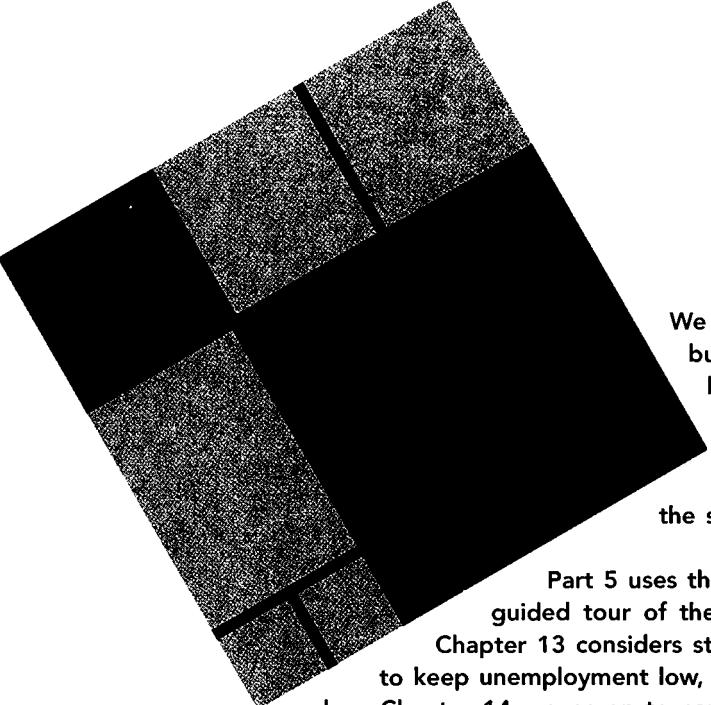


Macroeconomic Policy

PART

5



We now have all the tools we need to understand business cycles: Part 3 showed how to analyze business cycles in a flexible-price macroeconomy. Part 4 showed how to analyze business cycle a sticky-price macroeconomy, and how to understand when the flexible-price model and the sticky-price model is the best one to use.

Part 5 uses the tools built up earlier in this book to guided tour of the major issues in modern macroeco Chapter 13 considers stabilization policy: how the govern to keep unemployment low, growth steady, inflation low, and low. Chapter 14 moves on to consider fiscal policy and the effe ment's taxes, spending, and national debt on the level of invest growth. Chapter 15 focuses on the international economy: how try to manage its interconnections with the other economies o

se first three chapters of Part 5, the two that follo view. Chapter 16 discusses how the macro and how the changes in the macroec er 17 considers the discipline o w is it likely to change i

CHAPTER

13

Stabilization Policy

QUESTIONS

- How does the Federal Reserve work?**
- How does the budget process work?**
- What are the goals of stabilization policy?**
- How has the practice of stabilization policy evolved?**
- What aspects of stabilization policy do economists argue about today?**
- How does uncertainty affect stabilization policy?**
- How long are the lags associated with stabilization policy?**

Part 4 of this book set out the last of our major models, the sticky-price model of the economy, in which short-run changes in real GDP, unemployment, interest rates, and inflation are all driven by changes in the economic environment and by shifts in two kinds of government policy: fiscal policy and monetary policy. Changes in fiscal policy shift the MPRF curve. Central-bank-driven changes in interest rates — monetary policy — move the economy along the MPRF, changing real GDP as well as unemployment and inflation rates.

These policies and the economic environment together set the level of planned expenditure. They move the economy along the Phillips curve, raising and lowering inflation and unemployment. Changes in expectations of inflation, changes in the natural rate of unemployment, and supply shocks shift the position of the short-run Phillips curve, and thus play a powerful role in determining the options open to the government and the central bank.

This is the context in which the government tries to manage the macroeconomy, controlling to a certain extent unemployment and inflation. It attempts to stabilize the macroeconomy by minimizing the impact of the shocks that cause business cycles. The first part of this chapter looks at the institutions that make macroeconomic policy: the Federal Reserve, which makes monetary policy, and the Congress, which makes fiscal policy (subject to the president's veto). After looking at the institutions we will look at how macroeconomic policy is actually made and how well it works.

13.1 MONETARY POLICY INSTITUTIONS

The Federal Reserve Board

Monetary policy in the United States is made by the Federal Reserve, which is our central bank. (In other countries the central bank bears a different name, most frequently the name of its country: The central bank of country X is probably called the Bank of X.)

Today the Federal Reserve is and for more than two decades past the Federal Reserve has been the most important organization making American macroeconomic policy. Because monetary policy is the most powerful tool for stabilizing the economy, the Federal Reserve has the power to play the leading role in stabilization policy. Because the Federal Reserve is effectively independent of its political superiors, the Federal Reserve has the discretion to play the leading role in stabilization policy. And it does. These days fiscal policy — the decisions about spending levels and tax rates made by the president and the Congress — plays a distinctly second fiddle. And these days the president and the Congress, who could order the Federal Reserve around, do not like to do so. That's why White House press releases talking about monetary policy almost always begin: "The Federal Reserve is an independent agency, charged with the mission of maintaining price stability, full employment, and maximum purchasing power . . ."

This institutional division of labor is probably the correct one. Over the past 50 years in the United States, monetary policy has proved to be more powerful, faster acting, and more reliable than fiscal policy.

The Federal Reserve has a central office and 12 regional offices. Its central office is the Board of Governors, composed of a chair, a vice chair, and five governors, all of them nominated by the president and confirmed by the Senate. The Board

of Governors' offices are in Washington, DC. The Federal Reserve's 12 regional offices are the 12 Federal Reserve banks. They are scattered around the country in San Francisco, Minneapolis, Dallas, Kansas City, St. Louis, Chicago, Cleveland, Atlanta, Richmond, Philadelphia, New York, and Boston.

The Federal Open Market Committee

The principal policy-making body of the Federal Reserve system is its Federal Open Market Committee (FOMC). The FOMC lowers and raises interest rates, which increases and decreases the money supply. The *Federal Reserve's Board of Governors* can alter bank regulations and can raise or lower the interest rate at which the Federal Reserve itself lends to banks and businesses. But most of the time the FOMC plays the leading role within the Federal Reserve.

The members of the Board of Governors and the presidents of the 12 regional Federal Reserve banks together make up the Federal Open Market Committee (see Figure 13.1). The chair, the vice chair, the other five governors, and the president of the Federal Reserve Bank of New York are always voting members of the FOMC. The 11 presidents of the other Federal Reserve banks alternate. At any moment four are voting members and seven are nonvoting members of the FOMC (see Figure 13.2 on page 382).

The History of the Federal Reserve

The Federal Reserve was created just before World War I. Its congressional architects feared that a unitary central bank based in Manhattan would pay too much attention to the interests of bankers and financiers and not enough attention to the interests of merchants and producers. A near century of experience, however, suggests that they were wrong: Bankers in St. Louis think like bankers in New York.

The Federal Reserve failed to handle its first great crisis, the Great Depression that started in 1929. Depending on whom you believe, the Federal Reserve either

FIGURE 13.1

Structure of the Federal Reserve System

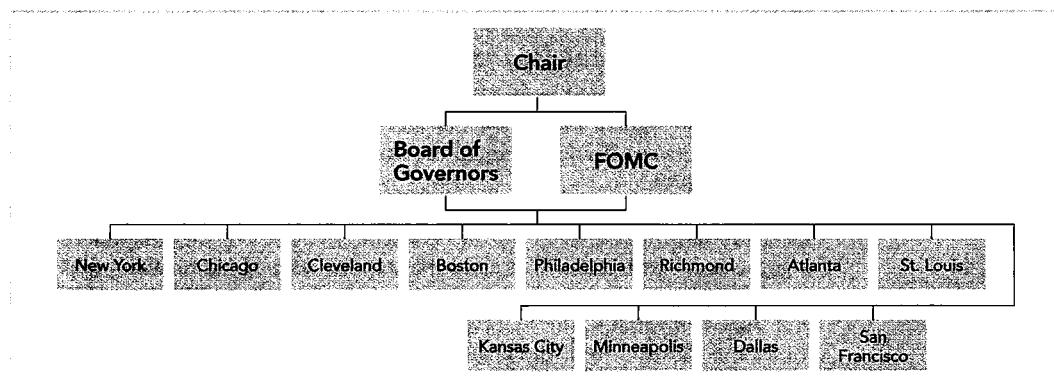
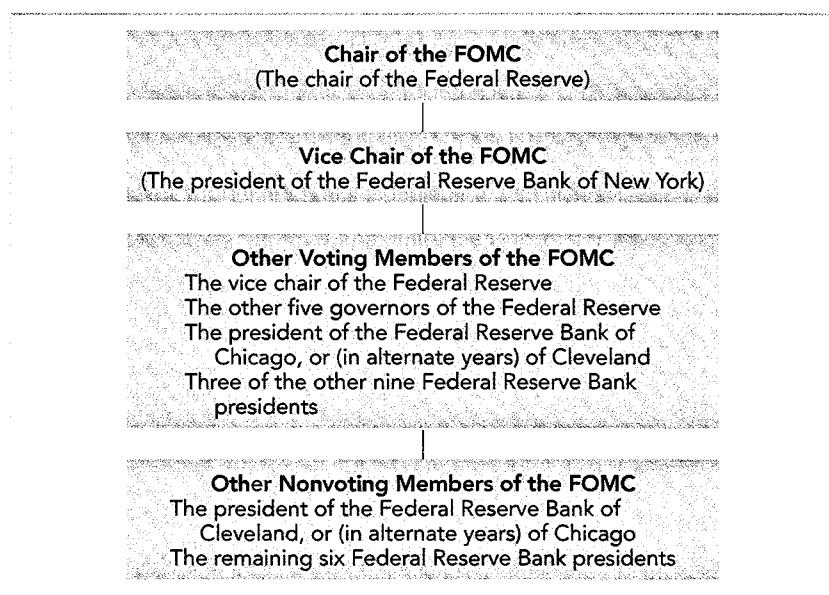


FIGURE 13.2

Composition of the Federal Open Market Committee (FOMC)



did nothing to help cure the Great Depression, or it made things much worse and played a major role in causing the Great Depression. Since World War II, however, the Federal Reserve has done a much better job: There has been no repeat of the Great Depression.

The Federal Reserve's performance in the 1970s is generally regarded as inadequate. The 1970s were a decade of rising inflation and relatively high unemployment. Today, after two straight decades in the 1980s and 1990s of very successful monetary stabilization policy, the prestige of the Federal Reserve is high. It has almost unlimited freedom to conduct monetary policy as it wishes. Few outside the organization want to challenge its judgments or decisions.

How the Federal Reserve Operates

The FOMC meets about every six weeks to set interest rates. It can and frequently does delegate power to the chair of the Federal Reserve to alter interest rates between meetings if circumstances require. And it can hold emergency meetings on short notice.

The FOMC tries to reach its decisions by consensus. If a consensus cannot be achieved, the members of the FOMC are more likely to postpone the issue than to make a decision that a substantial minority of its members oppose. But a substantial minority almost never opposes. The chair has only one vote of twelve, but almost invariably the FOMC does what the chair wishes. These days questions and dissents from the chair's view of the economy and proposed path for interest rates are much more likely to be voiced in private in the chair's office before an FOMC meeting than in the meeting itself. Alan Greenspan and Paul

Volcker — and, before them, Arthur Burns and William McChesney Martin — have been very strong chairs.¹

However, once the FOMC decides on a change in policy, that change is implemented immediately. Interest rates shift within minutes in response to FOMC decisions. Indeed, interest rates often change in advance of the actual FOMC meeting as speculators attempt to make money by betting on what they believe the Federal Reserve will do.

The chair of the Federal Reserve Board is the chair of the FOMC. Alan Greenspan was confirmed to another four-year term as chair of the Federal Reserve Board in the summer of 2004. The president of the Federal Reserve Bank of New York is the vice chair of the FOMC; Tim Geithner currently holds the post.

The FOMC changes interest rates by carrying out open-market operations. In an expansionary open-market operation, the Federal Reserve buys government bonds. Such a transaction reduces the amount of interest-bearing government bonds available for financial investors to hold. This reduction in publicly available supply raises the price of short-term government bonds, and as we saw in Box 11.2, an increase in the price of a bond is a decline in its interest rate. When the Federal Reserve buys government bonds it pays for them by crediting the purchasers with deposits at the regional Federal Reserve banks. Commercial banks use these deposits to satisfy the reserve requirements imposed on them by bank regulators. The more reserves a bank has, the more deposits it can accept and the more loans it can make. With more banks trying to make more loans, the interest rates that banks charge on loans drop. Thus purchases of government bonds by the Federal Reserve are expansionary open-market operations, which reduce interest rates. Contractionary open-market operations work in reverse, raising interest rates.

Open-market operations are not the only policy tools the Federal Reserve has. The Board of Governors can alter legally required bank reserves, and it can lend money directly to financial institutions. It can restrict the types of loans that the financial institutions it regulates can make. But these tools are used very rarely. Almost always the FOMC can use open-market operations to set interest rates at whatever it wants them to be. Note the qualifier “almost always.” The Federal Reserve’s power to set interest rates is subject to only one important restriction: The Federal Reserve cannot reduce the nominal interest rate on any Treasury securities below zero. If a Treasury bill carried an interest rate less than zero, then no one would want to buy it, since simply holding cash would be more profitable.

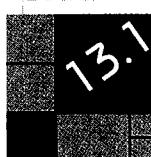
This inability of the Federal Reserve to push nominal interest rates below zero has potentially destructive consequences. If prices are expected to fall — during a time of anticipated deflation, for example, when the expected inflation rate is negative — a nominal interest rate that is close to but not less than zero may still be a relatively high real interest rate, because the real interest rate r is the difference between the nominal interest rate i and the expected inflation rate π^e :

$$r = i - \pi^e$$

If the expected inflation rate is sufficiently far below zero, the real interest rate will be high, and investment low, no matter what the FOMC does. In 2002 and 2003, a faltering economy led the Federal Reserve to lower short-term nominal

¹Between Burns and Volcker, G. William Miller was chair for a short period of time. He was not a strong chair.

interest rates down to 1 percent per year. Some observers feared that the United States might be teetering on the edge of price deflation. Deflation was feared because it would drive up real interest rates at just the time the Federal Reserve needed to reduce them to stimulate the economy. Yet with nominal interest rates near their minimum of zero, the Federal Reserve's hands would have been tied and stimulative reductions in the real interest rate would have been impossible. But by the middle of 2004 the danger (if indeed it was a danger) had passed, and the FOMC was arguing about how fast and how far to *raise* interest rates to keep inflation from accelerating over the next several years. (However, as Box 13.1 discusses, the inability to push nominal interest rates below zero is relevant to Japan's economic stagnation over the past decade.)

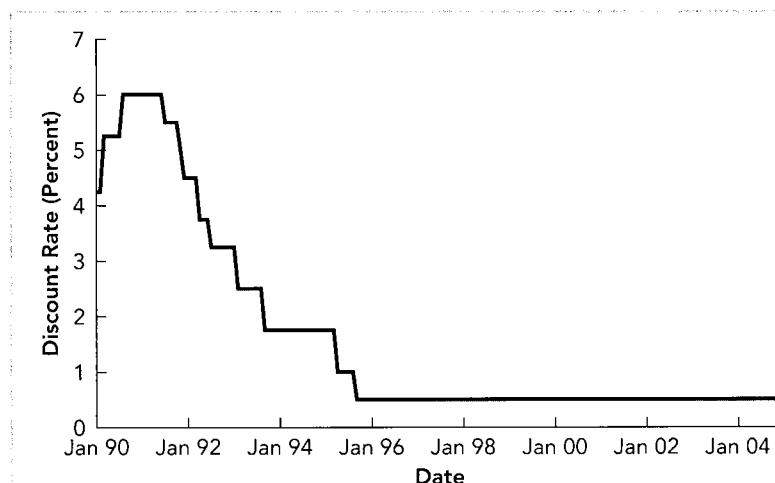


JAPAN'S LIQUIDITY TRAP: POLICY

The possibility that monetary policy might lose its power because expected deflation kept *real* interest rates high used to be dismissed as a theoretical curiosity irrelevant to the real world. But since the mid-1990s the Japanese economy has looked very much as though it might be caught in such a "liquidity trap." Real GDP has been far below potential output. Nominal interest rates on short-term government bonds have at times fallen to 0.04 percent — that is four-hundredths of 1 percent a year; the annual interest on \$100 invested at such an interest rate would be four cents. (See Figure 13.3.) But a combination of expected deflation,

FIGURE 13.3

Japan's Liquidity Trap, 1990–2004: Nominal Safe Interest Rates The graph shows the official discount rate of the Bank of Japan. Despite a decade of extremely low interest rates on government bonds in Japan, investment has not boomed. Why not? Because risk premiums and expected deflation have made businesses believe that the real interest rates at which they can borrow remain high.



Source: Bank of Japan.

high risk premiums, and steep term premiums meant that businesses found that the real interest rate they had to pay to borrow money was quite high.

This situation continues today. From banks' perspective there are few credit-worthy borrowers. Yet from businesses' perspective there is little affordable capital. Japan's stagnation has dragged on for nearly a decade.

What is to be done? Two obvious policies might improve matters. The first is fiscal expansion: Cut taxes or increase spending to shift the IS curve to the right and the MPRF to the left, raising the level of planned spending even if real interest rates are relatively high. The second is to create expectations of inflation by announcing that monetary policy will be expansionary not just now but for the indefinite future.

RECAP MONETARY POLICY INSTITUTIONS

The most important kind of stabilization policy is monetary policy, carried out by the Federal Reserve, the United States' central bank. The principal policy-making body of the Federal Reserve is the Federal Open Market Committee — the FOMC. The FOMC decides what the level of short-term safe nominal interest rates will be, and how fast the money stock will grow. The head of and the most important decision maker in the Federal Reserve is the chair. Alan Greenspan was reappointed to another four-year term as chair of the Federal Reserve in the summer of 2004.

13.2 FISCAL POLICY INSTITUTIONS

The Budget Cycle in Theory

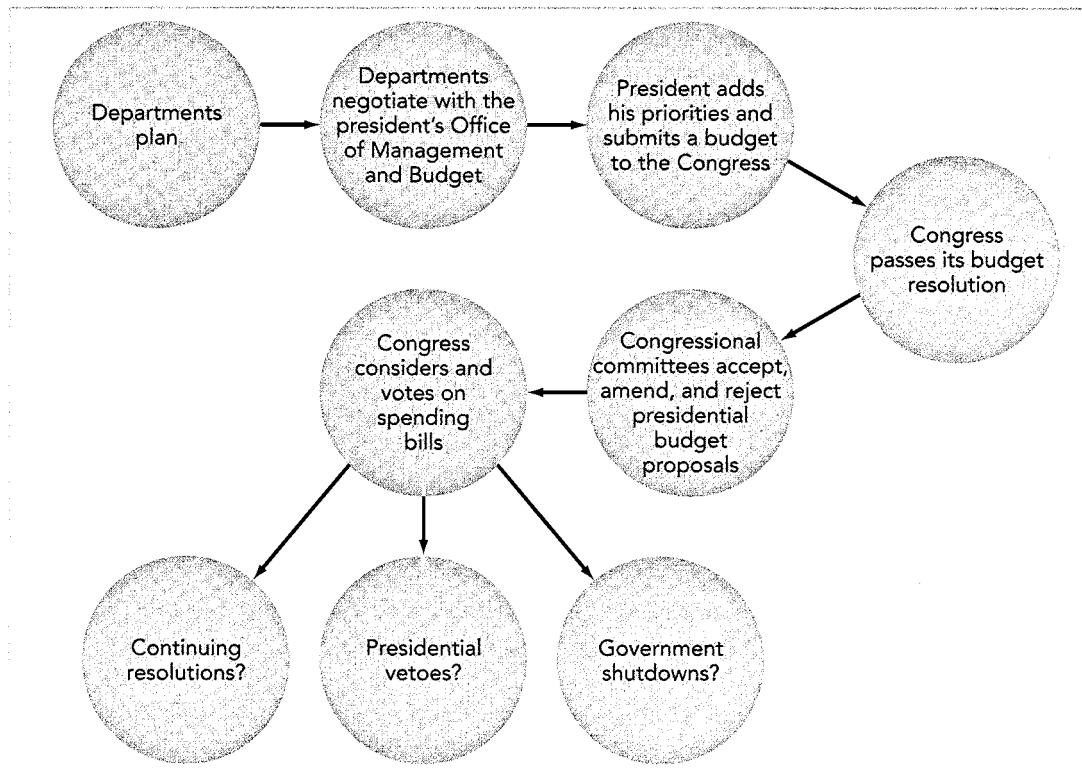
Fiscal policy in the United States today is managed by Congress (subject to the veto of the president). Congress passes laws which the president then signs (or vetoes — and Congress then overrides or fails to override the vetoes). Congress's tax laws determine the taxes imposed by the federal government. Congress's spending bills determine the level of government purchases. Together these taxes and government purchases make up the government's fiscal policy.

Tax and spending levels are set in a combined bureaucratic-legislative process called the budget cycle, outlined in Figure 13.4 on page 386. The federal government's year for budget purposes — its fiscal year — runs from October 1 of one year to September 30 of the next. The budget period from October 1, 2005, to September 30, 2006, for example, is called "fiscal 2006."

Some broad classes of expenditure, called "mandatory," are the result of open-ended long-term government commitments, and they continue whether or not Congress explicitly appropriates money for them in the current year. Social Security, Medicare, Medicaid, unemployment insurance, food stamps, and so forth fall into this category of so-called mandatory spending. Other broad classes of expenditure, called "discretionary," must be explicitly appropriated by Congress in each fiscal year. Defense spending, the National Park Service, NASA, the National Institutes

FIGURE 13.4

The Budget Process The process by which Congress and the president make fiscal policy is arcane and byzantine.



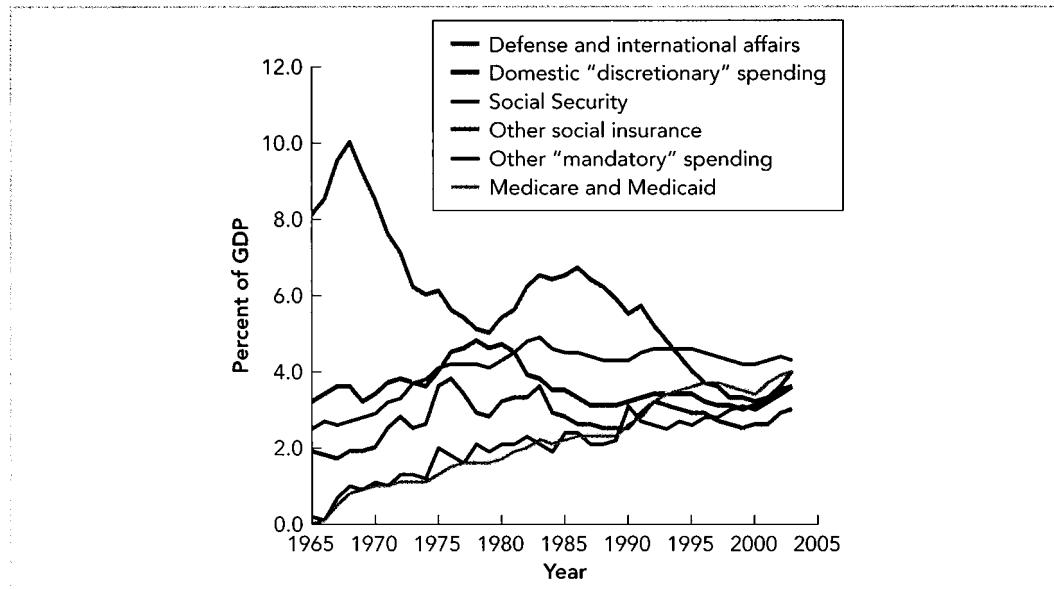
of Health, highway spending, education spending, and so forth fall into this category of so-called discretionary spending. Figure 13.5 shows major areas of spending relative to GDP over the last four decades. Figure 13.6 on page 388 details non-defense discretionary spending.

