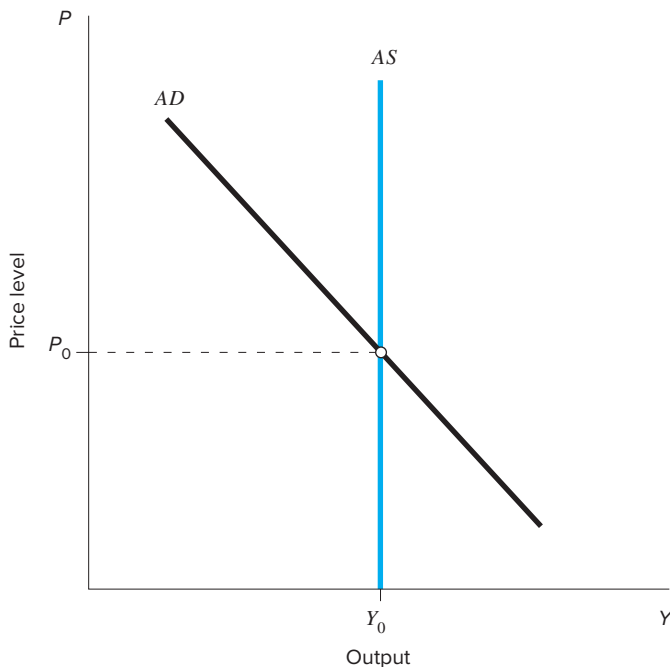
of capital—broadly defined. In developing countries, the development of a well-functioning infrastructure is more important than the development of new technology, because the latter can be imported. In all countries, the rate of saving is a key determinant of future well-being. Countries that are willing to sacrifice today have higher standards of living in the future.

Do you really care whether the economy grows at 2 percent a year rather than 4 percent? Over a lifetime you'll care a great deal: At the end of one 20-year generation, your standard of living will be 50 percent higher under 4 percent growth than under 2 percent growth. Over 100 years, a 4 percent growth rate produces a standard of living *seven* times higher than does a 2 percent growth rate.

### THE ECONOMY WITH FIXED PRODUCTIVE CAPACITY

What determines the inflation rate—the change in the overall price level? Why do prices in some countries remain stable for many years, while prices in other countries double every month? In the long run, the level of output is determined solely by supply-side considerations. Essentially, output is determined by the productive capacity of the economy. The price level is determined by the level of demand relative to the output the economy can supply.

Figure 1-2 shows an *aggregate supply–aggregate demand* diagram with a vertical aggregate supply curve. It may be a little premature to ask you to work with this



**FIGURE 1-2** AGGREGATE DEMAND AND SUPPLY: THE LONG RUN.

## 1-1 History Speaks

# Aggregate Supply and Aggregate Demand

- The *level of aggregate supply* is the amount of output the economy can produce given the resources and technology available.
- The *level of aggregate demand* is the total demand for goods to consume, for new investment, for goods purchased by the government, and for net goods to be exported abroad.

diagram, since we devote most of Chapters 5 and 6 to explaining it. Perhaps you should think of the diagram as a preview of coming attractions. For now we'll present the aggregate supply and aggregate demand schedules as the relationships between the overall price level in the economy and total output. **The aggregate supply (AS) curve depicts, for each given price level, the quantity of output firms are willing to supply.** The position of the aggregate supply curve depends on the productive capacity of the economy. **The aggregate demand (AD) curve presents, for each given price level, the level of output at which the goods markets and money markets are simultaneously in equilibrium.** The position of the aggregate demand curve depends on monetary and fiscal policy and the level of consumer confidence. The intersection of aggregate supply and aggregate demand determines price and quantity.<sup>1</sup>

**In the long run, the aggregate supply curve is vertical.** (Economists argue over whether the long run is a period of a few quarters or of a decade.) Output is pegged to the position where this supply curve hits the horizontal axis. The price level, in contrast, can take on any value.

Mentally shift the aggregate demand schedule to the left or right. You will see that the intersection of the two curves moves up and down (the price changes), rather than horizontally (output doesn't change). **It follows that in the long run output is determined by aggregate supply alone and prices are determined by both aggregate supply and aggregate demand.** This is our first substantive finding.

The growth theory and long-run aggregate supply models are intimately linked: The (horizontal) position of the vertical aggregate supply curve in a given year equals the level of output for that year from the very long run model, as shown in Figure 1-3. Since economic growth over the very long run averages a few percent a year, we know that the aggregate supply curve typically moves to the right by a few percent a year.<sup>2</sup>

<sup>1</sup>You should be warned that the economics underlying the aggregate supply and aggregate demand schedules is very different from the economics of the ordinary garden-variety supply and demand that you may remember from studying microeconomics.