Early in one fiscal year the executive branch departments and agencies that administer federal programs begin planning for the next. Throughout the fall they negotiate with the president's Executive Office — the Office of Management and Budget. The result of these negotiations, modified by the president's own priorities, becomes the president's budget submission to Congress in January.

Congress considers the president's budget request, conducts its own internal debates, and by the end of April is supposed to have passed a budget resolution giving spending targets for broad classes of expenditure. Using the budget resolution as a guide, Congress alters and amends the laws that control mandatory spending, alters and amends the tax code, and passes the appropriations bills necessary for discretionary spending. By the end of September all of the appropriations bills are supposed to have been passed, so that the new fiscal year can begin with the pieces of the government knowing how much should be spent and on what over the next 12 months.

FIGURE 13.5

Major Federal Government Expenditures by Category, 1965–2003 The past four decades have seen the level of federal government spending as a share of GDP remain roughly constant, but the composition of federal spending has changed remarkably. Spending on national defense and international affairs has fallen from nearly 10 to between 3 and 4 percent of GDP. Spending on Medicare and Medicaid and Social Security has risen from about 2.5 to over 8 percent of GDP. Net interest, which comprises most other “mandatory” spending, rose sharply from 1 to 3 percent of GDP as a result of the deficits of the 1980s, declined in the 1990s, but recently began to climb again. Other social insurance — unemployment insurance, welfare, and so forth — rose from just under 2 percent of GDP in the 1960s to 3.5 percent by the deep recession years of the early 1980s, and has been cut since. And domestic “discretionary” spending — everything else the government does, from the FBI to the National Park Service, the National Institutes of Health, and the interstate highway system — rose from 3 to 5 percent of GDP between 1965 and 1980, and has since been cut back to about 3 percent.



Source: Congressional Budget Office.

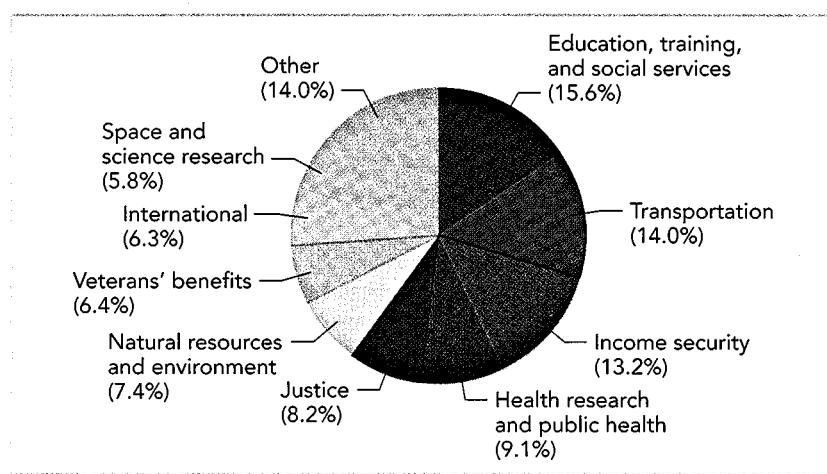
The Budget Cycle in Practice

More often than not, however, Congress fails to pass or the president vetoes one or more appropriations bills. In that case the government continues more or less on autopilot if Congress passes and the president signs a continuing resolution until the appropriations bill is passed. If they don't, the government “shuts down.” Discretionary spending is cut back to the bone. Nonessential employees are sent home. The Washington Monument and other major tourist attractions are closed. Government office buildings are inhabited by only a skeleton crew of key functionaries and unpaid interns until Congress and the president reach agreement and pass and sign the appropriations bills necessary for the government's discretionary spending programs to go forward.

However, even during a so-called government shutdown, most of what the government does continues. Mandatory spending does not have to be explicitly appropriated every year, and it continues even if there is total gridlock in Washington.

FIGURE 13.6**Federal Government Domestic Discretionary Spending, 2000**

Every year Congress and the president must sign appropriations bills for those categories of spending that are not mandated by long-run open-ended enabling statutes (like Social Security, Medicare, and unemployment insurance) or required by the Constitution (like net interest). Of this "discretionary" spending, defense takes about half. The rest is spread out among a wide variety of activities.



Source: Congressional Budget Office.

inside lag

The lapse of time between the moment that a shock begins to affect the economy and the moment that economic policy is altered in response to the shock.

The lesson to draw from this overview is that making fiscal policy in the United States is complicated, baroque, and time-consuming. The **inside lag** — the time between when an economic shock occurs and when a policy proposal becomes effective — for fiscal policy is measured in years. By contrast, the inside lag associated with FOMC-decided changes in monetary policy is measured in days, weeks, or at most two months. The FOMC can turn on a dime. Congress and the president cannot. This is a key advantage that makes the Federal Reserve more effective at undertaking stabilization policy to manage unemployment and inflation.

RECAP FISCAL POLICY INSTITUTIONS

Fiscal policy in the United States is conducted by Congress, which passes laws, and the president, who signs — or vetoes — them. Most government spending is "mandatory" and takes place each year regardless of whether Congress acts. Other spending is "discretionary," subject to the whims of politics, lobbying, and, occasionally, economics. Discretionary spending is well less than half of government spending. Defense spending is about half of discretionary spending.

13.3 THE HISTORY OF STABILIZATION POLICY**The Employment Act of 1946**

The United States government did not always see itself as responsible for stabilizing the economy and taming the business cycle. It accepted this responsibility in the Employment Act of 1946, which did the following:

- Established Congress's Joint Economic Committee.
- Established the president's Council of Economic Advisers.

- Called on the president to estimate and forecast the current and future level of economic activity in the United States.
- Announced that it was the “continuing policy and responsibility” of the federal government to “coordinate and utilize all its plans, functions, and resources . . . to foster and promote free competitive enterprise and the general welfare; conditions under which there will be afforded useful employment for those able, willing, and seeking to work; and to promote maximum employment, production, and purchasing power.”

Passage of the Employment Act marked the rout of the belief that the government could not stabilize the economy and should not try to do so. In the old view, common at the beginning of the twentieth century, monetary and fiscal policies to fight recessions would keep workers and firms producing in unsustainable lines of business and levels of capital intensity, thus making the depression less deep only at the price of making it longer.

This doctrine that in the long run even deep recessions like the Great Depression would turn out to have been “good medicine” for the economy drew anguished cries of dissent even before World War II. John Maynard Keynes tried to ridicule this “crime and punishment” view of business cycles, concluding that he did not see how “universal bankruptcy could do us any good or bring us any nearer to prosperity.” Indeed, it was largely due to Keynes’s writings, especially his *General Theory of Employment, Interest and Money*, that economists and politicians became convinced that the government could halt depressions and smooth out the business cycle. But Keynes was not alone. For example, Ralph Hawtrey, an adviser to the British Treasury and the Bank of England, called worry about government action the equivalent of “crying, ‘Fire! Fire!’ in Noah’s flood.” By the end of the Great Depression there was near universal consensus that the government had to take steps to moderate the business cycle to make sure nothing like the Great Depression ever happened again.

Keynesian Overoptimism and the Monetarist Correction

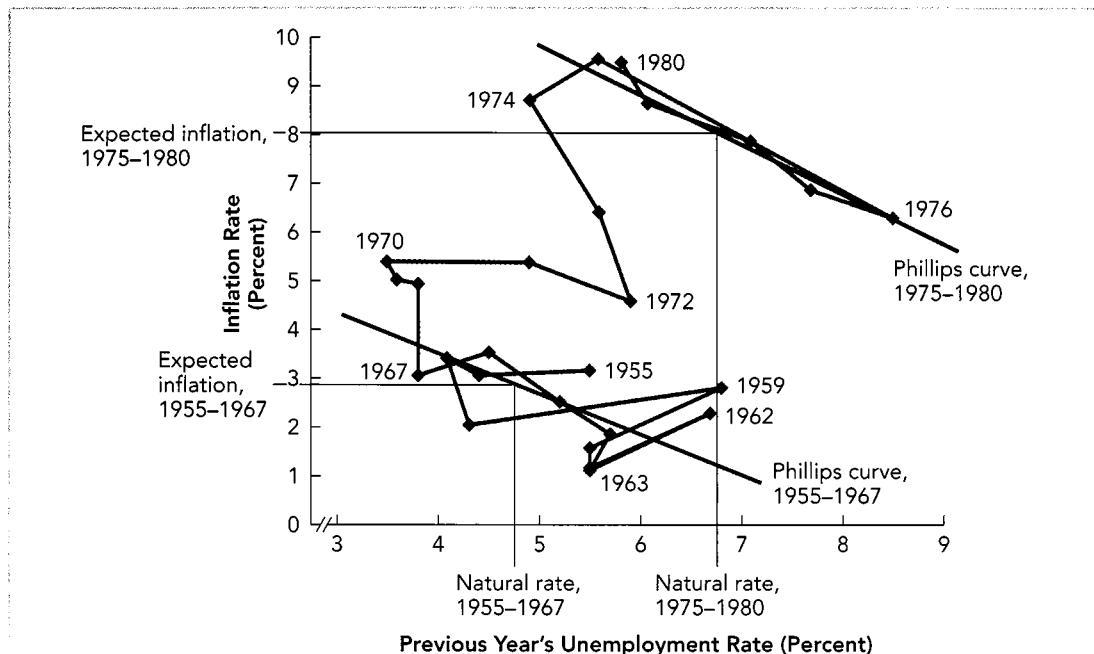
The high-water mark of confidence that the government could and would manage to use its macroeconomic policy tools to stabilize the economy came in the 1960s. In that decade President Lyndon Johnson’s chief economic adviser, Walter Heller, wrote of the “New Dimensions of Political Economy” that had been opened by the Keynesian revolution. The Department of Commerce changed the title of its *Business Cycle Digest* to the *Business Conditions Digest* — because, after all, the business cycle was dead.

The 1970s, however, erased that confidence. Economists Milton Friedman and Edward Phelps had warned that attempts to keep the economy at the upper left corner of the Phillips curve would inevitably cause an upward shift in inflation expectations — that even if expectations had truly been static during the 1950s and early 1960s, they would become adaptive if unemployment were pushed too low for too long.

Friedman and Phelps were correct: The 1970s saw a sharp upward shift in the Phillips curve as people lost confidence in the commitment of the Federal Reserve to keep inflation low and raised their expectations of inflation. (See Figure 13.7.) The result was stagflation: a combination of relatively high unemployment and relatively high inflation. The lesson learned was that attempts to keep unemployment low and the level of output stable were counterproductive if they tried to keep

FIGURE 13.7

The U.S. Phillips Curves, 1955–1980 Between the mid-1950s and the late 1960s, unemployment and inflation in the United States were low and stable, and productivity growth was rapid. Economists in government and their politician bosses thought that the new tools of economic policy had licked the business cycle. They were wrong. Between 1967 and 1975 expected inflation nearly tripled, the natural rate of unemployment rose by 2 percentage points, and stagflation set in.



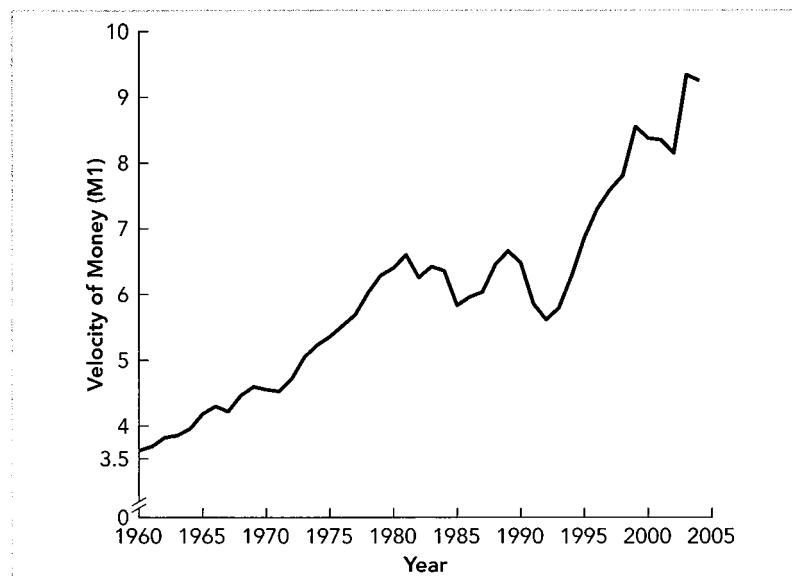
Source: The 2004 edition of *The Economic Report of the President* (Washington, DC: Government Printing Office).

unemployment below the natural rate and so eroded public confidence in the central bank's commitment to keep inflation low and prices stable.

Monetary Management in the 1980s and Beyond

The 1970s ended with many economists convinced that "activist" monetary policy did more harm than good, and that the United States might be better off with an "automatic" monetary policy that fixed some control variable like the money stock on a stable long-run growth path. But the sharp instability of monetary velocity since the start of the 1980s (see Figure 13.8) greatly reduced the number of advocates of an automatic central bank that lets the money stock grow by a fixed proportional amount every year.

Thus today the Federal Reserve acts as outlined in Chapters 10 and 12. As in Chapter 10, the Federal Reserve estimates what level of real GDP will correspond to full employment and where the IS curve will be in a year to a year and a half, and it tries to set a real interest rate today that will produce an appropriate level of output, of capacity utilization, and of the unemployment rate. What is an



Source: The 2004 edition of *The Economic Report of the President* (Washington, DC: Government Printing Office).

FIGURE 13.8
The Velocity of Money
Before 1980 monetarists argued that the velocity of money was stable and predictable. It had a constant upward trend as new technology was introduced into the banking system, and nearly no other fluctuations. Keep the money supply growing smoothly, they argued, and the smooth trend of velocity will keep the economy stable. They too were wrong. After 1980 the velocity of money became unstable indeed.

"appropriate level"? That is where Chapter 12 comes in. When inflation is above the Federal Reserve's target for where it should be, the appropriate level of demand has a certain amount of economic slack built into it to produce downward pressure on inflation. When inflation is below the Federal Reserve's target, it aims for a level of output above potential, all according to the Taylor rule and monetary policy reaction function (MPRF) of Chapter 12. This is the operating procedure that the Federal Reserve has been following for more than two decades. And it is widely judged to have been highly successful.

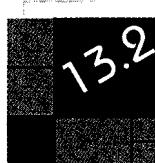
RECAP THE HISTORY OF STABILIZATION POLICY

Before the Great Depression, the government viewed the business cycle much like people today view hurricanes and tornadoes: They are catastrophes, and the government should help those who suffer, but it makes no sense to ask the government to prevent or manage them. Largely as a result of the writings of the British economist John Maynard Keynes, this attitude vanished during the Great Depression and World War II. After World War II, economists and politicians believed that the government could and should prevent great depressions and smooth out the business cycle. Overconfidence in the government's ability to manage the macroeconomy vanished in the 1970s, a decade of both relatively high unemployment and relatively high inflation. Today we have a more limited confidence in the government's ability to stabilize and manage the business cycle.

13.4 THE POWER AND LIMITS OF STABILIZATION POLICY

Economists' Disagreements

Economists today arrange themselves along a line with respect to their views as to how the central bank (the Federal Reserve) and fiscal authorities (the president and Congress) should manage the economy. At one end are economists like Milton Friedman, who holds that activist attempts to manage the economy are likely to do more harm than good. Government should settle on a policy that does not produce disaster no matter what the pattern of shocks or the structure of the economy. This end of the spectrum holds that most of the large business cycles and macroeconomic disturbances experienced in the past century were the result of well-intentioned but destructive economic policy decisions based on faulty models of the economy (see Box 13.2).



THE STRUCTURE OF THE ECONOMY AND THE LUCAS CRITIQUE: THE DETAILS

Economist *Robert Lucas* has argued that most of what economists thought they knew about the structure of the economy was false. Expectations of the future have major effects on decision making in the present: Workers' nominal wage demands, managers' investment decisions, households' consumption decisions, and practically every other economic decision hinge, in one way or another, on what is expected to happen in the future. And expectations depend on many things—including the policies followed by the government. Change the policies followed by the government, and you change the structure of the economy as well.

Thus, Lucas argued, the use of economic models to forecast how the economy would respond to changes in government policy is an incoherent and mistaken exercise. Changes in policy would induce changes in the structure of the economy and its patterns of behavior that would invalidate the forecasting exercise. Economic forecasts based on a period in which inflation expectations were adaptive would turn out to be grossly in error if applied to a period in which inflation expectations were rational. Forecasts of consumption spending based on estimates of the marginal propensity to consume when changes in national income were permanent would lead policy makers astray if used to forecast the effects of policies that cause transitory changes in national income.

This *Lucas critique* is an important enough insight that for it Robert Lucas was awarded the Nobel Prize in 1995. 

Lucas critique

The assertion that much analysis of the effects of economic policy is badly flawed because it does not take proper account of how changes in policies induce changes in people's expectations and thus in their behavior.

At the other end of the spectrum are those who hold that shocks to the economy are frequent and substantial. They believe that appropriate government policy can do a lot to stabilize the economy—to avoid both high unemployment and high inflation.

This economic policy debate has been going on for generations. It will never be resolved, for the differences are inevitably differences of emphasis rather than sharp lines of division. Even the most "activist" economists recognize the limits imposed on stabilization policy by uncertainty about the structure of the economy and the difficulties of forecasting. Even the greatest believer in the natural stability of the economy—Milton Friedman—believes that the economy is naturally stable only if government policy follows the proper policy of ensuring the smooth growth of the money stock.

The Implications of Uncertainty

Because economic policy works with long and variable lags, stabilization policy requires that we first know where the economy is and where it is going. If future conditions cannot be predicted, policies initiated today are as likely to have destructive as constructive effects when they affect the economy 18 months or two years from now.

In general, economists take two approaches in trying to forecast the near-term future of the economy. The first approach is to use large-scale macroeconomic models — more complicated versions of the models of this book. The second approach is to search for leading indicators: one or a few economic variables not necessarily noted in this book that experience tells us are strongly correlated with future movements in real GDP or inflation. Taking over a former U.S. government task, a private economics research group called the Conference Board now publishes a monthly index of leading economic indicators — 10 factors averaged together that many economists believe provide a good guide to economic activity nine or so months in the future.

Of the components that go into the index of leading indicators (see Box 13.3), perhaps the most broadly watched is the stock market. The level of the stock

leading indicators

A number of variables correlated with future movements in real GDP or inflation.



WHAT ARE LEADING INDICATORS? THE DETAILS

The index of leading indicators contains 10 different components. The index used to be constructed by the Commerce Department's Bureau of Economic Analysis. As a cost-saving move, it was privatized: It is now compiled and reported by the Conference Board, a nonprofit economic research group. The Conference Board weights all 10 of these components to try to create the best possible index of leading indicators. The current weighting factors applied to the components of the index are shown in Table 13.1.

TABLE 13.1
Components of the Leading Indicators Index

Code	Component	Weighting
BCI-1	Average weekly hours, manufacturing	0.195
BCI-5	Average weekly initial claims for unemployment insurance	0.027
BCI-8	Manufacturers' new orders, consumer goods and materials	0.050
BCI-32	Vendor performance, slower deliveries diffusion index	0.030
BCI-27	Manufacturers' new orders, nondefense capital goods	0.014
BCI-29	Building permits, new private housing units	0.020
BCI-19	Stock prices, 500 common stocks	0.031
BCI-106	Money supply, M2	0.278
BCI-129	Interest rate spread, 10-year Treasury bonds minus federal funds	0.336
BCI-83	Index of consumer expectations	0.019

market is a good indicator of the future of investment spending because the same factors that make corporate investment committees likely to approve investment projects — optimism about future profits, cheap sources of financing, willingness to accept risks — make investors eager to buy stocks and to buy stocks at higher prices. We can read likely future decisions of corporate investment committees from the current value of the stock market. But the stock market is far from perfect as a leading indicator: As economist Paul Samuelson likes to say, the stock market has predicted nine of the past five recessions.

The Money Supply as a Leading Indicator

A second leading indicator that has been closely watched is the money supply. Before the instability of the 1980s monetarists used to claim that the appropriate measure of the money stock was the only leading indicator worth watching. If the central bank can guide the money stock to the appropriate level through open-market operations, then success at managing the economy will immediately and automatically follow.

As we saw in Chapter 8, no sharp, bright line separates assets that are easy to spend from other assets. A dollar bill is clearly “money” in economists’ sense of being readily spendable purchasing power. But what about a 90-day certificate of deposit with an interest penalty if it is cashed in before it matures? Each place you draw the line gives you a particular total dollar amount of the assets that make up the economy’s “money” — a different monetary aggregate. In order from the smallest to the largest, with each a superset of the one before, the most frequently used measures are called by the shorthand names M1, M2, and M3.

These monetary aggregates do not behave the same. At the start of the 1990s the Federal Reserve faced an especially fierce conundrum. During 1992, for example, M1 — the narrow measure — grew by more than 14 percent while M3, the broad measure, grew by only 0.3 percent, as shown in Figure 13.9.

Different measures of the money stock say different things about monetary policy. Republican Party critics of Alan Greenspan continue to blame his tight money policies for George H. W. Bush’s defeat in the presidential election of 1992, with op-ed columnists like Robert Novak and Fred Barnes being the least forgiving of Greenspan, pointing to 1992’s M3 growth of only 0.3 percent. The Federal Reserve was keeping M3 stable, pushing up interest rates and deepening the 1990–1992 recession. What Novak and Barnes do not tell you — and what supporters of Greenspan do — is 1992 also saw extraordinarily rapid growth of M1 (and short-term real interest rates of less than zero). While those looking at M3 call 1992’s monetary policy extraordinarily contractionary, those looking at M1 take its 14 percent growth rate as evidence of a recession-fighting monetary policy that was strongly stimulative.

To say that the money stock is the single most important leading indicator is not helpful if different measures of “the” money stock say different things. And 1992 is not alone. In 2000 — as the stock market reached its peak and started rapidly down — M3 grew by 8.6 percent and M1 shrank by 3.3 percent. In 1996 M3 grew by 7.5 percent and M1 shrank by 4.3 percent. Easy money or tight money?

All in all, being a monetary economist is much harder than it used to be (see Box 13.4).

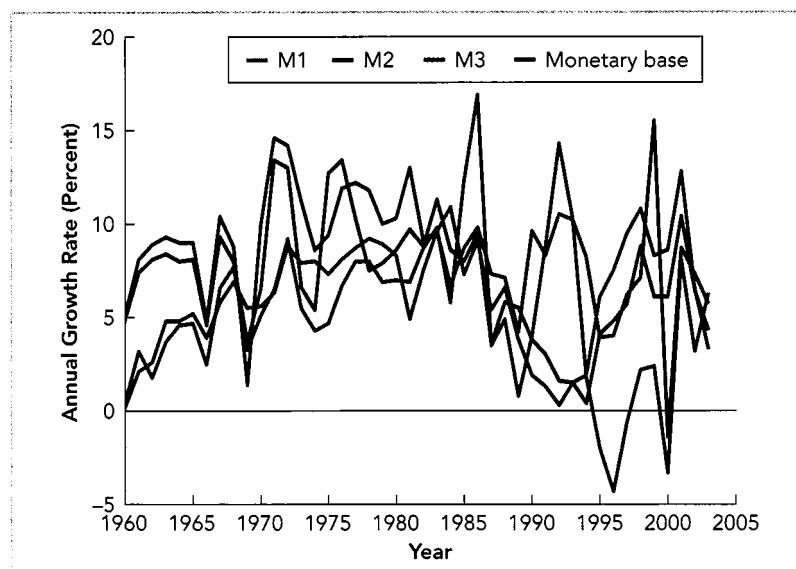


FIGURE 13.9
Different Measures
of the Money Stock
Behave Differently

The graph shows the annual growth rates of different money stock measures. Since 1980 these different measures have ceased to move together. A year like 1996 in which M1 falls can also see M3 grow, with a difference between the two of more than 10 percentage points per year.

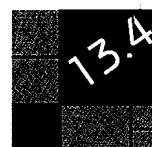
Source: The 2004 edition of *The Economic Report of the President* (Washington, DC: Government Printing Office).

THE MONEY MULTIPLIER: DETAILS

The Federal Reserve's open-market operations change the monetary base: One more dollar's worth of Treasury bills sold to the public means one dollar of cash or reserve deposits fewer in the hands of the public. The effects of Federal Reserve open-market operations on the money supply are less direct, and less certain. Changes in the monetary base cause amplified changes in the money supply through a process called the money multiplier process.

When someone deposits \$100 in cash in a bank, the Federal Reserve requires the bank to set aside some portion of that deposit as a reserve to satisfy the Fed that the bank is liquid and can meet its daily demands for funds. Suppose — for simplicity's sake — that the current reserve requirement is 10 percent, so the bank takes \$10 of the newly deposited cash and itself deposits it in the nearest regional Federal Reserve Bank as a reserve deposit. The bank then loans out the remaining \$90 to collect interest. The borrower receiving the \$90 loan typically redeposits it into some other banks. That second wave of banks set aside 10 percent of what they have received — \$9 — as their reserves, and loan out the remaining \$81. This cycle repeats over and over.

In the end, the Federal Reserve's 10 percent reserve requirement means that an initial injection of \$100 in cash into the banking system leads to an increase in total banking systemwide deposits of $\$100/10\% = \$1,000$, and an increase in banks' own reserve deposits at the Federal Reserve of \$100. Thus if the Federal Reserve injects, say, \$10 billion into the economy in an open-market operation — by purchasing bonds for cash — it triggers a potential increase of as much as \$100 billion in the total money supply. We then say that the economy has a *money multiplier* of 10.



In practice, the increase in the money supply will be less. Borrowing households and businesses who seek to keep a fixed *currency-to-deposits ratio* will keep some of the money in cash, so not all money loaned out by banks in one wave will be redeposited in the next. And banks will keep some excess reserves — not all that they could legally lend will be. The money multiplier depends on three factors: the reserve requirements the Federal Reserve imposes on banks, the proportional amount of excess reserves to deposits that banks seek to keep, and the ratio of currency to deposits in which households and businesses prefer to hold their money. If you know these three factors, then you can calculate that the money multiplier μ is

$$\mu = \frac{(\text{curr}/\text{dep}) + 1}{(\text{curr}/\text{dep}) + (\text{req}/\text{dep}) + (\text{exc}/\text{dep})}$$

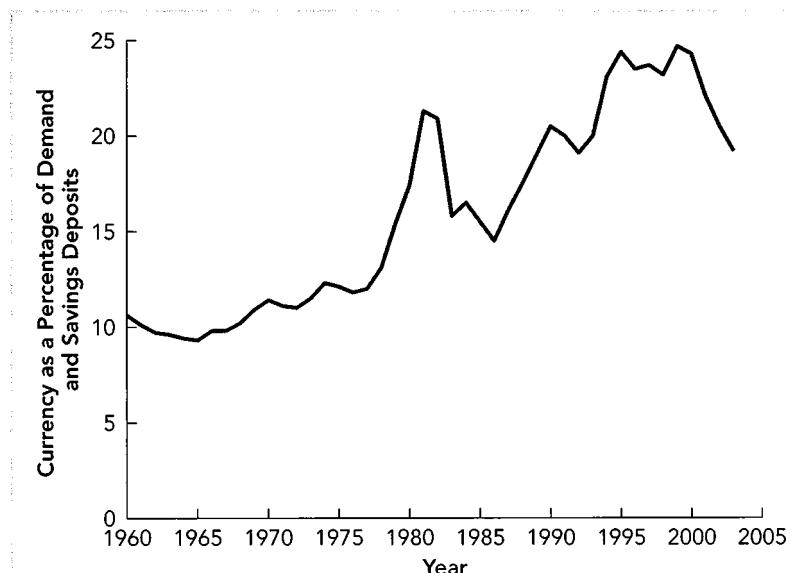
where (curr/dep) is households' and businesses' desired ratio of currency-to-deposits, (req/dep) is the ratio of required reserves imposed by the Fed, and (exc/dep) is the ratio of excess reserves that banks desire to hold to total deposits.

Once you know the money multiplier, you can calculate the economywide stock of liquid money assets M by multiplying the monetary base B directly controlled by the Fed by the money multiplier μ :

$$M = B \times \mu$$

FIGURE 13.10

Changes in the Currency-to-Deposits Ratio The currency-to-deposits ratio was fairly stable up until the late 1970s. Since then it has first risen and then fallen substantially. Its sharp increase and decrease mean that changes in the money stock are not highly correlated with changes in the monetary base produced by Federal Reserve open-market operations.



If any of the three factors determining the money multiplier changes, the money multiplier will change as well — and the money supply will change even if the Federal Reserve has not undertaken any open-market operations and has left the monetary base completely alone:

$$\Delta M = B \times \Delta \mu$$

Do the factors determining the money multiplier shift? Yes, they do. Figure 13.10 shows how one of these three factors — the currency-to-deposits ratio — has varied since 1960.

Long Lags and Variable Effects

Even if economists have good, reliable forecasts, changes in macroeconomic policy affect the economy with long lags and have variable effects. Estimates of the slope of the IS curve are imprecise: This isn't rocket science, after all. Economists are estimating the reactions of human beings to changes in the incentives to undertake different courses of action. They are not calculating the motions of particles that obey invariant and precisely known physical laws.

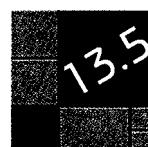
Moreover, changes in interest rates take time to affect the level of planned expenditure and real GDP. It takes time for corporate investment committees to meet and evaluate how changes in interest rates change the investment projects they wish to undertake. It takes time for changes in the decisions of corporate investment committees to affect the amount of work being done that builds up the country's capital stock. It takes time for the changes in employment and income generated by changes in investment to feed through the multiplier process and have their full effect on equilibrium aggregate demand. Thus the level of total product now is determined not by what long-term real risky interest rates are now, but by what they were more than a year and a half ago.

As more than one member of the FOMC has said, making monetary policy is like driving a car that has had its windshield painted black. You guess which way you want to go by looking in the rearview mirror at the landscape behind. Box 13.5 gives an example of how hard driving then becomes.

THE LIMITS OF STABILIZATION POLICY: ECONOMIC POLICY

Suppose that the target level of real GDP that the central bank hopes to attain is \$10,000 billion, but that the central bank staff forecasts that if interest rates are kept at their current levels the real GDP will be only \$9,500 billion. Reducing the interest rate will boost real GDP. But how far it will be boosted is uncertain. Suppose that there is one chance in four that a 1-percentage-point reduction in the interest rate will not boost real GDP at all, one chance in two that a 1-percentage-point reduction in the interest rate will boost real GDP by \$200 billion, and one chance in four that a 1-percentage-point reduction in the interest rate will boost real GDP by \$400 billion.

What should the central bank do? In this particular example, the answer is that it should do only about half as much as it would if there were no uncertainty about the effects of its policies. The point is general: If the effects of policy are uncertain, do less than you otherwise would, and be cautious.



Assume that the central bank tries to make the expected value (in billions) of $(Y - \$10,000)^2$ as small as possible: The best situation is to actually have real GDP equal to \$10,000 billion, and bigger deviations are proportionately worse. Then we can solve the central bank's problem. We can calculate the amount Δr by which it should reduce the real interest rate.

If the central bank reduces the real interest rate by Δr , there is

- One chance in four that $Y = \$9,500$.
- One chance in two that $Y = \$9,500 + \$20,000(\Delta r)$.
- One chance in four that $Y = \$9,500 + \$40,000(\Delta r)$.

In the first case, the squared deviation of Y from \$10,000 is

$$(-\$500)^2 = \$250,000$$

In the second case, the squared deviation of Y from \$10,000 is

$$[\$20,000(\Delta r) - \$500]^2 = 250,000 - 20,000,000(\Delta r) + [400,000,000(\Delta r)^2]$$

In the third case, the squared deviation of Y from \$10,000 is

$$[\$40,000(\Delta r) - \$500]^2 = 250,000 - 40,000,000(\Delta r) + [1,600,000,000(\Delta r)^2]$$

Since there is one chance in four of each of the first and third cases, and one chance in two of the second case, the total expected value (in billions) of $(Y - \$10,000)^2$ is

$$\begin{aligned} & 0.25(250,000) + \\ & 0.50\{250,000 - 20,000,000(\Delta r) + [400,000,000(\Delta r)^2]\} + \\ & 0.25\{250,000 - 40,000,000(\Delta r) + [1,600,000,000(\Delta r)^2]\} = \\ & 250,000 - 20,000,000(\Delta r) + [600,000,000(\Delta r)^2] \end{aligned}$$

When Δr equals 0, this expected value of $(Y - \$10,000)^2$ is \$250,000. When Δr equals 1 percent ($\Delta r = 0.01$), this expected value of $(Y - \$10,000)^2$ is \$110,000. When Δr equals 1.5 percent, this expected value of $(Y - \$10,000)^2$ is \$85,000. And when Δr equals 2 percent, this expected value of $(Y - \$10,000)^2$ is \$90,000. The minimum value of the expected square of the deviation of Y from \$10,000 billion comes for a value of Δr equal to 1.67 percent, which makes the expected square of the deviation of Y from \$10,000 billion equal to \$83,000 billion.

Suppose that we didn't take any account of uncertainty. Suppose that we simply said that the expected value of the increase in real GDP produced by a 1-percentage-point cut in interest rates is \$200 billion, and that we have a \$500 billion output gap to close. Then we would have set Δr at 2.5 percent — a larger change in the interest rate than the 1.67 percent that turned out to be the best a central bank trying to get real GDP as close as possible to \$10,000 billion could do.

Why the difference once one recognizes the uncertainty in the effects of policy? Because active policy to close the output gap has the additional effect of adding yet more variation to real GDP. The stronger the shift in policy, the more uncertain are its effects and the more likely it is that the policy will be counterproductive. This extra risk is the reason that the best thing for the central bank to do in this example is to cut interest rates not by 2.5 percent but by only 1.67 percent.

The point, however, is quite general. When the effects of your policies are uncertain, do less, and be cautious about undertaking bold policy moves.

RECAP THE POWER AND LIMITS OF STABILIZATION POLICY

Economists and policy makers have recognized that the ability of the government to successfully conduct stabilization policy is limited. Uncertainty about the actual state of the economy combined with the long and variable lags with which economic policies take effect means that monetary and fiscal policy must be slow to respond to sudden falls in production and rises in unemployment. Beyond that, because economic policies have uncertain effects, policies to aggressively fight recessions may well wind up being counterproductive. Good policy makers must be cautious policy makers.

13.5 MONETARY VERSUS FISCAL POLICY

Relative Power

At the end of the World War II era, most economists and policy makers believed that the principal stabilization policy tool would be fiscal policy. Monetary policy had proved to be of little use during the Great Depression: Risk premiums and term premiums were too high and too unstable for changes in the short-term nominal safe interest rates controlled by central banks to have reliable effects on production and employment. In contrast, changes in government spending and in taxes were seen as having rapid and reliable effects on aggregate demand. But over the past 50 years opinion has shifted. Today the overwhelming consensus is that monetary policy has proved itself faster acting and more reliable than discretionary fiscal policy.

When Congress tries to stabilize the economy by fiscal policy — by passing laws to change levels of taxes and spending — it cannot realistically hope to see changes in the level of output and employment in less than two years after the bill is first introduced into Congress. It takes time for the bill to move through the House of Representatives. It takes more time for the bill to move through the Senate, and for the conference committee to reconcile the different versions. Yet more time must pass before the operating departments in the executive branch of government can change actual spending or write new rules for administering the tax system once Congress has authorized the fiscal change. And it takes more time for the change in government purchases or in net taxes to have its full effect through the multiplier process.

Monetary policy lags are shorter. The FOMC can move rapidly; once its decisions are made they affect long-term real interest rates on the same day. Substantial lags occur between an interest rate change and output reaching its new equilibrium value: Monetary policy still takes more than a year to work. But monetary policy lags are shorter than those associated with discretionary fiscal policy.

The fact that the Federal Reserve's decision and action cycle is shorter than that of the president and Congress means that the Federal Reserve can, if it wishes, neutralize the effects of any change in fiscal policy on planned expenditure. As a rule, today's Federal Reserve does routinely neutralize the effects of changes in fiscal policy. Swings in the budget deficit produced by changes in tax laws and spending appropriations have little impact on real GDP unless the Federal Reserve wishes them to.

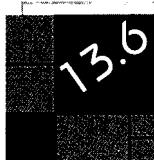
A recent partial exception is provided by the George W. Bush tax cuts of 2001 and 2003. Because the Federal Reserve had already cut interest rates so low, it would have been unable to keep demand stable by lowering interest rates if those

monetary policy lags

The time between when a monetary policy proposal is made and when it becomes effective in changing the economy in some way.

discretionary fiscal policy

Discretionary fiscal policy is made by Congress's and the president's decisions to change levels of spending and of taxes. It is policy that is not automatic in the sense that automatic stabilizers swing into action without anyone making an explicit decision.



TAX CUTS AND ECONOMIC STIMULUS: POLICY

Proponents of discretionary fiscal policy claim the 1964 Kennedy-Johnson tax cut as a success: It stimulated consumption spending and the economy. It was widely perceived as a permanent tax cut that would raise everyone's permanent income. But critics see it as a fiscal policy failure. Discussed in 1961 and proposed in 1962, it was not enacted until 1964 and had little effect on the economy until 1965–1967.

In 1961–1962 the unemployment rate was in the range of 5.5 to 6.7 percent. Maybe there was a case for thinking that unemployment was above its natural rate. But by 1965–1966 the unemployment rate was in the range of 3.8 to 4.5 percent, inflation was about to become a serious problem, and Johnson's advisers were already calling for tax increases to try to reduce aggregate demand and control inflation.

What about the Reagan tax cuts? The deficits that followed the 1981 Reagan tax cut certainly shifted out the IS curve. But did they raise the level of national product? Almost surely not. The Federal Reserve did not want to see national product expanding so fast as to set inflation rising again. Thus the Reagan deficits led to tighter monetary policy, higher interest rates, and lower investment—not to higher employment and total product. The rule that prevails today and probably will prevail for the next generation is that the Federal Reserve offsets shifts in aggregate demand created by the changing government deficit.

There is, however, one exception. Stanford's Michael Boskin argues that the George W. Bush tax cuts of the early 2000s hit the economy at exactly the right moment to cushion the shock to business confidence generated by the September 11, 2001, terror attack on the World Trade Center and the Pentagon. It was not by design—it was by luck—but it was very good luck to have the tax cut taking effect at that exact moment. 

tax cuts had not taken place. Near the edge of such a liquidity trap—when the Federal Reserve runs out of room to cut interest rates further—fiscal policy can have powerful effects. But, as Box 13.6 sets out, that is not the rule but the exception.

Fiscal Policy: Automatic Stabilizers

One kind of fiscal policy works rapidly enough to be important. The so-called fiscal automatic stabilizers swing into action within three months to dampen business cycle-driven swings in disposable income and so moderate the business cycle.

Whenever the economy enters a recession or a boom, the government's budget surplus or deficit begins to swing in the opposite direction. As the economy enters a boom, tax collections and withholdings automatically rise because incomes rise. Spending on social welfare programs like food stamps falls because higher employment and higher wages mean that fewer people are poor. Thus the government budget moves toward surplus, without Congress passing or the president signing a single bill. And if the economy enters a recession, tax collections fall, social welfare spending rises, and the government's budget swings into deficit.

As unemployment rises and national income falls, taxes fall by about 30 cents for every dollar fall in national product. Government spending rises by about 7

automatic stabilizers

Due to changes in tax revenues and in social insurance spending, the government budget automatically swings toward a deficit, providing a stimulus to aggregate demand, whenever private demand drops. Similarly, it automatically swings toward a surplus, reducing aggregate demand, whenever private demand rises.

cents for every dollar fall in national product. As a result, a \$1 fall in national product produces a fall of only 63 cents in consumers' disposable income. Thus automatic stabilizers provide more than \$1's worth of boost to planned expenditure for every \$3 fall in production.

Such fiscal automatic stabilizers would be large enough to reduce the marginal propensity to spend from about 0.6 to about 0.4. This would imply a reduction in the size of the multiplier from about 2.5 to about 1.67. Business cycles could be considerably larger if these automatic stabilizers did not exist, if the Federal Reserve found itself unable to compensate for their disappearance, and if their disappearance did not lead to counteracting changes in the marginal propensity to spend.

How Monetary Policy Works

For monetary policy to work, the Federal Open Market Committee must first recognize that there is a problem. It takes three to six months for statistical agencies to collect and process the data, for the Federal Reserve to recognize the state of the economy, and for it to conclude that action is needed. To this *recognition lag* add a *policy formulation lag*. The FOMC is a committee that moves by consensus. Members who have taken positions out on various limbs need time to climb down. More than six months can elapse between the start of a recession and decisive FOMC action to lower interest rates to try to increase planned expenditure.

Once the Federal Reserve acts, the response of financial markets is immediate. At the latest, interest rates shift the very day the trading desk at the *New York Federal Reserve Bank* receives new instructions. Often interest rates change in advance of the policy change. Because the Federal Reserve moves by consensus, traders can often guess what it is going to do beforehand. However, for changes in interest rates to change real GDP and unemployment takes more than a year. This means that the Federal Reserve is essentially powerless to smooth out fluctuations in less than a year. The average recession in the post-World War II United States has lasted less than 18 months. This means that by the time monetary policy changes initiated at the beginning of the recession and aimed at reducing its size have their effect on the economy, the recession is likely to be nearly over (see Box 13.7).

MONETARY POLICY INSTRUMENTS: POLICY

Today the Federal Reserve focuses on controlling interest rates. In the past it occasionally let interest rates be more volatile and focused on controlling the rate of growth of the money supply — also called the money stock — which is the economy's total supply of liquid assets.

Should the Federal Reserve target real interest rates — try to keep them stable, perhaps allowing them to climb when inflation threatens and to fall during a recession? Or should it focus on keeping the money stock growing smoothly because the money stock is a good leading indicator and stabilizing the growth path of this indicator is a good way to stabilize the economy as a whole?

It depends.

If the principal instability in the economy is found in a shifting IS curve, then targeting interest rates will do little or nothing to reduce the magnitude of shocks



to the economy. Better to have the growth of the money supply react to leading indicators and outcomes. But if the instability lies instead in the relationship between the money stock and real output (the result of volatile money demand) or in a shifting relationship between the monetary base and the money supply (because the currency-to-deposits and *reserves-to-deposits ratios* vary), then targeting interest rates is wiser.

In recent years instability has been primarily in the velocity of money and the size of the money multiplier. The money multiplier fluctuated unexpectedly and widely in the 1980s and 1990s, chiefly because of unexpected fluctuations in the currency-to-deposits ratio. Since 1980, the Federal Reserve's control over the monetary base has not been enough to allow the Federal Reserve to exercise control over the money supply. And the velocity of money has fluctuated as well. By contrast, the position of the IS curve has been relatively stable.

Thus in the past quarter century the Federal Reserve has been more successful targeting the level of interest rates than the growth of the money supply.

RECAP MONETARY VERSUS FISCAL POLICY

Policy affects the economy with a lag. Months or often years elapse from the time a problem occurs, to when policy makers recognize the problem exists, to when they finally reach agreement on a policy solution, to when the solution is put into place, to when the policy solution actually solves the problem. Monetary policy lags are shorter than fiscal policy lags, and that is why economists typically believe monetary policy solves macroeconomic problems better than does fiscal policy. But one type of fiscal policy does work rapidly: automatic stabilizers.

rules

Fixed rules that a central bank must follow for how fast they will allow the money supply to grow.

authorities

Central bank authorities with the discretion to respond to specific circumstances as they see fit. Contrasted with rules in a debate over the best way to conduct policy.

discretion

Leaving policies to be made and adjusted by appointed bodies of experts with discretion to respond to circumstances.

13.6 MAKING GOOD STABILIZATION POLICY: RULES VERSUS AUTHORITIES

In the late 1940s Chicago School economist Henry Simons set the terms for a debate over macroeconomic policy that continues to this day. He asked, Should macroeconomic policy be conducted "automatically," according to rules that would be followed no matter what? Or should macroeconomic policy be left to authorities — bodies of appointed officials — provided with wide discretion over how to use their power and given general guidance as to what goals to pursue?

Competence and Objectives

The first reason for automatic rules is that we fear that the people appointed to authorities will be incompetent. If people are appointed because of friendships from the past, or because of their ability to rally campaign contributions for a particular cause, there is little reason to think that they will be skilled

judges of the situation or insightful analysts. Better then to constrain them by automatic rules. Even if those appointed to authorities are well intentioned, they may fail to find good solutions to macroeconomic problems. The stream of public discourse about macroeconomics is polluted by a large quantity of misinformation.

A second reason for fixed rules is that authorities might not have the right objectives. To institute a good rule it is only necessary for the political process to make the right decision once — at the moment the rule is settled. But an authority making decisions every day may start pursuing objectives that conflict with the long-run public interest. The state of the economy at the moment of the election is a powerful influence on citizens' votes. Thus politicians in office have a powerful personal incentive to pursue policies that will sacrifice the health of the economy in the future in order to obtain good reported economic numbers during the election year, thus creating a **political business cycle** (see Box 13.8).

political business cycle

Movements in unemployment and inflation resulting from discretionary policy timed to enhance the political fortunes of an incumbent president.

THE POLITICAL BUSINESS CYCLE AND RICHARD NIXON: POLICY

The most famous example of the political business cycle at work comes from the American politician Richard Nixon's episodic autobiography, *Six Crises*, published in 1962. Looking back on his defeat in the 1960 presidential election by John F. Kennedy, Nixon wrote:

“Two other developments [that] occurred before the [Republican Party C]onvention . . . [had] far more effect on the election outcome. . . .

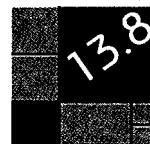
“Early in March [1960], Dr. Arthur Burns. . . called on me. . . [He] expressed great concern about the way the economy was then acting. . . . Burns' conclusion was that unless some decisive government action were taken, and taken soon, we were heading for another economic dip, which would hit its low point in October, just before the elections. He urged strongly that everything possible be done to avert this development . . . by loosening up on credit and . . . increasing spending for national security. The next time I saw the President, I discussed Burns' proposals with him, and he in turn put the subject on the agenda for the next cabinet meeting.

“The matter was thoroughly discussed by the Cabinet. . . . [S]everal of the Administration's economic experts who attended the meeting did not share [Burns'] bearish prognosis. . . . [T]here was strong sentiment against using the spending and credit powers of the Federal Government to affect the economy, unless and until conditions clearly indicated a major recession in prospect.

“In supporting Burns' point of view, I must admit that I was more sensitive politically than some of the others around the cabinet table. I knew from bitter experience how, in both 1954 and 1958, slumps which hit bottom early in October contributed to substantial Republican losses in the House and Senate. . . .

“Unfortunately, Arthur Burns turned out to be a good prophet. The bottom of the 1960 dip did come in October. . . . In October. . . . the jobless rolls increased by 452,000. All the speeches, television broadcasts, and precinct work in the world could not counteract that one hard fact.”