<sup>2</sup>Sometimes there are shocks that temporarily disrupt the orderly rightward progression of the aggregate supply schedule. These shocks are rarely larger than a few percent of output.

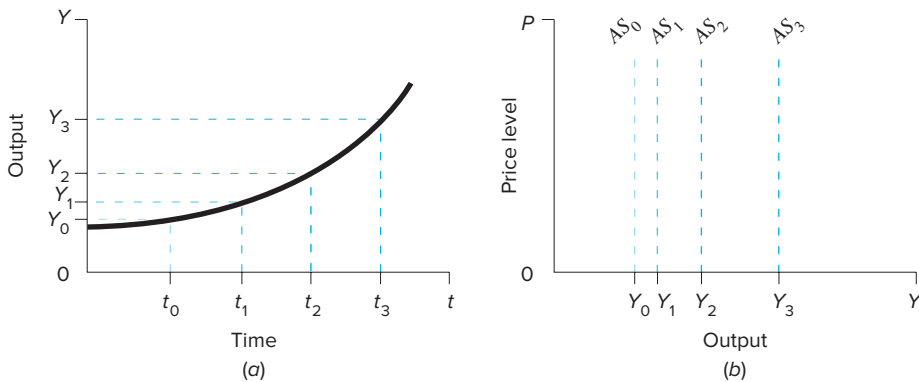


FIGURE 1-3 DETERMINATION OF AGGREGATE SUPPLY: THE VERY LONG RUN.

We are ready for our second conclusion: **Very high inflation rates—that is, episodes with rapid increases in the overall price level—are always due to changes in aggregate demand.** The reason is simple. Aggregate supply movements are on the order of a few percent; aggregate demand movements can be either small or large. So the only possible source of high inflation is large movements of aggregate demand sweeping across the vertical aggregate supply curve. In fact, as we will eventually learn, the only source of really high inflation rates is government-sanctioned increases in the money supply.<sup>3</sup>

Much of macroeconomics can be capsulized as the study of the position and slope of the aggregate supply and aggregate demand curves. You now know that in the long run the position of the aggregate supply curve is determined by very long run economic growth and that the slope of aggregate supply is simply vertical.

### THE SHORT RUN

Examine panel (b) in Figure 1-1. When we take a magnified look at the path of output, we see that it is not at all smooth. Short-run output fluctuations are large enough to matter a great deal. Accounting for short-run fluctuations in output is the domain of aggregate demand.<sup>4</sup>

The mechanical aggregate supply–aggregate demand distinction between the long run and the short run is straightforward. *In the short run, the aggregate supply curve is flat.* The short-run aggregate supply curve pegs the price level at the point where the supply curve hits the vertical axis. Output, in contrast, can take on any value. The underlying assumption is that the level of output does not affect prices in the short run. Figure 1-4 shows a horizontal short-run aggregate supply curve.

<sup>3</sup>Temporary price increases of 10 or 20 percent can be due to supply shocks—for example, the failure of the monsoon to arrive in an agricultural economy. However, ongoing double-digit annual price increases are due to printing too much money.

<sup>4</sup>Mostly. Supply shocks—the OPEC oil embargo is an example—sometimes matter too.

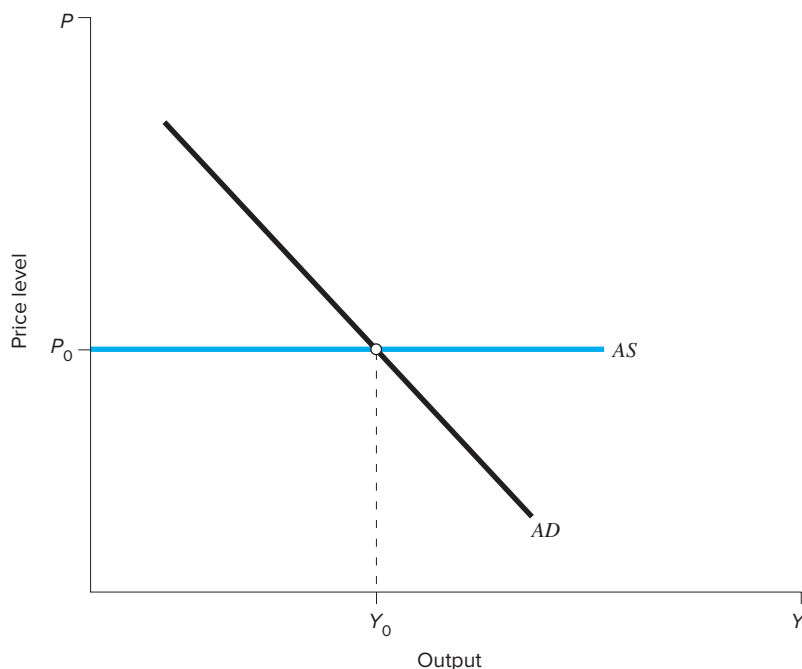


FIGURE 1-4 AGGREGATE DEMAND AND SUPPLY: THE SHORT RUN.