By 1972 Richard Nixon was president, and he had appointed Arthur Burns to be chair of the Federal Reserve. The year 1972 saw very good economic

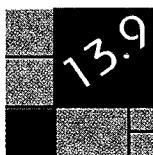


statistics — at the price of a sharp acceleration of inflation in subsequent years. Given the smoking gun provided by Nixon in *Six Crises*, many have diligently searched for evidence that the Federal Reserve made economic policy in 1971 and 1972 not in the public interest but to enhance the private political interest of Richard Nixon.

However, things are more complicated. Economist Herbert Stein pointed out that Nixon administration economic policy was in fact less expansionary than many Democratic politicians and economic advisers wished: The claim that Burns was leaning to the expansionary side of the center of gravity of opinion is simply not correct. And once Arthur Burns had become chair of the Federal Reserve, Nixon administration officials found him to be truly and annoyingly independent.

The verdict is that Richard Nixon dearly wished for the Federal Reserve to tune economic policies in a way that would enhance his reelection chances, but that the institutional independence of the Federal Reserve worked. White House political pressure in 1971–1972 led to little if any change in Federal Reserve policy.

The substitution of technocratic authorities — like the Federal Reserve — in the place of presidents, prime ministers, and finance ministers provides some insulation. The fear that politicians will have objectives different from the long-run public interest has led many to advocate that monetary policy be made by independent central banks. If stabilization policy is to be made by authorities, it should be made by authorities placed at least one remove from partisan politics (see Box 13.9). And there is reason to think that the more independent, the better (see Box 13.10 on page 406).



IS THERE A POLITICAL BUSINESS CYCLE? THE DETAILS

Few would dispute that politicians seek to tune the macroeconomy to their political advantage. The George H. W. Bush administration tried to persuade Federal Reserve Chair Alan Greenspan to pursue a more expansionary monetary policy in 1991 to produce better economic numbers for the George H. W. Bush reelection campaign in 1992, going so far as threatening not to nominate Greenspan for a second term as Federal Reserve chair. But it was unsuccessful. Richard Nixon certainly believed when he appointed Arthur Burns to be Fed chair that Burns would still be the loyal partisan supporter he had been in 1960 — contemplating this appointment, Nixon referred to the “myth of the autonomous Fed” and laughed.

But how successful are governments at manipulating the political business cycle? It is not clear. It is true that in the United States since 1948, the fourth year of a president’s term — the presidential election year — has seen annual real GDP growth average 0.6 percent more than the average of nonpresidential election years. But there is a 15 percent probability that at least that large a difference would emerge from random chance and sampling variation alone. Faster growth in presidential election years is suggestive, but not conclusive.

Moreover, other ways of looking at the data deliver even less evidence. Out of 13 post-1948 presidential terms, fully six — Johnson, Nixon-Ford, Carter, Reagan II,

Bush 41, and Clinton I — saw slower economic growth in the politically relevant second half of the term than in the first half of the term. This alternative way of looking at the data provides not even a suggestion of evidence one way or another. And it is important when analyzing any situation not to choose to look at the data in only the way that makes one's preferred conclusion appear the strongest.

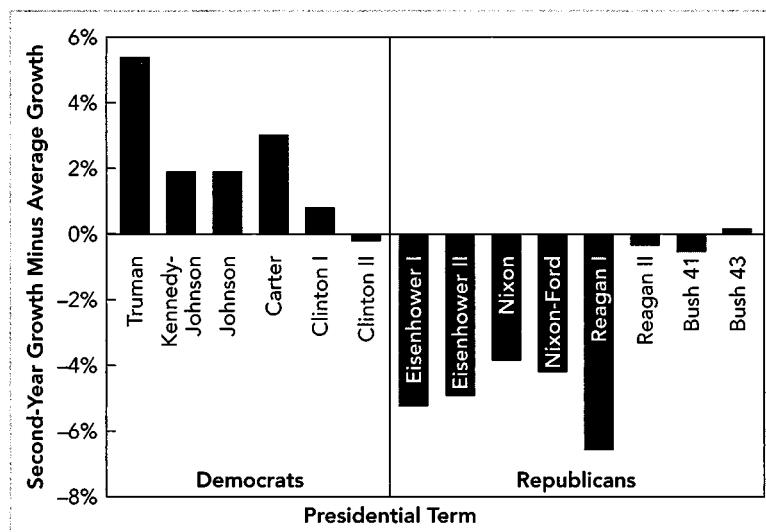
There is, however, stronger evidence not of a politically *motivated* component to the business cycle but of a politically *influenced* component to the business cycle. In seven of the last eight post-WWII presidential terms in which Republicans occupied the White House, growth in the second year of a presidential term has been lower than average real GDP growth over that term. By contrast, in only one of the six terms in which Democrats occupied the White House has second-year growth been lower than average, as shown in Figure 13.11.

The odds against this pattern happening are astronomical: There is less than one chance in a thousand that it could be the result of random sampling variation.

Economists Alberto Alesina and Nouriel Roubini interpret this pattern as showing that the political parties have — or had, for Clinton is the Democratic president

FIGURE 13.11

The Politically Influenced Business Cycle: Relative Growth in the Second Year of Presidential Terms Economic growth (real GDP) tends to be relatively rapid in the second year of the term of a Democratic president. Economic growth tends to be relatively slow — or negative — in the second year of the term of a Republican president.



Note: Bush 41 refers to George H. W. Bush, the 41st president of the United States. Bush 43 refers to his son, George W. Bush, the 43rd president.

Source: Authors' calculations based on data from the 2004 edition of *The Economic Report of the President* (Washington, DC: Government Printing Office); replicating an analysis conducted by Alberto Alesina and Nouriel Roubini, "Political Business Cycles in OECD Economies" (NBER: Working Paper 3478, 1990), subsequently published in the *Review of Economic Studies* 59, October 1992, pp. 663–688.

for whom the pattern of growth fits the Republican model and George W. Bush is the Republican president for whom the pattern fits the Democratic model — different views of the relative costs of unemployment and inflation. Republicans have more tolerance for unemployment and less tolerance for inflation than Democrats do. Hence when Republicans come into office the Federal Reserve feels freer to try to push inflation down to a lower level. Because a considerable portion of inflation expectations relevant for the second year of a presidential term were formed back before the result of the election was known, actual inflation in the second year of a term is less than expected inflation and so economic growth is relatively low.

Credibility and Commitment

A central bank is always tempted to pursue a more expansionary monetary policy: More expansionary policy raises national product and reduces the unemployment rate. Moreover, it has little impact on inflation in the short run in which expectations of inflation are more or less fixed. In the short run, expansionary monetary policy always seems to be a central bank's best option.

Suppose firms and unions agree on large nominal wage and price increases. Then the best short-run policy for the central bank is to accommodate inflation and expand the money supply. To fight inflation by raising interest rates would generate a recession, and inflation would continue anyway. Suppose instead that firms and unions decide on wage and price restraint. Expansionary monetary policy is still better — inflation will be low, and the economy will boom. In either case, pursuing a more expansionary monetary policy produces a better short-run outcome.



CENTRAL BANK INDEPENDENCE: POLICY

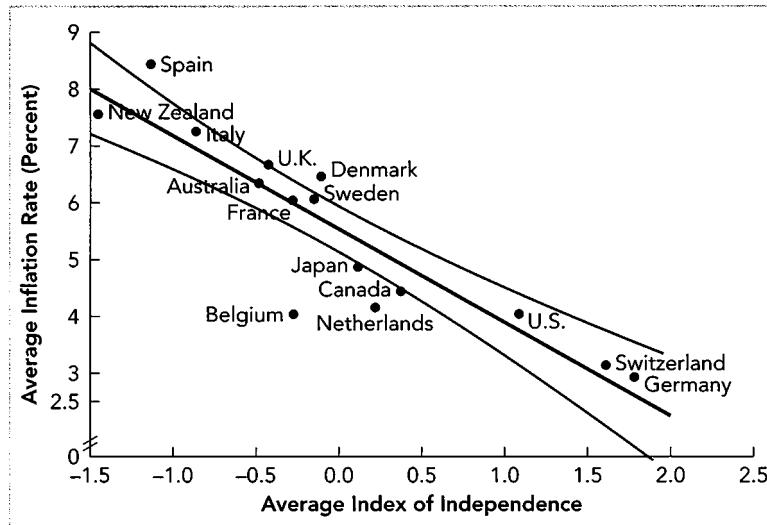
A number of economists have investigated the relationship between macroeconomic performance and the degree to which central banks are insulated from partisan politics. They have examined the legal and institutional framework within which central banks in different countries operate, and constructed indexes of the extent to which their central banks are independent.

Alberto Alesina and Lawrence Summers concluded that the more independent a central bank, the better its inflation performance. More independent central banks presided over lower average inflation and less variable inflation. Moreover, countries with independent central banks did not pay any penalty. Countries with independent central banks did not have higher unemployment, lower real GDP growth, or larger business cycles.

Interpreting this correlation is not straightforward. Perhaps the factors that lead countries to have independent central banks lead them to have low inflation. Perhaps independent central banks do reduce economic growth, but only countries likely to have high economic growth for other reasons are likely to have independent central banks. Nevertheless, at least the post-1950 experience of the industrialized countries strongly suggests that insulating central banks from partisan politics delivers low inflation without any visible macroeconomic cost (see Figure 13.12).

FIGURE 13.12

Inflation and Central Bank Insulation from Politics Countries whose central banks are more independent — rate higher on an average index of independence — have lower average inflation rates.



Source: J. Bradford DeLong and Lawrence H. Summers, "Macroeconomic Policy and Long-Run Growth," in *Policies for Long-Run Economic Growth* (Kansas City: Federal Reserve Bank of Kansas City, 1993), pp. 93–128; replicating an analysis carried out by Alberto Alesina, "Macroeconomics and Politics," *NBER Macroeconomics Annual 1988* (Cambridge, MA: MIT Press, 1988).

At the same time, announcing that monetary policy will be more *restrictive* in the near future produces a better short-run outcome as well, for by announcing that fighting inflation is job one, the central bank may influence the expectations of workers, managers, investors, and households.

But why — given the obvious short-run benefits of a more expansionary monetary policy — should anyone ever believe that a central bank will actually implement restrictive monetary policy and aim for low inflation? Because, in the long run, a central bank is wiser to keep low inflation as its top priority. Central banks benefit if workers, firms, and investors all believe that future inflation will be low. A central bank that succumbs to the temptation to make inflation higher than expected loses its **credibility**. All will soon recognize that the central bank's talk is cheap, and that it has a strong incentive once expectations for a period are formed to make inflation and money growth higher than expected. So the central bank will find that its words about future policy are ignored in the process of setting expectations. And expectations of inflation will be sky-high.

Economists give this conflict the awkward name “**dynamic inconsistency**”: What it is good to have workers, managers, investors, and employers believe that you will do in the future is not what seems best to do when the future becomes

credibility

The degree to which the public believes in the policy action taken by some institution of government (e.g., the Fed, Congress, or the president).

dynamic inconsistency

A situation where a central bank succumbs to the temptation to make inflation higher than expected and thereby loses its credibility.

the present. Many economists have argued that this dynamic inconsistency problem is a strong point on the side of rules rather than authorities: You don't have to worry about a rule breaking its word. Others have pointed out that central banks that are concerned with their long-term reputation and credibility appear to have little problem resisting the temptation to make inflation and money growth higher than the firms and workers in the economy had expected. And they have little problem acquiring credibility if they really want to do so, which they do in many ways, including

- Complaining that inflation may be rising.
- Refusing to admit even the possibility that monetary expansion might reduce unemployment.
- Repeatedly declaring that price stability is the primary objective.

The most important way to acquire credibility is to possess a history of past successful control of inflation.

Modern Monetary Policy

Whether monetary policy is guided by strict and rigid rules or made by authorities using their discretion to come up with the best policy for the particular — unique — situation, one question remains: What sort of rule should be adopted, or how should the authority behave? What sort of guidelines for monetary policy should those who set the rules or those who staff the authorities follow?

Economists believe that one set of rules to avoid are those that command the central bank to attain values for real economic variables, like the rate of growth of real GDP or the level of the unemployment rate. The rate of growth of real GDP is limited in the long run by the rate of growth of potential output. The level of the unemployment rate is controlled in the long run by the natural rate of unemployment. A central-bank target of too high a rate of real GDP growth, or too low a level of the unemployment rate, is likely to end in upward-spiraling inflation. A policy that targets nominal variables — like the nominal money stock, or nominal GDP, or the inflation rate — is robust, in the sense that it does not run the risk of leading to disaster if our assessment of the macroeconomic structure of the economy turns out to be wrong.

Stanford University macroeconomist John Taylor has put forward his Taylor rule as a description of how the Federal Reserve has typically operated, and as a way of adding some structure and order to the process by which the Federal Reserve discusses and makes monetary policy. The Federal Reserve picks a target for inflation. Whenever inflation is higher than the target (and perhaps when unemployment is lower than the Fed's judgment of the natural rate), it raises interest rates to levels above their normal values to diminish output and employment and put downward pressure on inflation. Whenever inflation is lower than the target (and perhaps when unemployment is higher than its judgment of the natural rate), it lowers interest rates to levels below their normal values to boost output and employment.

We've seen this before: It is the MPRF from Chapter 12

$$u = u_0 + \phi(\pi - \pi^t)$$

which assumed that the Fed set interest rates according to the Taylor rule

$$r = r_0 + r_\pi(\pi - \pi^t)$$

This is a version of the Taylor rule for interest rates (one that has the central bank reacting only to the inflation rate; in other versions it reacts to unemployment as well).

Former Federal Reserve Vice Chair Alan Blinder said he found the framework set out by John Taylor to be extremely helpful in making monetary policy. Taylor did not intend for the rule to be followed exactly. For example, if fiscal policy is unusually tight (or loose) then the federal funds rate should be lower (or higher) than the Taylor rule prescribes. The Taylor rule provides a way to think about how strongly the Federal Reserve should move to counter shocks to the economy. Do you believe that the Federal Reserve should act more aggressively to boost the economy when unemployment is high? Then you are arguing for a larger parameter r_π in the Taylor rule. Do you believe that the Federal Reserve reacts too strongly to cool the economy when inflation rises? Then you are arguing for a smaller parameter r_π in the Taylor rule.

RECAP MAKING GOOD STABILIZATION POLICY

Economists disagree over whether the central bank should be tightly constrained by policy rules. Automatic rules are favored by those who believe the authorities are incompetent or misguided. In the United States, the central bank is at least somewhat removed from partisan politics and is given wide discretion. A central bank which, at its discretion, pursues a goal of long-run price stability will have more credibility than one that succumbs to pressure to use short-run expansionary monetary policy to boost employment. The Taylor rule describes how the Federal Reserve typically operates. Despite its name, the Taylor rule is not a rule that the FOMC must follow but a framework for understanding the choices made by monetary authorities operating with discretion.

13.7 FINANCIAL CRISES

But perhaps the most important policy tools of central banks are those that we almost never see used. A huge danger to economies is the possibility of a large-scale financial crisis — like those the U.S. suffered in 1933, 1929, 1907, 1893, 1884, and 1873; like that East Asia suffered in 1997–1998; like that Mexico suffered in 1994–1995. For nearly 400 years market economies have undergone financial crises — episodes when the prices of stocks or of other assets crash, everyone tries to move their wealth into safer forms at once, and the consequent panic among investors can lead to a prolonged and serious depression. Managing such financial crises has been one of the responsibilities of monetary policy makers for more than a century and a half.

A financial crisis sees investors as a group suddenly (and often not very rationally) become convinced that their investments have become overly risky. As a result, they try to exchange their investments for high-quality bonds and cash. But as everyone tries to do this at once, they create the risk that they hoped to avoid: Stock and real estate prices crash, and interest rates spike upward as investors try to increase their holdings of relatively safe, liquid assets.

The sharp rise in real interest rates that occurs in a financial crisis can severely reduce investment, sending the economy into a deep depression. Moreover, once the crisis gathers force, the ability of monetary policy tools to boost investment may well be limited. Financial crises are accompanied by steep rises in risk premiums. They are often accompanied by sharp rises in term premiums as well, as investors decide that they want to hold their wealth in as liquid a form as possible. And financial crises frequently generate deflation as well.

All of these drive a large wedge between the short-term nominal safe interest rates that the central bank controls and the long-term real risky interest rate relevant for the determination of investment and planned expenditure. The central bank may have done all it can via open-market operations to reduce short-term safe nominal interest rates to their lowest possible level, but it may not be enough: Long-term real risky interest rates may well remain very high indeed.

But central banks have powerful (albeit rarely visibly used) tools to stem financial crises. They can make direct loans to institutions in trouble — act as what MIT economist Charles Kindleberger called a “*lender of last resort*” in order to restore confidence that making new loans even in a time of crisis is not unduly risky. And since the Great Depression governments have provided *deposit insurance* to keep savers from pulling their money out of the financial system in a crisis, thus generating a collapse of the banking and payments system for no reason other than their fear that the banking and payments system might collapse.

Lenders of Last Resort

What can a central bank do in a financial crisis? In such a situation a central bank can do a lot of good easily by rapidly expanding the money supply, so that the increase in the demand for liquid assets to hold doesn't lead to a spike in interest rates and a crash in other asset prices.

It can also do a lot more good by lending directly to institutions that are fundamentally solvent — that will, if the crisis is stemmed and resolved rapidly, be able to function profitably — but that are temporarily illiquid in the sense that no one is willing to lend to them because no one is confident that the crisis will be resolved. Such a lender of last resort can rapidly reduce risk and term premiums as it reduces safe short-term nominal interest rates, and it can end the financial crisis.

The problem is that a central bank can also do a lot of harm if it bails out institutions that have gone bankrupt, by encouraging others in the future to take excessive risks hoping that the central bank will bail them out. Thus the central bank has to (1) expand the money supply and lend freely to institutions that are merely illiquid — that is, caught short of cash but fundamentally sound — while (2) forcibly liquidating institutions that are insolvent, those that could never repay what they owe even if the panic were stemmed immediately. This is a neat trick, to save one without saving the other.

A central bank can take institutional steps in advance to reduce the chance that the economy will suffer a financial crisis and reduce the damage that a *financial panic* will do. The first and most obvious step is to do a good job as a supervising regulator over the banking system. Depositors will panic and pull their money out of a bank when they fear that it is bankrupt — that it no longer has

enough capital, and that the capital plus the value of the loans that it has made are together lower than the value of the money it owes to its depositors. If banks are kept well capitalized, and if banks that fail to meet standards for capital adequacy are rapidly taken over and closed down, then the risk of a full-fledged financial panic is small.

The potential problem with this strategy of supervision and surveillance is that it may be politically difficult to carry out. Bankers are, after all, often wealthy and influential people with substantial political connections. Bank regulators are midlevel civil servants, subject to pressure and influence from politicians.

Deposit Insurance and Moral Hazard

The most recent major financial crisis in the United States was long ago. It took place during the Great Depression, and it was not only the last major but also the most destructive financial crisis the United States ever saw.

Banks closed; at the beginning of 1933, more than one in three of the banks that had existed in 1929 had closed its doors. When banks failed, people who had their money in them were out of luck; years might pass before any portion of their deposits would be returned. Hence fear of bank failure led to an immediate increase in households' and businesses' holdings of currency relative to deposits. In the Great Depression this flight from banks reduced the money supply.

With 6,000 banks failing in the first three years of the Depression, more and more people felt that putting their money in a bank was not much better than throwing it away. Since a rise in the currency-to-deposits ratio carries with it a fall in the money multiplier, fear of bank failures shrank the money stock. That only deepened the Depression. Something had to be done to prop up depositors' confidence.

One of the reforms of President Franklin D. Roosevelt's *New Deal* program in the 1930s was the institution of deposit insurance provided by the Federal Deposit Insurance Corporation — the FDIC. If your bank failed, the government would make sure your deposits did not disappear. The aim was to diminish monetary instability by eliminating bank failure–driven swings in the money supply and interest rates.

Since the 1930s, federal deposit insurance has acted as a *monetary automatic stabilizer*. A financial panic gathers force when investors conclude that they need to pull their money out of banks and mutual funds because such investments are too risky. Deposit insurance eliminates the risk of keeping your money in a bank — even if the bank goes belly-up, your deposit is still secure. Thus there is no reason to seek to move your money to any safer place. Deposit insurance has broken one of the important links in the chain of transmission that used to make financial panics so severe.

The availability of deposit insurance and the potential existence of a lender of last resort do not come for free. These institutions create potential problems of their own — problems that economists discuss under the heading of *moral hazard*. If depositors know that the Federal Deposit Insurance Corporation has guaranteed their deposits, they will not inquire into the kinds of loans that their bank is making. Bank owners and managers may decide to make deliberately risky high-interest loans. If the economy booms and the loans are repaid, then they make a fortune. If the economy goes into recession and the risky firms to

which they have loaned go bankrupt, they declare bankruptcy too and leave the FDIC to deal with the depositors. It becomes a classic game of heads-I-win-tails-you-lose.

The principal way to guard against moral hazard is to make certain that decision makers have substantial amounts of their own money at risk. Making risky loans using government-guaranteed deposits as your source of funding is a lot less attractive if your personal wealth is the first thing that is taken to pay off depositors if the loans go bad. Hence deposit insurance and lenders of last resort function well only if there is adequate supervision and surveillance: only if the central bank and the other bank regulatory authorities are keeping close watch on banks, and making sure that every bank has adequate capital, so that it is the shareholders' and the managers' funds, rather than those of the FDIC, that are at risk if the loans made go bad.

RECAP FINANCIAL CRISES

In the extreme situations of financial crises, economic policy makers face a choice between large-scale bankruptcy, the possible unraveling of the financial system, and deep depression on the one hand; and rewarding those who have made overspeculative and overleveraged bets on the other.

Chapter Summary

1. Macroeconomic policy should attempt to stabilize the economy: to avoid extremes of high unemployment and also of high and rising inflation.
2. Long and variable lags make successful stabilization policy difficult.
3. Economists arrange themselves along a spectrum, with some advocating more aggressive management of the economy and others concentrating on establishing a stable framework and economic environment. But compared to differences of opinion among economists in the past, differences of opinion today are minor.
4. In today's environment, monetary policy is the stabilization policy tool of choice, largely because it operates with shorter lags than does discretionary fiscal policy.
5. Nevertheless, the fiscal "automatic stabilizers" built into the tax system play an important role in reducing the size of the multiplier.
6. Uncertainty about the structure of the economy or the effectiveness of policy should lead policy makers to be cautious: Blunt policy tools should be used carefully and cautiously lest they do more harm than good.
7. The advantage of having economic policy made by an authority is that the authority can use judgment to devise the best response to a changing — and usually unforeseen — situation.
8. The advantages of having economic policy made by a rule are threefold: First, rules do not assume competence in authorities where it may not exist; second, rules reduce the possibility that policy will be made not in the public interest but in some special interest; third, rules make it easier to avoid so-called dynamic inconsistency.
9. Dynamic inconsistency arises whenever a central bank finds that it wishes to change its previously announced policy in an inflationary direction: It is always in the central bank's short-term interest to have money growth be higher, interest rates lower, and inflation a little higher than had been previously expected.
10. Today, however, central banks are by and large successful in taking a long-term view. They pay great attention to establishing and maintaining the credibility of their policy commitments.
11. Monetary authorities are vitally important during a financial crisis. They can expand the money supply or serve as a lender of last resort. But they must be wise, for a bluntly applied policy can hurt as readily as it helps during a financial crisis.

Key Terms

inside lag (p. 388)
 Lucas critique (p. 392)
 leading indicators (p. 393)
 monetary policy lags (p. 399)

discretionary fiscal policy (p. 399)
 automatic stabilizers (p. 400)
 rules (p. 402)
 authorities (p. 402)

discretion (p. 402)
 political business cycle (p. 403)
 credibility (p. 407)
 dynamic inconsistency (p. 407)

Analytical Exercises

1. What is the Lucas critique? How would the Lucas critique suggest that you should design a policy to try to reduce annual inflation from 10 percent to 2 percent?
2. What is “dynamic inconsistency”? Why does dynamic inconsistency strengthen the case for having policy rules rather than having authorities with discretionary power over economic policy?
3. Under what circumstances do you think that the Federal Reserve should shift from targeting the interest rate to targeting the money stock growth rate?
4. What would be the economic advantages and disadvantages of eliminating federal deposit insurance?
5. Why do economic policy makers think it important to get the best available forecasts?

Policy Exercises

1. Suppose that the economy's Phillips curve is given by

$$\pi = \pi^e - \beta(u - u^*)$$

with β equal to 0.4 and u^* equal to 0.06 (6 percent). Suppose that the economy has for a long time had a constant inflation rate equal to 3 percent per year. Suddenly the government announces a new policy: It will use fiscal policy to boost real GDP by 5 percent relative to potential — enough by Okun's law to push the unemployment rate down by 2 percent — and it will keep that expanded fiscal policy in place indefinitely. Suppose that agents in the economy have adaptive expectations of inflation, so that this year's expected inflation is equal to last year's actual inflation. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out 20 years, assuming that no additional shocks occur.

2. Suppose that all conditions given in question 1 are the case. In addition, suppose that for each 1 percentage point that the inflation rate rises above 3 percent, the central bank raises real interest rates by 2 percentage points — and that each 1-percentage-point increase in real interest rates moves the economy along the IS curve sufficiently to shrink real GDP by 1 percent. As in question 1, suppose that agents in the economy have adaptive expectations of inflation, so that this year's expected

inflation is equal to last year's actual inflation. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out 20 years, assuming that no additional shocks occur.

3. Suppose that all conditions in question 2 are the case, except that β equals 0.5 and that for each 1 percentage point the inflation rate rises above 3 percent, the central bank raises real interest rates by only 1 percentage point. Again, suppose that each 1-percentage-point increase in real interest rates moves the economy along the IS curve sufficiently to shrink real GDP by 1 percent. Finally, suppose that agents in the economy have rational expectations of inflation, so that this year's expected inflation is what an economist knowing the structure of the economy and proposed economic policies would calculate actual inflation was likely to be. What will be the course of inflation and unemployment in this economy in the years after the shift in fiscal policy? Track the economy out 20 years, assuming that no additional shocks occur.
4. Why do economists today tend to believe that monetary policy is superior to discretionary fiscal policy as a stabilization policy tool? In what circumstances that you can imagine would this belief be reversed?

14

CHAPTER

Budget Balance, National Debt, and Investment

QUESTIONS

What is the best measure of the government's budget balance for analyzing short-run stabilization policy? For analyzing the effect of changes in the national debt on long-run growth?

What is the typical pattern that the U.S. national debt follows over time?

How has experience in the past generation deviated from this traditional pattern of debt behavior?

Why should we worry about a rising national debt?

Why shouldn't we worry too much?

government deficit

The difference between government spending and the government's revenue when the first is larger than the second.

national debt

The sum total of all past deficits less all past surpluses the government has run.

government surplus

The difference between the government's spending and the government's revenues when the second is larger than the first.

A government spending more than it collects in taxes (including the inflation tax noted in Chapter 8) must borrow the difference to finance its spending. The amount borrowed this year is this year's **government deficit**. A government borrows by selling its citizens and foreigners bonds: promises that the government will repay the principal it borrows with interest. These accumulated promises to pay make up the **national debt**. In a year when government spending is less than tax collections, the difference is the **government surplus**. The national debt shrinks by the amount of the surplus.

Call the *debt* D and the deficit d (and recognize that a surplus is a negative value of d). Then the relationship between the debt and the deficit is simple:

$$\Delta D = d$$

The change in the debt from year to year ΔD is equal to the deficit d .

Economists are interested in the debt and the deficit for two reasons. First, the deficit is a convenient and often handy — though sometimes treacherous — measure of fiscal policy's role in stabilization policy. It is an index of how government spending and tax plans affect the position of the IS curve of Chapter 10. The central bank will in general adjust its stance to try to offset the effects of the deficit on planned expenditure so that deficits do not upset the monetary policy reaction function (MPRF) of Chapter 12.

Second, the debt and deficit are closely connected with national saving and investment. A rising debt — a deficit — tends to depress capital formation. It lowers the economy's long-run balanced-growth path and reduces the balanced-growth GDP per worker of Chapter 4. Moreover, a high national debt means that taxes in the future will be higher to pay higher interest charges. Such higher taxes are likely to further discourage economic activity and reduce economic welfare.

What to do about the national debt is one of the current flashpoints of American politics. The United States ran its national debt up by an enormous amount during the high-deficit Reagan and Bush 41 (George H. W. Bush was the 41st president) administrations from 1981 to 1992. This pattern of large deficits and rapidly growing debt was restored beginning in 2001 under the Bush 43 administration (George W. Bush is the 43rd president). This self-generated problem is one of the biggest economic problems that will confront the United States in the second half of this decade.

One of the main questions facing American voters and politicians now is: What (if anything) should be done to deal with the large future rise in the debt that is currently being forecast? Should the government accept large deficits? Should it try to stabilize the government debt-to-GDP ratio, and if so at what level? Should the government aim for large surpluses in order to push the debt down to its late-1970s level (or even lower) share of GDP? At the moment this issue hangs in the balance.

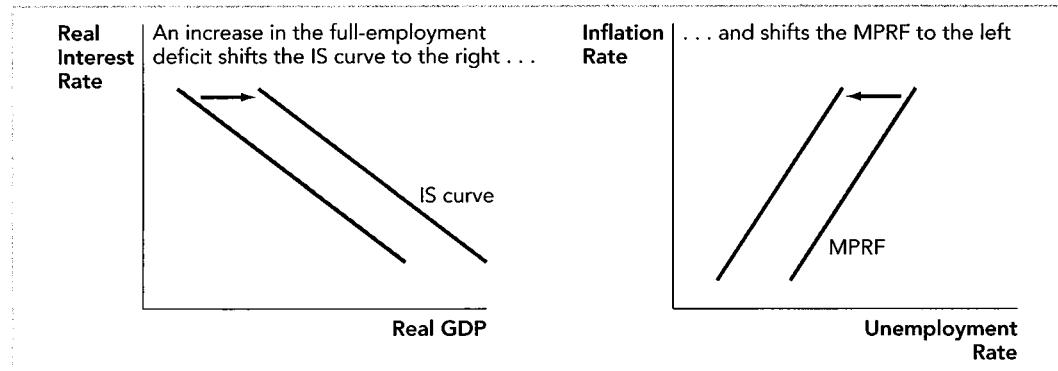
14.1 THE BUDGET DEFICIT AND STABILIZATION POLICY

The Budget Deficit and the IS Curve

An increase in government purchases increases planned expenditure. It shifts the IS curve out and to the right, increasing the level of real GDP for each possible value of the interest rate. The increase in government purchases shifts the MPRF in and to the left, decreasing the unemployment rate at each level of inflation.

FIGURE 14.1

An Increase in the Full-Employment Deficit Shifts the IS Curve Outward and the MPRF Inward An increase in government purchases or a decrease in net taxes when employment is held at full employment shifts the IS curve to the right and shifts the MPRF to the left. To keep track of the impact of government tax and spending policy on the position of the IS curve, we need to look at the difference between the two when the economy is at full employment — the full-employment government deficit (or surplus).



A decrease in government tax collections also increases planned expenditure. If the decrease in tax collections is due to a drop in income, we simply move along an IS curve. But if a change in tax policy made tax collections fall, this change also shifts the IS curve out and the MPRF in: Unless the Federal Reserve changes the rule it uses to set interest rates, it will find that the fiscal stimulus is making unemployment lower than it expected and desired given the current rate of inflation.

The government's budget deficit is equal to purchases minus net taxes. Must we bother with two measures of fiscal policy — purchases and net taxes — when we can just keep track of their difference? No. Our drive for simplification is the reason for focusing on the government's budget balance as a measure of fiscal policy.

But it turns out, as Figure 14.1 shows, that the right measure of budget balance is not the government's actual deficit (or surplus). Instead, the right measure of fiscal policy is the **full-employment or cyclically adjusted deficit (or surplus)**: what the government's budget balance would be if the economy were at full employment.

full-employment cyclically adjusted deficit

An estimate of what the budget deficit would be if national product were at potential output. This measure removes shifts in the budget deficit that are due to the operation of the economy's automatic stabilizers.

THE BUSH TAX CUT OF 2001: POLICY

It is extremely rare in the United States that a tax cut legislated by the Congress and signed by the president takes effect at the right moment to offset a recession. Most tax cuts that have their origin in a desire to fight a recession do not take effect until long after the need has passed. The most recent such example is the so-called stimulus package proposed in the aftermath of the September 11, 2001, terrorist attacks on the World Trade Center and the Pentagon. Squabbling between the houses of Congress and between the Congress and the president kept it from being enacted until the consensus of economists and the Federal Reserve was that the recession of 2001 had already ended.



However, one tax cut — the Bush tax cut of 2001 — did, largely by accident, take effect right at the moment that consumer confidence was depressed by the destruction of the World Trade Center. According to Morgan Stanley's economic analysis staff, the tax cut enacted in 2001 boosted household disposable income in the first quarter of 2002 by an amount equal to approximately \$100 billion a year, well over 1 percent of GDP. This boost to household disposable income was very welcome and kept the recession of 2001 from being longer and deeper than would otherwise have been the case.

What of the standard argument that fiscal policy — tax cuts and spending increases — should not be used to manage the business cycle? This argument hinges on the belief that the Federal Reserve (1) is more competent than the Congress and the president, (2) is more efficient than the Congress and the president, and (3) has sufficient room to maneuver to stabilize the economy near full employment. Although the quality of the Federal Reserve staff analysis certainly is higher than that of the Congress, and although the long and variable "inside" lags associated with legislation make discretionary fiscal policy erratic, nevertheless, by the end of 2001 the Federal Reserve found that it had cut interest rates almost as far as they could go: The short-term federal funds interest rate was down to 1.75 percent per year, and in its internal discussions the Federal Reserve was beginning to worry that with "short-term interest rates . . . already . . . very low," if "the economy were to deteriorate substantially . . . it might be impossible to ease monetary policy sufficiently through the usual interest rate process" to keep the economy near full employment. In this context, the extra boost to planned expenditure provided by the arrival of the stimulative effects of the Bush 2001 tax cut was very welcome.

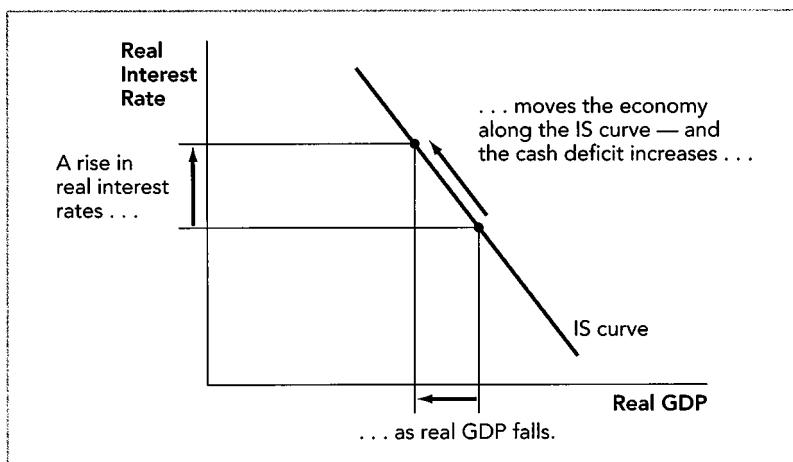
In 2003 an even stronger argument could be made for using fiscal policy to try to stimulate demand. The U.S. recovery had stalled in late 2002, and the Federal Reserve had run out of room to lower short-term interest rates further without risking damage to the ability of important financial institutions to survive. A further boost to demand at that time would have been very welcome as well. Unfortunately, the tax cut proposed and passed by the Bush administration was one that channeled most of the tax relief to those with relatively low marginal propensities to consume, and the effectiveness of the 2003 tax reduction as a short-run stabilization policy is questionable.

Does fiscal policy therefore have a stable place as an important stabilization policy tool? This seems unlikely. Recall that the beneficial effects of the 2001 Bush tax cut came about as a result of an unexpected and lucky chance. It is still the case that — as long as full employment does not require that the Federal Reserve push short-term safe nominal interest rates below zero — monetary policy is a faster acting and more flexible stabilization policy tool than discretionary fiscal policy. And situations like those of 2003, when the Federal Reserve found itself in the position of having already reduced interest rates almost as far as they could go, are very unusual.

However, in a low-inflation world like that in which we live today, the fact that the Federal Reserve cannot push short-term safe nominal interest rates below zero places limits on the effectiveness of monetary policy as well. 

Measuring the Budget Balance

Unfortunately, the government budget bottom line reported in the newspapers is not the full-employment budget balance. It is either the "unified cash" balance or the balance excluding Social Security. The first of these bottom lines is the difference

**FIGURE 14.2****A Fall in Real GDP**

The cash budget balance is not a good indicator of the position of the IS curve.

between the money that the government actually spends in a year and the money that it takes in. This balance is called “unified” because it unifies all of the government’s accounts and trust funds (including Social Security). This balance is called “cash” because it does not take account of either changes in the value of government-owned assets or the future liabilities owed by the government: It is just cash in minus cash out. The second of these bottom lines is equal to the unified cash balance minus the revenues and plus the expenditures of the Social Security program. It takes the Social Security system “off budget.”

Why is the full-employment budget balance a better index than either of the more frequently mentioned cash budget balance measures? Consider a situation in which the government does not change either its purchases or its tax rates, and so there is no change in government fiscal policy. But suppose that monetary policy tightens: Real interest rates are raised, and so the economy moves up and to the left along a stable IS curve (see Figure 14.2). As the economy moves along the IS curve, real GDP falls and tax collections fall too. The government’s cash deficit increases, even though there has been no change in government policy to shift the IS curve. The full-employment budget balance, however, remains constant. The fact that the cash budget balance changes as the economy moves along a constant IS curve means that it is not a good indicator of how the government’s fiscal policy is affecting the location of the IS curve: The full-employment budget balance is better.

To turn the cash balance into the full-employment balance, we must adjust the budget deficit (or surplus) for the automatic reaction of taxes and spending to the business cycle, as is done in Figure 14.3. When unemployment is high, taxes are low and social welfare spending high. The budget balance swings toward deficit. When unemployment is low, taxes are high and the budget balance swings toward surplus.

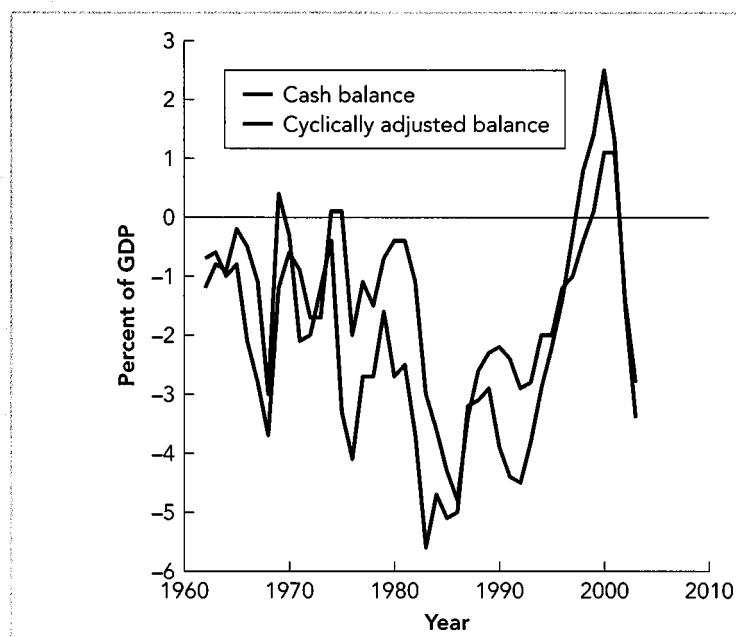
However, the cyclically adjusted budget deficit is not a perfect measure of the effect of taxing and spending on the position of the IS curve. And the standard budget deficit you see reported in the newspapers is not even a good measure of the effect of taxing and spending on the position of the IS curve. More adjustments are needed.

cash budget balance

A way of measuring the government’s budget balance called “cash” because it does not take account of changes in the value of government-owned assets or of the future liabilities owed by the government.

FIGURE 14.3
The Full-Employment and the Cash Budget Deficits

The difference between the actual cash budget balance and the full-employment balance can be substantial when the economy is either suffering from a recession as in the early 1990s or undergoing an uplifting boom as in the late 1990s.



Source: Congressional Budget Office.

RECAP THE BUDGET DEFICIT AND STABILIZATION POLICY

The cyclically adjusted budget deficit is a good measure of the impact of the government's taxing and spending on aggregate demand. When the cyclically adjusted budget deficit rises, the IS curve shifts right as government policy becomes more stimulative. When the cyclically adjusted budget deficit falls, the IS curve shifts left as government policy becomes more contractionary.

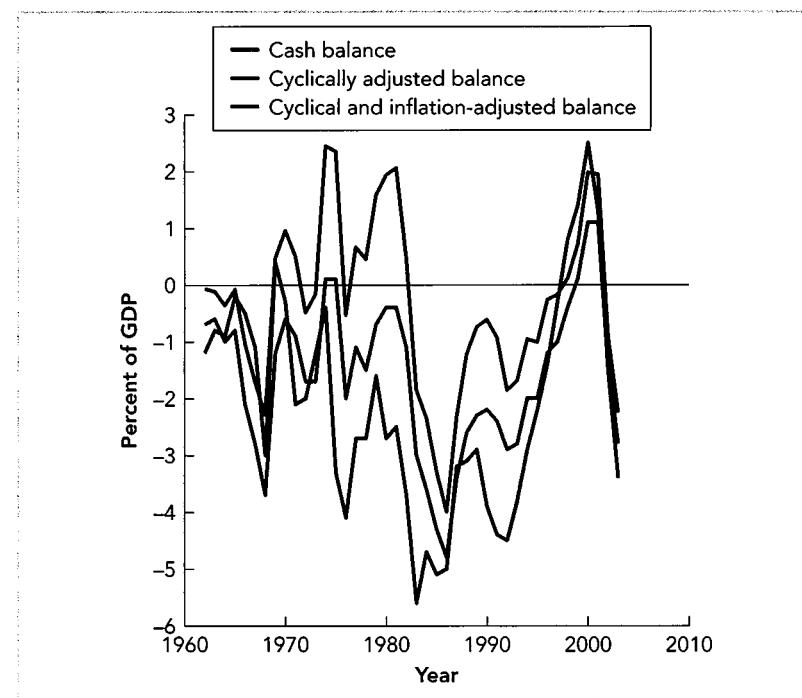
14.2 MEASURING THE DEBT AND THE DEFICIT

In addition to cyclical adjustment, we should consider making three other adjustments to the reported cash budget balance. These adjustments matter, as Figure 14.4 shows.

Inflation

One adjustment economists make is to correct the officially reported cash budget balance for the effects of inflation. A portion of the debt interest paid out by the government to its bondholders merely compensates them for inflation's erosion of the value of their principal.

A good measure of the deficit should be a measure of whether the government is spending more in the way of resources than it is taking in: a measure

**FIGURE 14.4**
The Cash Balance and the Inflation-Adjusted Budget Balance

Large differences between officially reported and economically relevant measures of budget balance emerge as more adjustments are made. Adjusted for both the state of the business cycle and inflation, the federal budget was in rough balance or even in surplus (save for the peak of the Vietnam War) until the 1980s.

Source: Congressional Budget Office.

of the change in the real debt that the government owes. At the end of the year the debt principal plus this inflation component of debt interest are together equal — in their power to purchase useful goods and services — to what the debt principal was at the start of the year. So the real interest that the government has paid on its debt is not equal to the nominal interest rate times the debt, iD , but to the real interest rate times debt, rD . The difference between the nominal and the real interest rate is the expected rate of inflation, which we'll assume here equals the inflation rate π . Hence the real deficit d^r is related to the cash deficit d^c by

$$d^r = d^c - \pi D$$

Almost everyone who analyzes economic and budget policy prefers to work with these inflation-adjusted measures of the deficit and debt.

Public Investment

Yet another adjustment corrects for an asymmetry between the treatment of private and public assets. Private spending on long-lived capital goods is called “investment.” A business with total sales of \$100 million, costs of goods sold of \$90 million, and \$20 million spending on enlarging its capital stock reports a profit of \$10 million — not a deficit of \$10 million. Standard and sensible

accounting treatment of long-lived valuable assets in the private sector is definitely not to count their entire cost as a charge at the time of initial purchase, but instead to spread the cost out—a process called “amortization”—over the useful life of the asset. The government should do its accounting the same way, like a business, and amortize rather than expense its spending on long-lived assets.

Calls for reforming the federal government budget to use capital budgeting are heard periodically. But few people use numbers based on capital budgeting. The principal reason that capital budgeting is resisted is political. Which government expenditures are capital expenditures? Aircraft carriers and nuclear weapons? The interstate highway system? Improvements to trails in the national parks? Head Start expenditures—money spent on educating poor children? (After all, this is an investment in their future.)

From a political point of view, a dividing line between government investment and government consumption expenditures is unlikely to stand for long when subjected to pressure from Congress eager to justify expenditures by calling them “investments,” and possessing the legal power to direct estimating agencies like the Congressional Budget Office and the Office of Management and Budget to do so. Thus critics regard capital budgeting as simply too difficult to implement in a helpful way. Supporters, however, point out that not doing capital budgeting at all is, in a sense, worse than even the least helpful implementation.

The fact that the numbers usually reported do not correct for public investment should be kept in mind: The reported numbers tend to overestimate the real value of the outstanding national debt and overstate the magnitude of the current deficit.

Future Government Liabilities and Generational Accounting

All of the issues surrounding capital budgeting appear again whenever the long-run future of the government’s budget is considered. Back when Brad worked at the Treasury Department, some \$10,000 a year was set aside for him in his Treasury pension account. It is as if his income had been \$10,000 a year higher, and he had invested that extra \$10,000 in U.S. government bonds. Bonds issued by the government appear on the books as part of the government’s debt. But pension fund liabilities that the government owes to former workers do not.

Thus in a sense the right way to count the government’s debt is to look not just at the bonds that it has issued but at all of the promises to pay money in the future that it has made. Indeed, a large chunk of the government’s expenditures—those by the Medicare and Social Security trust funds, for example—are presented to the public in just this way. The Social Security deficit reported by the trustees of the Social Security system every spring is not the difference between Social Security taxes paid in and Social Security benefits paid out, but is instead the long-run, 75-year balance between the estimated value of the commitments to pay benefits that the Social Security system has made and will make and the estimated value of the taxes that will be paid into the Social Security trust funds.

But the Social Security trustees’ report covers just one program—albeit a big program. And great confusion is created by the fact that the Social Security system’s expenditures and revenues are also included within the unified budget balance.

Wouldn't it be better to bring all of taxation and spending within a long-run system like that currently used by Social Security?

Economists Laurence Kotlikoff and Alan Auerbach say an emphatic yes. They propose that instead of the year-by-year budget balances, the U.S. government shift to a system of "generational accounting." Generational accounting would examine the lifetime impact of taxes and spending programs on individuals born in specific years and provide a final balance that could be used for long-term planning. Auerbach and Kotlikoff clearly have a strong case. Yet few analysts of the budget use their generational accounting measures, and at the moment these issues are not often dealt with in macroeconomics classes, but are reserved for public finance classes.