Repeat the exercise above and mentally shift the aggregate demand schedule to the left or right. You will see that the intersection of the two curves moves horizontally (output changes), rather than up and down (the price level doesn't change). **It follows that in the short run output is determined by aggregate demand alone and prices are unaffected by the level of output.** This is our third substantive finding.<sup>5</sup>

Much of this text is about aggregate demand alone. We study aggregate demand because in the short run aggregate demand determines output and therefore unemployment. When we study aggregate demand in isolation, we are not really ignoring aggregate supply; rather, we are assuming that the aggregate supply curve is horizontal, implying that the price level can be taken as given.

### THE MEDIUM RUN

We need one more piece to complete our outline of how the economy works: how do we describe the transition between the short run and the long run? In other words, what's the process that tilts the aggregate supply curve from horizontal to vertical? The simple

<sup>5</sup>As we said in the last footnote, "mostly." This is an example of what we mean when we say that applying a model requires judgment. There have certainly been historical periods when supply shocks outweighed demand shocks in the determination of output.



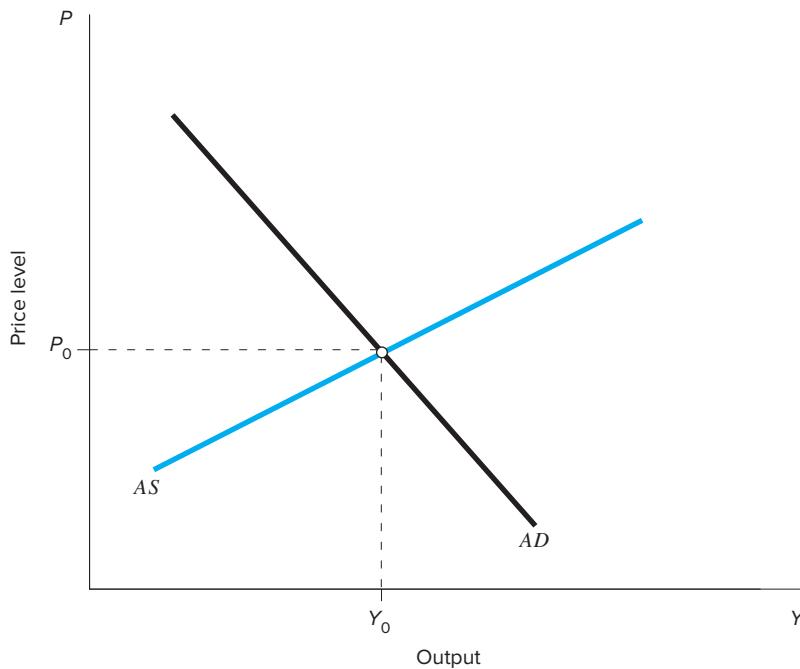


FIGURE 1-5 AGGREGATE DEMAND AND SUPPLY.

answer is that when high aggregate demand pushes output above the level sustainable according to the very long run model, firms start to raise prices and the aggregate supply curve begins to move upward. The *medium run* looks something like the situation shown in Figure 1-5; the aggregate supply curve has a slope intermediate between horizontal and vertical. **The question, How steep is the aggregate supply curve?, is in effect the main controversy in macroeconomics.**

The speed with which prices adjust is a critical parameter for our understanding of the economy. At a horizon of 15 years, not much matters except the rate of very long run growth. At a horizon of 15 seconds, not much matters except aggregate demand. What about in between?

It turns out that prices usually adjust pretty slowly; thus, over a 1-year horizon, changes in aggregate demand give a good, though certainly not perfect, account of the behavior of the economy. **The speed of price adjustment is summarized in the Phillips curve, which relates inflation and unemployment, one version of which is shown in Figure 1-6.**

In Figure 1-6, the change in the inflation rate is plotted against the unemployment rate. Pay careful attention to the numbers attached to the horizontal and vertical scales. A 2-point drop in unemployment is a very large change. You can see that such a drop, say, from 6 to 4 percent, will increase the inflation rate by only about 1 point over a period of a year. So over a 1-year horizon, the aggregate supply curve is quite flat and aggregate demand will provide a good model of output determination.