Generational accounting is thus not part of the present state of macroeconomics, but it should become part of its future, for the issues involved are the biggest ones facing the domestic American government today. For example, in the fall of 2004 Brookings Institution economists William Gale and Peter Orszag projected that current U.S. government policies would produce cash deficits averaging 3.5 percent of GDP over the next decade as shown in Figure 14.5. Compared to a *balanced budget*, they argued, such deficits would reduce annual GDP a decade from now by 1 to 2 percent—that is, \$1,500 to \$3,000 per household. And that, they said, was the "good part of the story." The bad part lay further in the future in the liabilities the government was assuming through its big social-insurance programs: Medicare, Medicaid, and Social Security. Over the next 75 years, as Figure 14.6 on page 424 shows, the nation's fiscal gap would amount to about 7 percent of GDP. At some point taxes must be raised substantially or benefits paid to Social Security, Medicaid, and Medicare recipients need to be cut well below currently projected levels. The fact that budget accounting does not include generational accounting reduces politicians' incentives to try to tackle these problems today.

generational accounting

A way of looking at the government's tax and spending plans that attempts to set out the total lifetime impact of government policy on an individual's resources and obligations.

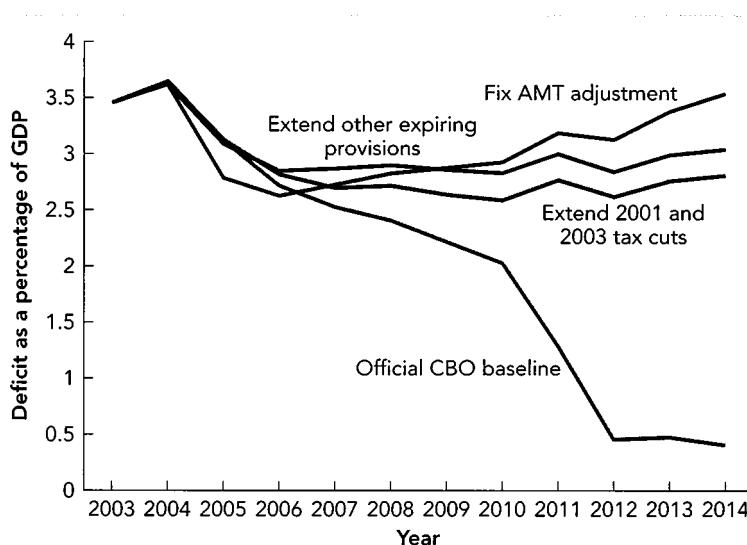
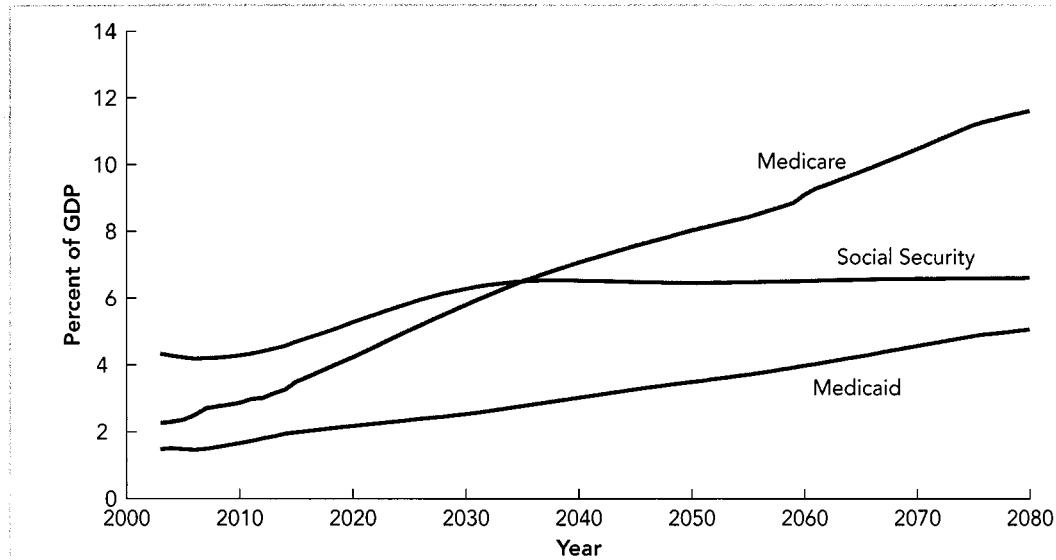


FIGURE 14.5
Budget Deficit
Projections over the
Next 10 Years

The Bush administration, newly reelected in 2004, is committed to (1) making permanent the 2001 and 2003 tax cuts, (2) extending the standard list of other expiring tax preferences, and (3) keeping the Alternative Minimum Tax (AMT) from becoming the effective tax system. These commitments mean that the deficit is unlikely to decline as a share of the economy.

FIGURE 14.6

Projected Entitlement Costs as a Percentage of GDP As America's population ages and medical care costs continue to rise, the costs of federal "entitlement" programs are projected to rise enormously. From today's level of 8.5 percent of GDP, the three big programs — Medicare, Medicaid, and Social Security — are projected under current law to rise to 23 percent of GDP by 2080.



Source: William Gale and Peter Orszag, Tax Policy Center, www.taxpolicycenter.org.

RECAP MEASURING THE DEBT AND THE DEFICIT

Measuring the debt in an economically relevant way requires — in addition to a cyclical adjustment — three further adjustments to the reported cash government budget balance. Adjusting for inflation's effect on debt interest produces the real deficit. Adjusting for public spending on investment goods — a political hot potato — is capital budgeting. Adjusting for taxes we are strapping our kids and grandkids with — an even hotter political potato — is generational accounting. In practice, the reported government deficit includes none of these adjustments.

14.3 ANALYZING THE DEBT AND THE DEFICIT

Sustainability

The first question to ask about a government that is running a persistent deficit is: "Can it go on?" Is it possible for the government to continue running its current deficit indefinitely, or must policy change — possibly for the better, but also quite possibly for the worse?

The Equilibrium Debt-to-GDP Ratio

The variable to look at to assess whether the government's current fiscal policy is sustainable is the time path of the ratio of the government's total debt to GDP, or the debt-to-GDP ratio, D/Y . Fiscal policy is sustainable if the debt-to-GDP ratio is heading for a constant value; that is, a balanced growth equilibrium.

As in Chapters 4 and 5, we can analyze the debt-to-GDP ratio D/Y by looking to see if it heads for some constant equilibrium value. At that value, both the numerator D (the debt) and the denominator Y (GDP) will be growing at the same proportional rate — there will be balanced growth of debt and GDP. We know that real GDP grows in the long run at a proportional annual rate $n + g$, where n is the annual growth rate of the labor force and g is the annual growth rate of the efficiency of labor.

What is the proportional growth rate of the debt, D ? Adding time subscripts to keep things clear, the real debt next year will be equal to

$$D_{t+1} = (1 - \pi)D_t + d_t$$

The real value of the debt shrinks by a proportional amount π as inflation erodes away the real value of the debt principal owed by the government and grows by an amount equal to the officially reported cash deficit d . As the economy grows, tax revenues grow roughly in proportion to real GDP and spending grows in proportion to real GDP too. So it makes sense to focus not on the deficit itself but on the deficit as a share of GDP, d/Y .

Then the proportional growth rate of the debt is

$$\frac{D_{t+1} - D_t}{D_t} = -\pi + \left(\frac{d}{Y}\right)\left(\frac{Y}{D}\right)$$

The debt-to-GDP ratio will be stable when these two proportional growth rates — of GDP and of the debt — are equal to each other:

$$n + g = -\pi + \left(\frac{d}{Y}\right)\left(\frac{Y}{D}\right)$$

which happens when

$$\frac{D}{Y} = \frac{d/Y}{n + g + \pi}$$

This is the level toward which the debt-to-GDP ratio will head; Box 14.2 provides an example of how to calculate this long-run value of the debt-to-GDP ratio. This is the level consistent with a constant cash-balance deficit of d/Y percent of GDP in an economy with long-run inflation rate π and with long-run real GDP growth rate $n + g$.

Is the Equilibrium Debt-to-GDP Ratio Possible?

Why then do economists talk about deficit levels as being “unsustainable”? For any deficit as a share of GDP (d/Y), the debt-to-GDP ratio heads for its well-defined value $(d/Y)/(n + g + \pi)$. The reason is that this calculation is at most half the story. The ratio of the debt to GDP that the government wants to issue heads for a stable value, yes. But are there enough investors in the world willing to hold that amount of debt? The higher the debt-to-GDP ratio, the riskier an investment financiers judge the debt of a country to be, and the less willing they are to buy and hold that debt.



THE EQUILIBRIUM DEBT-TO-GDP RATIO: AN EXAMPLE

Suppose that the economy is running a constant budget deficit of 4 percent of GDP year after year. Suppose further that the growth rate of the labor force is 2 percent per year, the growth rate of output per worker is 1 percent per year, and the inflation rate is 5 percent per year. What then will be this economy's equilibrium ratio of government debt to GDP?

To determine the answer, simply plug the parameter values into the formula

$$\frac{D}{Y} = \frac{d/Y}{n + g + \pi} = \frac{0.04}{0.02 + 0.01 + 0.05} = \frac{1}{2}$$

The equilibrium debt-to-GDP ratio will be $\frac{1}{2}$. If the current debt-to-GDP ratio is less than $\frac{1}{2}$, the debt-to-GDP ratio will grow. If the current debt-to-GDP ratio is greater than $\frac{1}{2}$, the debt-to-GDP ratio will fall.

Notice a similarity to the analysis of the equilibrium capital-output ratio way back in Chapter 4? The mathematical tools and models are the same, even though the phenomena in the world to which they apply are very different. Such recycling of a formal model in a different context is yet another trick economists use to try to keep their discipline and their models simple. 

equilibrium debt-to-GDP ratio

The constant ratio of government debt to GDP when both real government debt and real GDP are growing at the same rate.

A higher debt-to-GDP ratio makes investment in the debt issued by a government more risky for two reasons. First, revolutions—or other, more peaceful changes of government—happen. One of the things a new government must decide is whether it is going to honor the debt issued by previous governments. Are these debts the commitments of the nation, which, as an honorable entity, honors its commitments? Or are these debts the reckless mistakes made by and obligations of a gang of thugs, unrepresentative of the nation, to whom investors should have known better than to lend money for the thugs to steal? The holders of a government's debt anxiously await every new government's decision on this issue. The higher the debt-to-GDP ratio, the greater the temptation for a new government to repudiate debt issued by its predecessor, hence the riskier it is to buy and hold a portion of that country's national debt.

Second, a government can control the real size of the debt it owes by controlling the rate of inflation. The (nominal) interest rate to be paid on government debt is fixed by the terms of the bond issued. The real interest rate paid on the debt is equal to the nominal interest rate minus the rate of inflation—and the government controls the rate of inflation.

Thus a government that seeks to redistribute wealth away from its bondholders to its taxpayers can do so by increasing the rate of inflation. The more inflation, the less the government's debt is worth and the lower the real taxes that have to be imposed to pay off the interest and principal on the debt. Whether a government is likely to increase the rate of inflation depends on the costs and benefits—and raising the rate of inflation does have significant political costs. But the higher the debt-to-GDP ratio, the greater the benefits to taxpayers of a sudden burst of inflation. When the debt-to-GDP ratio is equal to 2, a sudden 10 percent rise in the price level reduces the real wealth of the government's creditors and increases

the real wealth of taxpayers by an amount equal to 20 percent of a year's GDP. By contrast, when the debt-to-GDP ratio is equal to 0.2, the same rise in the price level redistributes wealth equal to only 2 percent of a year's GDP.

Thus the government's potential creditors must calculate that the greater the debt-to-GDP ratio, the greater the benefits to the government of inflation as a way of writing down the value of its debt. The higher the debt-to-GDP ratio, the more likely the government is to resort to inflation. Thus the higher the debt-to-GDP ratio, the riskier it is to invest in a government's debt.

A deficit is sustainable only if the associated debt-to-GDP ratio is low enough that investors judge the debt safe enough to be willing to hold it. Think of each government as having a debt capacity — a maximum debt-to-GDP ratio at which investors are willing to hold the debt issued at reasonable interest rates. If this debt capacity is exceeded, then the interest rates that the government must pay on its debt spike upward. The government is faced with a much larger deficit than planned (as a result of higher interest costs). Either the government must raise taxes, or it must resort to high inflation or hyperinflation to write the real value of the debt down.

Economic Effects of Deficits

Even if a given deficit as a share of GDP is sustainable, it still may have three types of significant effects on the economy. It may affect the political equilibrium that determines the government's tax and spending levels. It may, if the central bank allows it, affect the level of real GDP in the short run. And it will (except in very special cases) affect the level of real GDP in the long run.

The U.S. national debt today, however, is below the level at which economists begin to watch the debt with anxious concern. There were fears during the 1980s that the United States had put itself on a course for national disaster through a mounting national debt. These fears have been renewed as the surpluses of the late 1990s have been replaced by the return of large deficits. But the United States is still far from the edge of the precipice.

The typical pattern the United States has followed is one of sharp spikes in the debt-to-GDP ratio during wartime, followed by paying off the national debt as a share of GDP during peacetime. Why governments usually run up large debts during wartime is easily explained. Their survival, and perhaps the survival of their nation and their civilization, is at stake. So during major wars, governments use all the tools they have to gain control of resources for their fleets, armies, and air forces. And one of those tools is a substantial dose of government borrowing.

The great peaks in U.S. government debt as a share of total domestic product all came after the three major wars in which the United States was engaged: the Civil War, World War I, and World War II. The minor peaks were mostly wartime peaks too: the initial level of debt as the federal government took over responsibility for state borrowing during the Revolutionary War, the uptick during the War of 1812, and a tiny uptick during the Spanish-American War at the end of the nineteenth century. (See Box 14.3 on page 428 for some details.)

There have been only three upward movements in the debt as a share of GDP not connected to wars: the rise in the national debt during the Great Depression of the

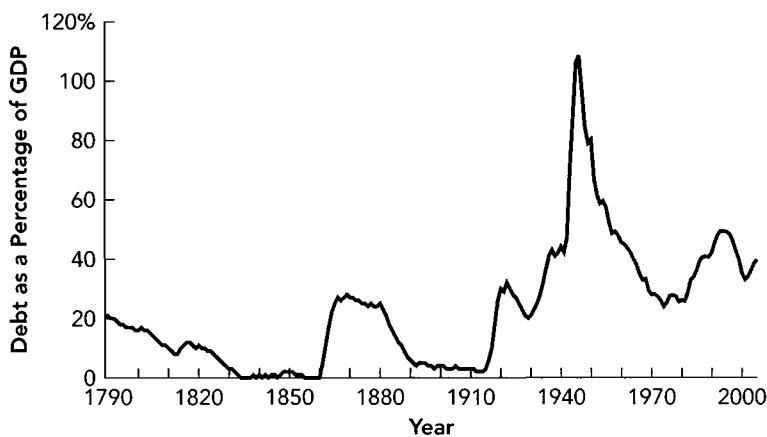
14.3

THE U.S. DEBT-TO-GDP RATIO: DATA

The United States ended the Revolutionary War with what was then thought of as a considerable national debt given the limited taxing capacity of late-eighteenth-century governments. The first secretary of the treasury, Alexander Hamilton, pressed hard and won congressional approval for the federal government to assume and pay the debts the individual states had incurred to fight the Revolutionary War. Hamilton believed that this assumption of the debt would make it easier for the federal government to borrow in the future. Moreover, he believed that if the government owed people money, there would be a strong interest group in favor of the continuation of the United States of America: Bondholders would like to be paid.

By the presidency of Andrew Jackson, however, virtually the entire debt run up first in the Revolutionary War and then in the War of 1812 had been repaid (see Figure 14.7). The Union debt run up during the Civil War was also repaid within a few decades. But then in quick succession came World War I, the Great Depression, and World War II, which together drove the U.S. national debt up to more than a year's GDP. Thereafter the growth of the economy, inflation, and more-or-less balanced budgets saw the debt fall relative to GDP until the coming of the 1980s with the Reagan tax cut and the resulting deficits and rapid increase in the debt once again.

FIGURE 14.7
U.S. Debt-to-GDP Ratio since the Revolutionary War



Source: J. Bradford DeLong, "Keynesianism, Pennsylvania-Avenue Style: Some Economic Consequences of the 1946 Employment Act," *Journal of Economic Perspectives* 10 (Summer 1996), pp. 41–53; as updated by the author.

1930s, the rise in the national debt during the Reagan and Bush 41 presidencies of the 1980s, and the rise during the Bush 43 presidency (see Figure 14.8).

The reason that during peacetime the size of the government debt as a share of GDP typically falls is also straightforward. Economic growth raises real GDP and inflation provides an additional boost to nominal GDP. As long as the government's tax

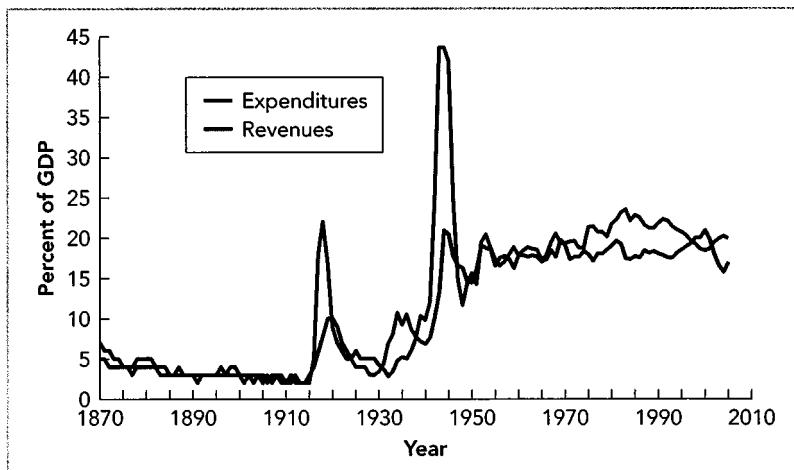


FIGURE 14.8
Federal Revenues and
Expenditures as Shares
of GDP

Since the Civil War U.S. government expenditures have significantly outrun revenues on five occasions: World War I, World War II, the Great Depression, the Reagan/Bush 41 deficits of the 1980s, and the Bush 43 deficit.

Source: J. Bradford DeLong, "Keynesianism, Pennsylvania-Avenue Style: Some Economic Consequences of the 1946 Employment Act," *Journal of Economic Perspectives* 10 (Summer 1996), pp. 41–53; as updated by the author.

and spending programs are not grossly out of whack, in peacetime government debt tends to fall as a share of GDP. Before 1930 the government's tax and spending programs could not get out of whack in peacetime: There was barely any peacetime federal government. Since 1930, however, the peacetime federal government has increased its share of the economy. Thus to see the emergence of substantial peacetime government budget deficits and a rising national debt-to-GDP ratio first in the 1980s and then again in the 2000s was a great surprise.

Partly because of higher spending on defense and other programs in the 1980s, partly because of substantial tax cuts, and partly because the productivity slowdown led real GDP growth to be smaller than previous forecasts, the Reagan presidency set in motion a series of deficits that ended by nearly doubling the burden of the federal government debt as a share of GDP. The rise in the debt was brought to an end by three factors:

- President George H. W. Bush's (Bush 41) economic advisers and the Democratic and Republican congressional leaders who persuaded him to go back on his campaign pledge of "read my lips, no new taxes" and to negotiate a serious deficit-reduction program including major reforms in congressional budget procedures in 1990.
- President Clinton, his economic advisers, and the Democratic members of Congress who made deficit reduction the highest priority of his administration in 1993.
- A healthy dose of good macroeconomic luck.

A fair but rough assignment of credit would give 40 percent to those who planned the 1990 deficit-reduction program, 30 percent to those who planned the 1993 deficit-reduction program, and 30 percent to sheer dumb good luck.

However, the early 2000s saw a return of the U.S. budget deficit to levels like those of the Reagan and first Bush administrations. It was the deficit-reduction

program of the 1990s that appears to have been the anomaly. The big deficits of the 1980s and 2000s appear to have become the rule.

How important is the near doubling of the debt as a share of GDP that took place in the last quarter century, and the further doubling that we can look forward to under current policies over the next generation? One view, held by a majority of economists, is that such large government deficits have three sets of effects. First, they have uncertain but probably destructive effects on the formulation of government spending and tax plans. Second, they have the potential to have expansionary effects on the economy in the short run. Third, they have contractionary effects on the economy in the long run by reducing investment and capital formation, and putting the economy on a less prosperous long-run balanced-growth path. The most important effect is probably the third. How big? The rule of thumb set out by economists Gregory Mankiw and Douglas Elmendorf is that \$1 of extra debt reduces long-run real GDP by about seven cents.

Political Effects of Deficits

voter myopia

The theory that voters react to the immediate economic situation, rather than to what happened in the further past or what is likely to happen in the future.

One thread of political economic analysis holds that deficits have destructive political consequences: The possibility of financing government spending through borrowing makes the government less effective at advancing the public welfare. Electoral politics suffers from a form of institutional voter myopia: The benefits from higher government spending now are clear and visible to voters, and the costs of the higher taxes later that will be needed to finance the debt built up via deficit spending are distant, fuzzy, and excessively discounted. Moreover, the unborn and underage do not vote: Many of those who will be obligated to pay taxes to make interest payments on tomorrow's national debt do not vote today. The principle of "no taxation without representation" would seem to call for no long-term national debt—or, rather, for a national debt that is not larger than the government's capital stock.

Thus economists like Nobel Prize-winner James Buchanan have argued for a stringent balanced-budget rule. In Buchanan's view, only if political dialogue must simultaneously confront both the benefits of spending and the pain of the taxes needed to finance that spending can we expect a democratic political system to adequately and effectively weigh the costs and benefits of proposed programs.

Since the start of the 1980s, another argument has appeared: an argument for deficits created by tax cuts. The political system, its proponents argue, delivers steadily rising government spending unless it is placed under immediate and dire pressure to reduce the deficit. Therefore the only way to avoid an ever-growing inefficient government share of GDP is to run a constant deficit that politicians feel impelled to try to reduce. And should they ever succeed, the appropriate response is to pass another tax cut to create a new deficit. Only by starving the beast Leviathan that is government can it be kept from indefinite expansion.

The U.S. experience of the past quarter century tends to support James Buchanan's position, and to count against the alternative position. Few today are satisfied with the decisions about government spending and tax policy made in the 1980s and 1990s. Moreover, the deficits of the 1980s and of today do not seem to have put downward pressure on federal spending. Program spending fell, but total spending rose because of the hike in interest payments created by the series of deficits in the 1980s. Because interest payments are part of government spending, modern deficits appear to put not downward but upward pressure on the size of government.

Effects of Deficits on Planned Expenditure

In the short run, the income-expenditure diagram of Chapter 9 tells us that a deficit produced by a tax cut stimulates consumer spending and thus indirectly increases planned expenditure. A deficit produced instead by an increase in government purchases directly increases planned expenditure. Either way, the deficit shifts the IS curve out and to the right: Any given interest rate is associated with a higher equilibrium value of production and employment.

If the money stock is unchanged — if the LM curve of Chapter 11 does not shift — then output and employment rise in response to the tax cut. A deficit is expansionary in the short run.

If monetary policy is set by the Taylor rule of Chapter 12, the MPRF shifts in and to the left. Unless expectations are rational — which they likely are not — unemployment falls and inflation rises. Again, a deficit is expansionary in the short run.

Of course, the belief that deficits are expansionary — that they increase production and employment — in the short run hinges not only on how we form our expectations but also on the Federal Reserve's response to the rise in the deficit. If the Federal Reserve does not want inflation to rise at all — if its r_π is very large — it will respond to the rightward expansionary shift in the IS curve by tightening monetary policy and raising interest rates, neutralizing at least part of the expansionary effect of the deficit. The MPRF will then be very flat. Because the decision-making and policy implementation cycle for monetary policy is significantly shorter than the decision-making and policy implementation cycle for discretionary fiscal policy, the central bank can keep legislative actions to change the deficit from affecting the level of production and unemployment. The question is whether it will. The answer is, most of the time, yes. The central bank is trying its best to guide the economy along a narrow path without excess unemployment and without *accelerating inflation*. It has made its best guess as to what level of planned expenditure leads us along that path. In all likelihood its senior officials are uninterested in seeing the economy pushed away from that path by the fiscal policy decisions of legislators.

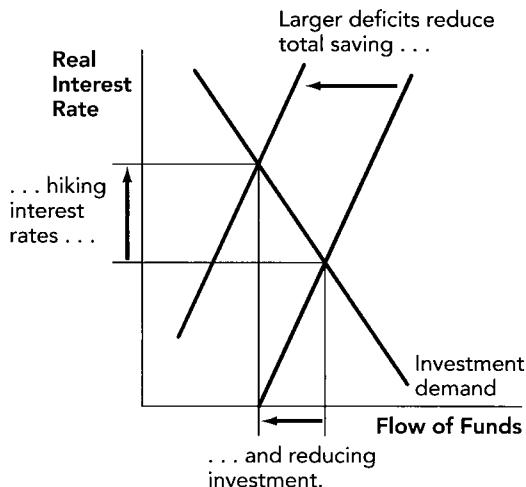
International Effects of Deficits

An increase in the government's budget deficit also leads to an increase in the *trade deficit*. The outward shift in the IS curve and inward shift of the MPRF push up interest rates. Higher interest rates mean an appreciated dollar — a lower value of the exchange rate and of foreign currency — and therefore net exports fall. Up to now we have implicitly assumed that the composition of planned expenditure has no effect on the productivity of industry. Businesses have been implicitly assumed to be equally happy and equally productive whether they are producing consumption goods, investment goods for domestic use, goods and services that the government will purchase, or goods for the export market. Yet this is unlikely to be true. Recall from your microeconomics courses that the point of international trade is to trade goods that your economy is especially productive at making for goods that your economy is relatively unproductive at making.

As large deficits that increase interest rates lower the value of the exchange rate, export industries — likely to be highly productive — shrink as exports shrink. This presumably reduces total productivity. Nobody, however, has a very sound estimate of how large these effects might be.

FIGURE 14.9
Higher Full-Employment Deficits Reduce Investment

In the long run, higher budget deficits are not expansionary. Instead, increased interest rates reduce investment spending and lower the economy's balanced-growth path of real GDP per worker.

Flexible Price Flow-of-Funds Diagram

Deficits and Long-Run Economic Growth

Higher full-employment deficits lead to low investment. Higher deficits lower government saving. In any run long enough for the full-employment flexible-price model of Chapter 7 to be relevant, large full-employment deficits lead to lower total saving, higher real interest rates, and, as shown in Figure 14.9, lower investment.

In the flexible-price context the analysis of persistent deficits is straightforward. Such deficits reduce government saving. Flow-of-funds equilibrium thus requires higher real interest rates and lower levels of investment spending and net exports.

Even in a sticky-price context it may well be that higher deficits reduce investment and net exports. The central bank can, and probably will, change monetary policy to neutralize at least part of the effect of the higher deficit on real GDP. The central bank chose its baseline monetary policy in order to try to strike the optimum balance between the risk of higher-than-necessary unemployment and the risk of rising inflation. The central bank does not want this balance disturbed by shifts in the IS curve, so it is highly likely to use monetary policy to offset at least partially the effect of the deficit-driven shift in the IS curve on the level of real GDP and employment. The IS curve shifts out, but interest rates rise, leaving investment lowered. Will the central bank raise interest rates high enough to create a dollar-for-dollar swap between government purchases on one hand and investment plus gross exports on the other? In the long run, it will. But in the short run it may or may not. If the central bank's responsiveness to a rise in inflation — the central bank's r_π — is infinitely large, then it will fully offset the increase in government purchases. Or if the central bank shifts its interest rate rule in order to

keep the location of the MPRF unchanged in spite of the fiscal stimulus, then again it will fully offset the increase. In other cases, in the short run, the central bank will allow some of the increase in government purchases to boost the economy.

Low investment reduces capital accumulation and productivity growth, putting the country on a trajectory to a lower balanced-growth path. Since the early 1960s, economists have argued that economic growth is fastest and the economy is best off when the policy mix pursued by the government and the central bank is one of tight fiscal policy (a government surplus) and loose monetary policy (a relatively low interest rate). Together this policy mix can produce full employment, high investment, and relatively rapid economic growth.

Over time, the U.S. government has appeared to have the opposite bias. Certainly for a period of two and a half decades now, beginning with the Reagan tax cuts of the early 1980s and interrupted only by Clinton's second term in office, the U.S. economy has had loose fiscal policy and tight monetary policy. If the current deficits continue for long, they will begin to have an effect on the economy's capital intensity. The reduction in national saving as a share of GDP will reduce the economy's balanced-growth capital-output ratio. A lower balanced-growth capital-output ratio implies a lower level of output per worker along the balanced-growth path for any given level of the efficiency of labor. Thus a policy of persistent deficits will — as long as the rise in the deficit reduces national saving — reduce the long-run level of output per worker below what it would otherwise have been. By how much? As mentioned earlier, Mankiw and Elmendorf's rule of thumb says that an extra dollar of debt reduces real GDP by seven cents. (This, at least, is the conventional analysis of the interaction between deficits and long-run growth. It has been challenged by a group of professors centered on Harvard's Robert Barro — as discussed later in this book.)

policy mix

The combination of monetary and fiscal policies being followed by a country's government and central bank.

Debt Service, Taxation, and Real GDP

But there are still more long-term effects. A higher deficit means a higher debt, which means that the government owes more in the way of interest payments to bondholders. Over time — even if the level of the deficit is kept constant — the increase in interest payments will require tax increases. And these tax increases will discourage entrepreneurship and economic activity. In addition to the reduction in output per worker resulting from the lower capital-output ratio, there will be an additional reduction in output per worker: The increased taxes needed to finance the interest owed on the national debt will have negative supply-side effects on production.

The interaction of macroeconomic policy, tax policy, incentives for production, and the level of real GDP deserves more space. No discussion of fiscal policy could be complete without noting, for example, a possible drawback of the progressive tax rates that create strong fiscal automatic stabilizers. The higher the marginal tax rate, the greater the danger that at the margin taxes will discourage economic activity — leading either to hordes of lawyers wasting social time executing negative-sum tax-avoidance strategies, to a shift away from aggressive entrepreneurship toward more cautious, less growth-promoting activities taxed at lower rates, or to a depreciated exchange rate (and thus less power to purchase imports) as capital flows across national borders to jurisdictions that have lower tax rates at the margin.

Thinking through these issues is complicated. Are government expenditures on infrastructure, basic research, and other public goods themselves productive? Do they raise total output by more than the increased tax rates threaten to reduce it? And what is the government's objective? After all, maximizing measured total output is the same thing as maximizing social welfare only if externalities are absent, and only if the distribution of total wealth corresponds to the weight individuals have in the social welfare function — with the tastes and desires of the rich being given more weight.

These topics are traditionally reserved for public finance courses, and are not covered in macroeconomics courses. But no one should think that an analysis of fiscal policy can start and end with the effects of discretionary fiscal policy and automatic stabilizers on the business cycle and the effects of persistent deficits on national saving. There is much more to be thought about.

RECAP ANALYZING THE DEBT AND THE DEFICIT

A high government budget deficit has three types of significant effects on the economy. First, it will tend to swell the absolute size of the government in relation to GDP. Myopic voters will see the benefits of spending increases and not count the costs of future tax increases to finance them. Higher national debt levels increase interest payments, and the government must eventually raise taxes to make these interest payments. A high government budget deficit may — if the central bank allows it — raise real GDP and lower unemployment in the short run. A high government budget deficit will in the long run slow economic growth and lower real GDP below what it would otherwise have been.

Chapter Summary

1. The United States is usually a moderate-debt country. The level of the national debt with which U.S. politicians and voters are comfortable is not terribly large. Only immediately after major wars does the U.S. national debt reach a high value relative to real GDP.
2. The last quarter century, however, saw steep rises in the national debt — unprecedented rises in peacetime — interrupted by only a few brief and temporary years of budget surpluses at the end of the 1990s.
3. Nevertheless, the U.S. national debt is still significantly below the level at which economists begin seriously worrying about the consequences of the debt for the health of the economy.
4. From the standpoint of analyzing stabilization policy, the best measure of the government's stance is the full-employment deficit. The full-employment deficit is not a bad measure of the net effect of government policy on the location of the IS curve and the MPRE.
5. From the standpoint of analyzing the effect of changes in the national debt on long-run growth, the debt and deficit need to be adjusted for inflation and government investment. A third adjustment — for outstanding government liabilities — has been proposed and has some attractive features, but it is not usually used.
6. Persistent deficits — a rising national debt — threaten to diminish national saving, reduce the level of output per worker along the economy's balanced-growth path, and retard economic growth.
7. Past deficits — which produce a high ratio of current debt to GDP — threaten to reduce national prosperity because the higher taxes required to service the national debt act as a drag on economic activity.

Key Terms

government deficit (p. 416)
national debt (p. 416)
government surplus (p. 416)
full-employment cyclically adjusted deficit (p. 417)

cash budget balance (p. 419)
generational accounting (p. 423)
equilibrium debt-to-GDP ratio (p. 426)

voter myopia (p. 430)
policy mix (p. 433)

Analytical Exercises

1. What is the typical pattern followed by the debt-to-GDP ratio in the United States over time?
2. How does the experience of the past quarter century differ from the typical U.S. pattern as far as the debt-to-GDP ratio is concerned?
3. Why are the deficits of the 1980s generally seen to have been a bad thing? What are the arguments that the deficits of the 1980s were a good thing?
4. Suppose someone asks you which measure of the government budget balance is best to look at. How does your answer depend on the purpose for which this person wishes to use the budget balance?
5. Why might there be a long-run link between government budget deficits on the one hand and the inflation rate on the other?

Policy Exercises

1. Why might it make sense for a government to finance roads and other investments in public infrastructure through borrowing rather than through taxing today's taxpayers?
2. What effect in today's world do changes in tax and spending programs legislated by Congress and the president have on the level of real GDP in the short run?
3. What are likely to be the long-run effects of a fiscal policy that involves ever-present large budget deficits?
4. Politicians sometimes call for the government to exclude Social Security spending and taxes from the federal government budget. They argue that Social Security moneys should not be used to avoid recognizing the fact

of possible deficits in other programs. What arguments can you think of to support the claim that the non-Social Security budget balance is the more interesting and relevant measure? What arguments support the claim that the unified budget balance is the more interesting and relevant measure?

5. Suppose that in a debate you claim that large deficits lead to high interest rates and lowered investment spending, but your opponent claims that it is not fiscal policy that leads to high interest rates — it is too-tight monetary policy on the part of the central bank. How would you respond?

CHAPTER

15

International Economic Policy

QUESTIONS

How has the world organized its international monetary system?

What is a fixed exchange rate system? A floating exchange rate system?

What are the costs and benefits of fixed exchange rates vis-à-vis floating exchange rates?

Why do most countries today have floating exchange rates?

Why does western Europe now have a common currency, the euro, and thus fixed exchange rates within western Europe?

What caused the major currency crises of the 1990s?

floating exchange rates

A system of international monetary arrangements by which central banks let exchange rates be decided by supply and demand, so that they “float” against one another as supplies and demands vary.

Up to this point we have assumed that the economy’s exchange rate is a floating exchange rate, one that rises and falls freely as supply balances demand in the market for foreign exchange. This chapter changes the focus and considers alternative international monetary arrangements. How do such alternative arrangements — chiefly fixed exchange rate systems — work? What are the relative costs and benefits of fixed versus floating exchange rates? How did we arrive at our current system of largely floating exchange rates? And what difference does having this system make?

Our current system is unusual: For most of the past century the dominant regime for international exchange rates has been one of fixed, not floating, exchange rates. This chapter begins by sketching the economic history of the international monetary system in order to understand how we got here from there. It then analyzes how the economy works when the government fixes the exchange rate. The chapter concludes by analyzing some of the major international shocks to the world economy in the 1990s. Three separate major international financial crises (and a host of lesser crises) struck during that decade: the European crisis of 1992, the Mexican crisis of 1995, the *East Asian crisis* of 1997–1998. The years since 1998 have been more quiescent. There have been crises in Brazil, Turkey, Argentina, and elsewhere, and there is the threat of a future crisis involving the United States, but nothing of the magnitude of the decade before. Yet.

15.1 THE HISTORY OF EXCHANGE RATES

The Classical Gold Standard

What the Gold Standard Is

In the generation before World War I nearly all of the world economy was on a particular fixed exchange rate system: the gold standard. A government would define a unit of its currency as worth such-and-such an amount of gold. It would stand ready to buy or sell its currency for gold at that price at any time, in any amount. Such a currency was convertible, for it could be converted into gold freely (and gold could be converted into it freely). The currency’s price in terms of gold was its parity.

When two countries were on the gold standard, their nominal exchange rate was fixed at the ratio of their gold parities. People wishing to turn British currency — pounds sterling — into U.S. currency — American dollars — could begin by taking British currency to the Bank of England and exchanging it for gold at the pound’s parity. They would then ship the gold across the Atlantic to New York, take it to the U.S. Treasury office in New York, and exchange it for dollars.

At the post-World War II parities of the Bretton Woods “gold exchange” standard, the U.S. dollar was defined as equal to 1/35 troy ounce of gold, and the British pound sterling was set equal to 1/14.58333 ounce of gold. Thus the exchange rate of the dollar for the pound was £1.00 = \$2.40. At the parities that had prevailed from 1879 to 1931 (with an interruption for World War I), the dollar-pound exchange rate was £1.00 = \$4.86.

fixed exchange rates

A system of international monetary arrangements by which central banks buy and sell in foreign exchange markets so as to keep their relative exchange rates fixed.

gold standard

A system by which central banks preserve fixed exchange rates by always being willing to buy or sell their currencies at fixed rates in terms of the precious metal gold.

Suppose that supply and demand in the market for foreign exchange in 1910 had balanced not at £1.00 = \$4.86 but at some other value — say £1.00 = \$5.00. Someone with an idle pound sterling note could then get \$5 for it by selling it on the foreign exchange market. But that \$5 could then buy enough gold at the U.S. Treasury to recover the original £1, with 14 cents left over. So if the market exchange rate ever drifted up from £1.00 = \$4.86 to £1.00 = \$5.00, a huge mass of people selling pounds would enter the market and drive the exchange rate back to £1.00 = \$4.86 as they attempted to carry out this currency arbitrage. Thus under the gold standard, nominal exchange rates were fixed at the ratio of countries' gold parities, as Box 15.1 explains. The gold standard was thus a fixed exchange rate system.

This gold-standard system grew up gradually. It originated when Sir Isaac Newton, in his government job as master of the mint in Britain, fixed the gold parity of the British pound sterling. Because the industrial revolution began in Britain, Britain became the largest trading nation in the world in the nineteenth century. Other countries' governments sought easy access to the British market for the products made by their citizens. A fixed gold parity meant the prices their countries' producers charged would appear stable to British customers. It also meant that

currency arbitrage

A situation, operating under the gold standard, whereby people buying or selling one currency at any price other than the ratio of the two gold parities would find themselves facing an unlimited demand, and would soon find themselves losing a nearly unlimited amount of money.

CURRENCY ARBITRAGE UNDER THE GOLD STANDARD: AN EXAMPLE

As long as central banks or treasuries stood ready to keep their currencies convertible at their gold parities, the ratio of two gold parities determined the nominal exchange rate. Why? Because of currency arbitrage. People buying or selling one currency at any price other than the ratio of the two gold parities would find themselves facing an unlimited demand, and would soon find themselves losing a nearly unlimited amount of money.

Suppose — as originally envisioned under the Bretton Woods system — that the U.S. Treasury stood ready to buy or sell gold from qualified parties at the price of \$35 an ounce, that the British Treasury stood ready to buy or sell gold from qualified parties at the price of £14.58333 an ounce, but that the pound sterling was trading in the foreign exchange market not for the \$2.40 that was the ratio of the gold parities, but instead for 10 percent more — \$2.64.

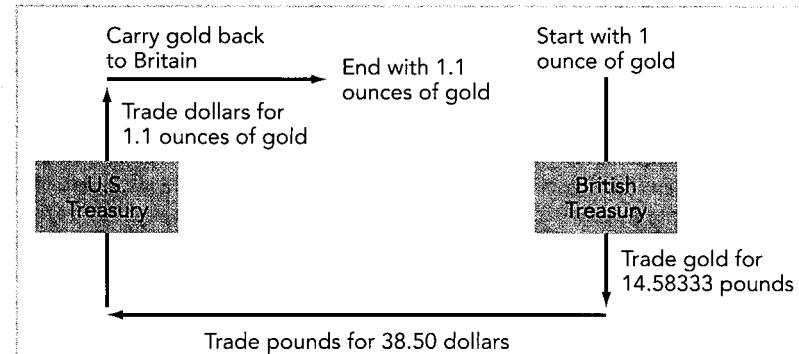
Then someone with an ounce of gold could

- Trade it to the British Treasury for £14.58333.
- Then trade those pounds sterling for dollars in the foreign exchange market and wind up with \$38.50.
- Trade that \$38.50 to the U.S. Treasury for 1.1 ounces of gold.
- Repeat the process as rapidly as possible, making a 10 percent profit each time the circle was completed.

Figure 15.1 on page 440 shows these steps. Note that those who sell dollars for pounds at the rate of \$2.64 = £1.00 are losing 10 percent of their value each time the circle is completed. The only things hindering this round-trip “arbitrage” process — as long as currencies remain convertible and parities remain fixed — are the costs of transporting and insuring the gold. Thus there can be very small fluctuations of exchange rates within the “gold points,” but gold is cheap to transport and straightforward to insure: These fluctuations are minor indeed.



FIGURE 15.1
How to Profit in the Foreign Exchange Market



British investors would not fear that depreciation and *devaluation* would erode the value of the principal that they had lent. Throughout the late nineteenth century, country after country joined the gold standard, as Figure 15.2 shows. By the eve of World War I the overwhelming fraction of world commerce and investment flowed between countries on the gold standard.

A Gold Standard Tends to Produce Contractionary Policies

Even in its turn-of-the-century heyday around 1900 the gold standard had already manifested certain serious weaknesses as an international monetary system. The most important of these weaknesses was that the gold standard tended to be contractionary. In some circumstances it pushed countries to raise their interest rates to reduce production and raise unemployment. And it never provided a countervailing push to other countries to lower their interest rates to raise production and to lower unemployment. To see why, we need to digress for a moment into the role played under a gold standard by a country's gold and other foreign exchange reserves. If the exchange rate is floating in country A, foreigners' earnings in currency A must be used to buy A's exports or be invested in country A: Nothing else can be done with them. Under a floating-rate system a country's net exports NX plus net investment from abroad NIA must add up to zero:

$$NX + NIA = 0$$

The exchange rate moves up or down in response to the supply and demand for foreign exchange in order to make this so.

Under a gold standard things are different. There is an extra participant in the market: the country's treasury or central bank. One can do something else with foreign-currency earnings besides using them to buy imports or make investments abroad: Take them to the foreign country's treasury, turn them into gold, ship the gold back home, take the gold to the treasury there, and turn the gold into real spendable cash. Under a gold standard it is net exports plus net investment from

foreign exchange reserves

Foreign currency-denominated assets held by a country's central bank or treasury to use in foreign exchange interventions.

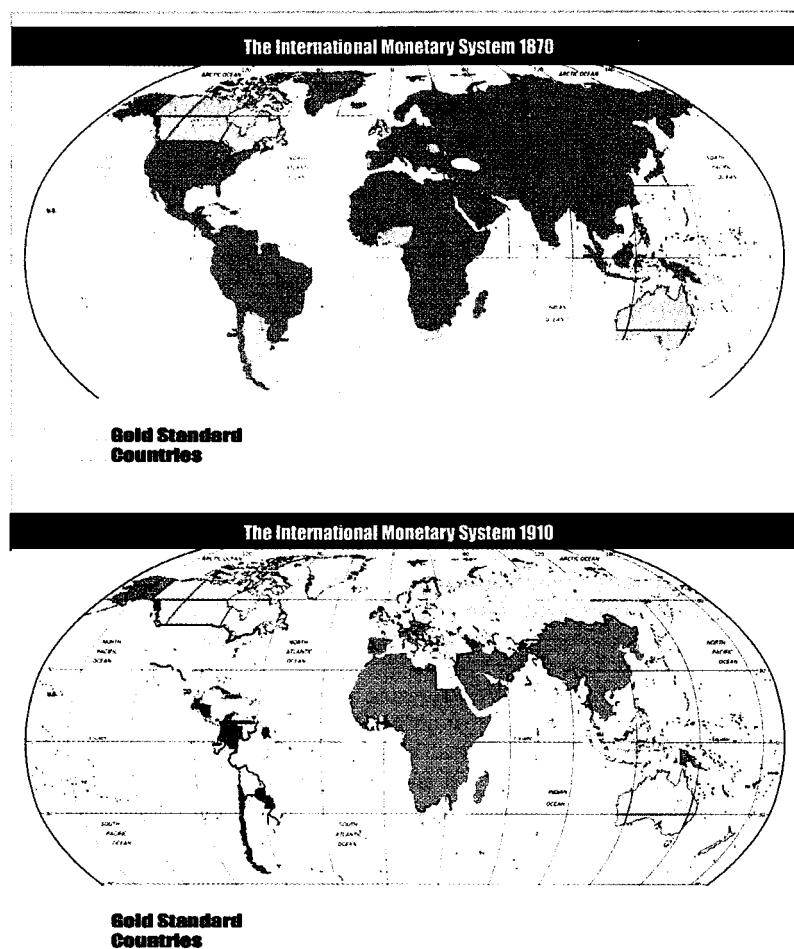


FIGURE 15.2
Growth of the Gold Standard

Between 1870 and 1910 the industrialized portions of the world almost universally joined the gold standard. The gold standard, however, remained weak in the mostly agricultural, relatively poor periphery of the world economy.

Source: Christopher M. Meissner, "A New World Order: Explaining the Diffusion of the Classical Gold Standard, 1870–1913," *Journal of International Economics*, 2005; and Niall Ferguson and Moritz Schularick, "The Empire Effect: The Determinants of Country Risk in the First Age of Globalization, 1880–1913," mimeo, New York University, 2004.

abroad minus the flow of gold into your country — FG — that together add up to zero:

$$NX + NIA - FG = 0$$

What happens if a country finds that net exports plus net investment from abroad are less than zero? Its treasury will find itself losing gold, as a long line of foreigners come into its office, demand gold in exchange for currency, and then ship the gold out of the country. With each such transaction the country's gold reserves shrink. Eventually the government's gold reserves are gone.

At this point the country has a choice. One option is to abandon the fixed exchange rate system. It "closes the gold window," announces that the

country will no longer buy back its currency at the established gold parity, abandons its fixed exchange rate, and lets the exchange rate float. The only other option is to solve its gold-outflow problem by attracting more foreigners to invest. The way to increase net investment from abroad is to raise domestic interest rates. If net investment from abroad rises enough, gold will no longer flow out.

Thus under a gold standard, countries that run persistent *balance-of-payments* deficits — losing gold — must eventually raise interest rates to stay on the gold standard. However, surplus countries — those gaining gold — face no symmetrical crisis in which they must lower interest to stay on the gold standard. Their central banks can lower interest rates if they wish. But if they do not so wish, they can keep interest rates constant and watch their gold reserves grow.

This asymmetry means that a fixed exchange rate system like the gold standard puts periodic contractionary pressure on the world economy. Such pressure turned the interwar period into a disaster; the gold standard's contractionary pressure on countries to raise interest rates played a major role in generating the worldwide Great Depression of the 1930s.

The Collapse of the Gold Standard

The international gold standard was suspended when World War I began in 1914. Every country used inflation to help finance its massive war expenditures. Inflation was inconsistent with the gold standard. Under the gold standard attempted inflation simply leads everyone to immediately trade their currency for solid gold.

After World War I was over, politicians and central bankers sought to restore the gold standard. They believed that the pre–World War I system of a fixed exchange rate based on the gold standard had been a success. They saw restoring it as an important step to restoring general economic prosperity. The gold standard had, after all, delivered 40 years of more rapid economic and industrial growth than the world had ever seen before.

More than half a decade was needed to fully restore the gold standard. But the revived gold standard did not produce prosperity. Instead, in less than half a decade the Great Depression began, and the restored gold standard broke apart. The consensus of economic historians today is that the Great Depression had its principal origin in the United States, where for reasons not fully understood some combination of small shocks set off a downward spiral of destabilizing deflation. But a combination of mistaken policies and flaws in the functioning of the post–World War I gold standard then quickly amplified the Great Depression and propagated it around the world.

Economists Barry Eichengreen and Ben Bernanke argue that four factors made the post–World War I gold standard a much less secure monetary system than the pre–World War I gold standard:

- Everyone knew that governments could abandon their gold parities in an emergency. After all, they had done so during World War I. Thus everyone was eager to turn currency holdings into gold at the first sign of trouble. This meant countries had to maintain much larger gold reserves in order to keep the gold standard functioning.
- Everyone knew that governments had taken on the additional responsibility of trying to keep interest rates low enough to produce full employment.

- After World War I countries held their reserves not in gold but in foreign currencies. This was fine in normal times, but it meant that at the first sign of trouble not only would citizens show up trying to turn their currency into gold, but foreign central banks would do so too, greatly multiplying the magnitude of the gold outflow.
- The post-World War I surplus economies, the United States and France, did not lower their interest rates as gold flowed in.

These factors meant that as soon as a recession set in and gold drains began from countries with weak currencies, their governments found themselves under immediate and massive pressure to raise interest rates and lower output further if they were to stay on the gold standard. If they stayed on the gold standard, they guaranteed themselves high real interest rates and deep depression. If they abandoned the gold standard, they went against all the advice of bankers and gold standard advocates.

There was a clear divergence in the 1930s between those countries that abandoned the gold standard early in the Depression and those that stubbornly clung to gold, as shown in Figure 15.3. Those that clung to their gold parities found themselves forced to raise interest rates and contract their money supplies in order to avoid large gold losses that would rapidly exhaust their reserves. Those that abandoned the gold bloc and floated their exchange rates could avoid deflation,

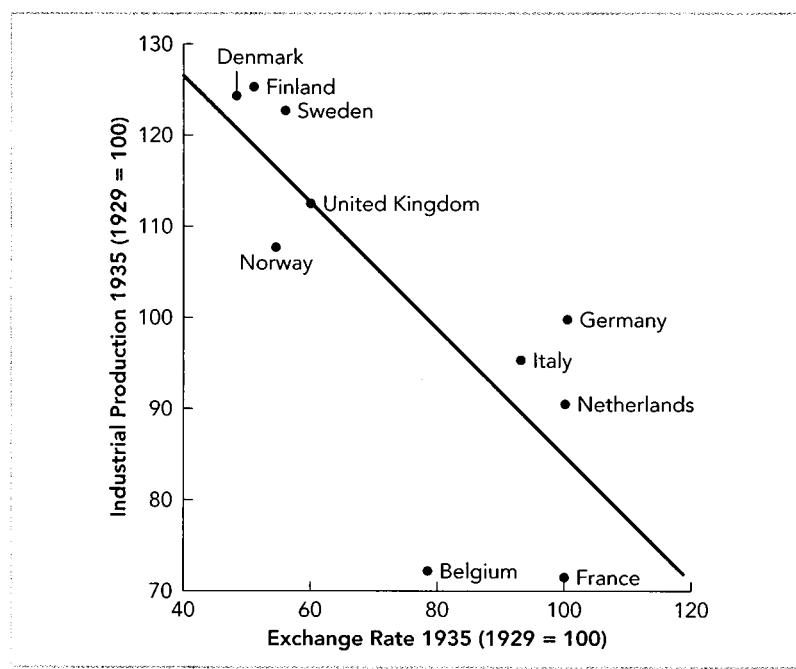


FIGURE 15.3
Economic Performance and Degree of Exchange Rate Depreciation during the Great Depression
The further countries moved away from their gold-standard exchange rates, the faster they recovered from the Great Depression.

Note: The exchange rate is in units of gold per unit of domestic currency.

Source: Barry Eichengreen and Jeffrey Sachs, "Exchange Rates and Economic Recovery in the 1930s," *Journal of Economic History* (December 1985), pp. 925–946.

and avoid the worst of the Great Depression. By the middle of the 1930s the Great Depression was in full swing, and the gold standard was over.

The Bretton Woods System

After World War II, economists took careful note of what they thought had gone wrong after World War I. Led by Harry Dexter White for the United States and John Maynard Keynes for Great Britain, governments tried to set up an international monetary system that would have all the advantages and none of the drawbacks of the gold standard. The system they set up came to be called the “Bretton Woods system,” after a New Hampshire mountain resort town that was the location in late 1944 of a key international monetary conference.

Three principles guided this first post-World War II international monetary system:

- In ordinary times, exchange rates should be fixed: Fixed exchange rates encourage international trade by making the prices of goods made in a foreign country predictable, and so have powerful advantages.
- In extraordinary times — whenever a country found itself in recession with a significantly overvalued currency that discouraged its exports, or found itself suffering from inflation because an undervalued currency raised the prices of imports and stimulated export demand — exchange rates should be changed. Such “fundamental disequilibrium” could and should be corrected by revaluing or devaluating the currency.
- An institution was needed — the International Monetary Fund — to watch over the international financial system. The IMF would make bridge loans to countries that were adjusting their economic policies. It would ensure that countries did not abuse their privilege of changing exchange rates. Exchange rate devaluation and *revaluation* would remain an exceptional measure for times of “fundamental disequilibrium,” rather than becoming a standard tool of economic policy.

Our Current Floating-Rate System

The Bretton Woods system in its turn broke down in the early 1970s. The United States saw inflation accelerate in the 1960s. It found itself with an overvalued exchange rate and a significant trade deficit at the end of the 1960s. The United States sought to devalue its currency: to reduce the value of the dollar in terms of other currencies, so that exports would rise and imports would fall.

Policy makers in other countries thought that the United States should instead raise interest rates. Higher U.S. interest rates would make foreigners more willing to invest in the United States. The foreign currency committed to those investments could then be used to finance the excess of imports over exports that was the U.S. trade deficit. In the end the deadlock was broken by unilateral American action, and the Bretton Woods system fell apart.

Since the early 1970s the exchange rates at which the currencies of the major industrial powers trade against each other have been “floating” rates. The exchange rate is announced by the government but fluctuates according to the balance of demand and supply on that day in the foreign exchange market. There seem to be few if any prospects for a restoration of a global system of fixed exchange rates

over the next generation. Thus this book has assumed as its standard case that exchange rates are free to float and are set by market forces.

Nevertheless, the older system is worth studying for three reasons. First, understanding the functioning of a fixed-rate system sheds light on how a floating-rate system works. Second, economic policy makers still debate the costs and benefits of a fixed-rate system relative to our current floating-rate system. Third, perhaps the pendulum will swing back in a generation and we will find ourselves once more in a fixed exchange rate system.

RECAP HISTORY OF EXCHANGE RATES

In the generation before World War I nearly all of the world economy was on a fixed exchange rate system called the gold standard, under which nominal exchange rates were equal to the ratio of currencies' gold parities. The international gold standard was suspended when World War I began in 1914. After World War I attempts to rebuild the gold standard created a system vulnerable to shocks that played a key role in causing the Great Depression. Therefore, after World War II economists built a fixed exchange rate system — the Bretton Woods system — that they hoped would combine the advantages of fixed- and floating-rate systems. But this system collapsed in the early 1970s, and was replaced by our current floating exchange rate system.

15.2 HOW A FIXED EXCHANGE RATE SYSTEM WORKS

We begin by distinguishing between two different economic environments in which a fixed exchange rate system works. The first is an environment of very high *capital mobility*, like the situation the advanced industrial countries face today. Foreign exchange speculators buy and sell bonds denominated in different currencies with a few presses on a keyboard. Hot money — funds that speculators can shift from country to country as fast as they can press the “enter” key — flows around the world nearly instantaneously in response to differences in expected rates of return. Governments find themselves in large part dancing to the tune called by international currency speculators.

The second is an environment of lower capital mobility. The ability of individuals in one country to invest their money in a second is low and limited. Flows of capital out of one country into another are limited. And governments that are willing to do so can shift the exchange rate for a time by using their foreign exchange reserves to intervene in the foreign exchange market.

A fixed exchange rate is a commitment by a country to buy and sell its currency at fixed, unchanging prices in terms of other currencies. To carry out this commitment, the country's central bank and treasury must maintain foreign exchange reserves. If people come to your central bank or treasury under a fixed exchange rate system wanting to exchange your currency for pounds sterling or gold bars, the central bank or treasury must have the pounds sterling or the gold bars to trade them.

But the foreign exchange reserves of a country are limited. With today's high degree of capital mobility the world has a great many potential foreign exchange speculators. All of them are seeking to make sure that their wealth is invested in the place that offers the highest expected return. Their decisions about where to invest their money are the result of a delicate balance between greed and fear, and all the foreign exchange reserves a government has cannot materially alter the balance of foreign exchange supply and demand for more than a day or two.

High Capital Mobility

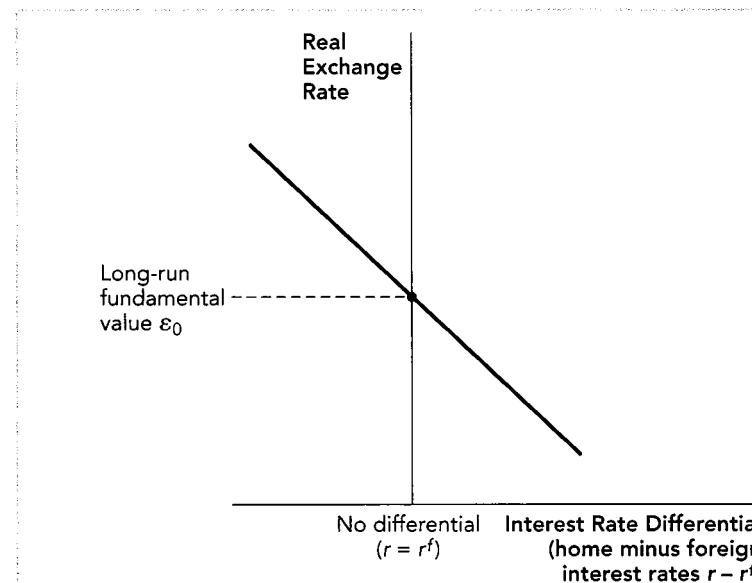
Under high capital mobility, countries' foreign exchange reserves are all but irrelevant. The real exchange rate is set by the same exchange rate equation we have seen before, as greed balances fear in the mind of the typical foreign exchange speculator:

$$\epsilon = \epsilon_0 - \epsilon_r(r - r^f)$$

Remember, in this equation ϵ_0 is foreign exchange speculators' belief about the long-run fundamental value of the real exchange rate; $r - r^f$ is the difference between home and foreign real interest rates; and ϵ_r is a parameter that tells at what point fear balances greed: It tells how much speculators would be willing to bid up the value of dollar-denominated assets if those assets had an extra 1 unit (100 percentage points) per year interest rate differential. The higher the interest rate differential in favor of the home country, the lower the real exchange rate (which, remember, is defined as the value of foreign currency). (See Figure 15.4.)

FIGURE 15.4
The Real Exchange Rate, Long-Run Expectations, and Interest Rate Differentials

When there is no differential between home and foreign real interest rates, the value of the real exchange rate is ϵ_0 ; what foreign exchange speculators believe and expect the long-run equilibrium value of the exchange rate to be. When home interest rates are higher than foreign interest rates, the value of the exchange rate is lower. When home interest rates are lower than foreign interest rates, the value of the exchange rate is higher.



Why must this equation for the exchange rate hold? Suppose that the government sets a fixed parity such that the fixed value of foreign currency ε^* is lower than given by the equation above. Foreign exchange speculators see foreign currency as a bargain. The extra interest return and potential capital gain from appreciation they get from investing their money in foreign currency-denominated assets more than offsets any risks. So foreign exchange speculators come to the government to sell it the (overvalued) home currency and buy from it the (undervalued) foreign currency at the fixed exchange rate parity. The government spends down its reserves, buying its own currency in exchange for its stocks of other countries' currencies and of gold: It is a fixed exchange rate system after all.

The next day — or hour, or minute — the foreign exchange speculators do it again. And again. And again. The government rapidly runs out of reserves. When its reserves are gone, it can no longer buy and sell foreign currency for domestic currency at the fixed exchange rate parity because it no longer has any foreign currency — or gold — to sell. How long does this process take? Under high capital mobility, hours or days. There are lots of potential foreign exchange speculators. They are all eager to profit by betting against a central bank, especially a central bank that is carrying out its exchange transactions not for economic but for political reasons.

Thus if the government wants to keep the exchange rate at ε^* , its central bank must set interest rates so that the equilibrium value of the exchange rate produced by the equation

$$\varepsilon = \varepsilon_0 - \varepsilon_r(r - r^f)$$

corresponds to the desired fixed exchange rate value ε^* .

For this equation to hold, the central bank must set the domestic real interest rate r at

$$r = r^f + \frac{\varepsilon_0 - \varepsilon^*}{\varepsilon_r}$$

Monetary policy no longer can play a role in domestic stabilization: You cannot ask the central bank to lower interest rates to fight unemployment or raise interest rates to fight inflation because the interest rate is already devoted to maintaining the fixed exchange rate system, as Figure 15.5 on page 448 shows. There is no monetary policy reaction function — no MPRF. Under a fixed exchange rate system with high capital mobility, not macroeconomic policy makers but international currency speculators determine the interest rate.

This means that international financial shocks coming from abroad are immediately transmitted to the domestic economy:

- An increase in foreign interest rates r^f requires an immediate, point-for-point increase in domestic interest rates — and a move up and to the left along the IS curve.
- An increase in foreign exchange speculators' view of the long-run fundamental value of the exchange rate ε_0 requires an immediate increase in domestic interest rates of $(\Delta\varepsilon_0)/\varepsilon_r$.

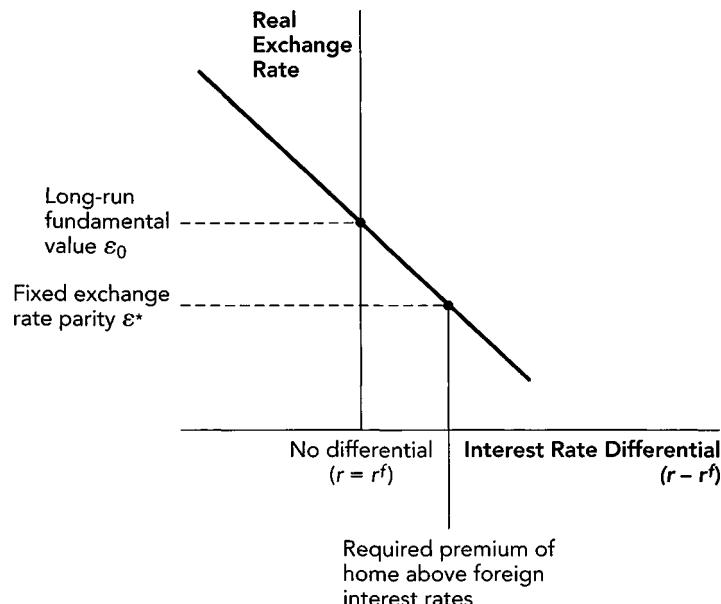
Figure 15.6 on page 448 shows these effects.

Countries on fixed exchange rate systems find their interest rates tightly linked. This led John Maynard Keynes to warn in the 1920s against an attempt by Britain

FIGURE 15.5

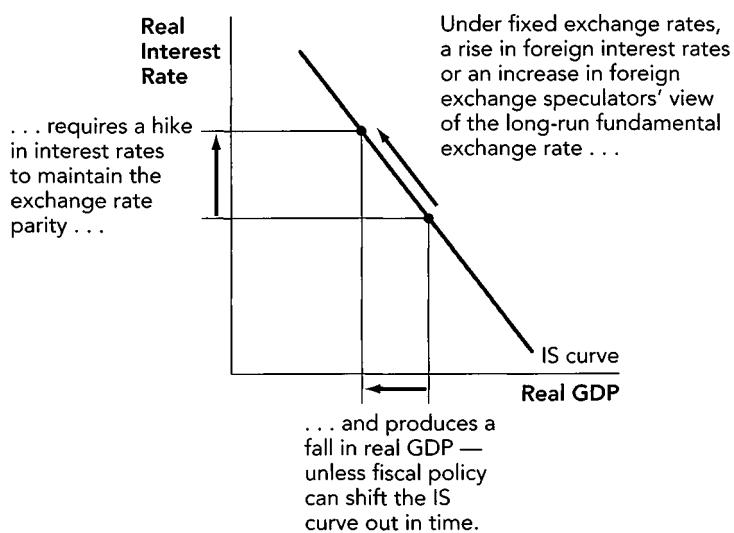
Domestic Interest Rates Are Set by Foreign Exchange Speculators and the Exchange Rate Target

Under high capital mobility, maintaining a fixed exchange rate requires that the central bank ignore domestic conditions and focus on the exchange rate alone in setting interest rates.

**FIGURE 15.6**

Effect of Foreign Shocks under Fixed Exchange Rates

If the exchange rate is fixed and if capital mobility is high, external shifts in foreign exchange speculators' opinions or foreign interest rates have direct and immediate effects on domestic interest rates and on domestic output.



to return to the fixed exchange rate gold standard. It would, Keynes warned, force Britain to receive the full force of interest rate shocks delivered by the unstable U.S. economy. Earlier, when Britain was the leading industrial power before World War I, people expressed it differently: "When [the] London [money market] catches cold," they said, "Buenos Aires [or New York or Sydney] catches pneumonia."

Barriers to Capital Mobility

Now turn to the case of lower, as opposed to higher, capital mobility. Suppose that existing barriers to international financial flows are sufficient to make it difficult and costly to move money across national borders. Thus the government's foreign exchange reserves are sizable relative to flows of capital. Capital mobility today is limited for many developing countries with "thin" financial markets. Capital mobility was limited for all countries only a few decades in the past. It may be limited in the future as well, either as future governments impose explicit controls on types of transactions or as small taxes on international transactions levied by future governments put sand in the wheels of international finance.

If capital mobility is low, the rate at which the government buys or sells its currency for foreign exchange has an impact on foreign exchange supply and demand and thus on the current exchange rate. The exchange rate is determined by foreign currency speculators' expectations, interest rate differentials, and also the speed at which the government is accumulating or spending its foreign exchange reserves R :

$$\epsilon = \epsilon_0 - \epsilon_r(r - r^f) + \epsilon_R \Delta R$$

A change ΔR in foreign exchange reserves raises the value of the exchange rate by an amount equal to a parameter ϵ_R times the change in reserves. When the government is accumulating reserves, the value of foreign currency is higher than it would otherwise be: The government is there buying foreign currency, raising the demand. When the government is spending reserves, the value of foreign currency is lower than it would otherwise be.

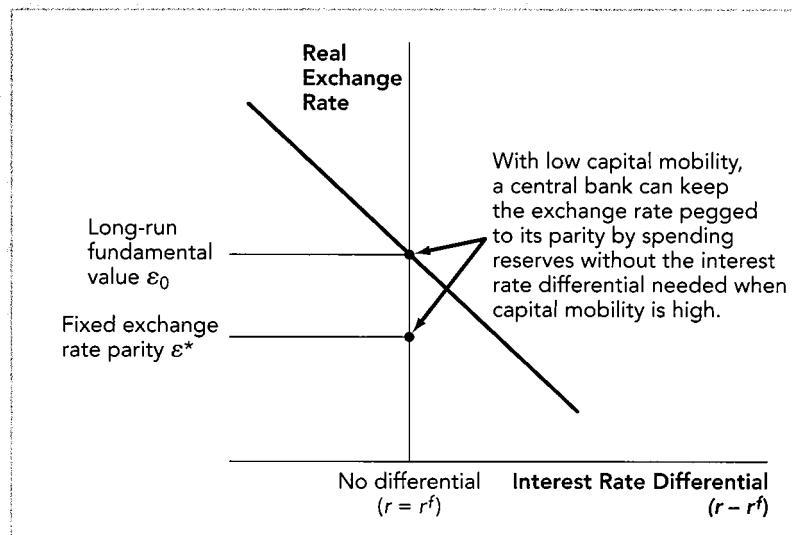
Under such barriers to capital mobility, the central bank regains some freedom of action to use monetary policy for domestic uses. It does not have to directly and immediately transmit adverse shocks due to foreign exchange speculator confidence or foreign interest rates to the domestic economy in the form of higher interest rates and a recession. As long as it has reserves, it can choose to let them run down for a while rather than raising domestic interest rates (see Figure 15.7 on page 450). The domestic interest rate r is now

$$r = r^f + \frac{\epsilon_0 - \epsilon^*}{\epsilon_r} + \frac{\epsilon_R}{\epsilon_r}(\Delta R)$$

But the amount of freedom of action for monetary policy is limited by (1) the sensitivity of exchange rates to the magnitude of foreign exchange market interventions performed by the central bank and (2) the amount of reserves. The level of foreign exchange reserves must be positive. Policies that spend reserves cannot be continued forever, because once the government's foreign exchange reserves have fallen to zero it can no longer finance interventions in the foreign exchange market. (Note, however, that reserves can be replenished if they drop dangerously close to zero. That is what loans from the IMF, or from other major economy central banks, are for.)

FIGURE 15.7

With Limited Capital Mobility a Central Bank Can Shift the Exchange Rate by Spending Reserves



RECAP HOW A FIXED EXCHANGE RATE SYSTEM WORKS

In an environment of very high capital mobility, monetary policy no longer can play a role in domestic stabilization if you have a fixed exchange rate: International currency speculators rather than macroeconomic policy makers determine the value of your domestic interest rate. In an environment of low capital mobility, central banks have some freedom of action to set domestic interest rates to help the domestic economy, but their freedom of action is limited and is constrained by foreign exchange speculators and by limited foreign exchange reserves.

15.3 THE CHOICE OF EXCHANGE RATE SYSTEMS

Economists either applaud or deplore the breakdown of the Bretton Woods system and the resort to floating exchange rates, depending on their underlying philosophy. For some, like Nobel Prize-winner Milton Friedman, the exchange rate is a price. Economic freedom and efficiency require that prices be set by market supply and demand. They should not be set by the decrees of governments. Thus the replacement of the fixed exchange rate, administered-price Bretton Woods system by the floating exchange rate, market-price system of today is a very positive change.

For others, like Nobel Prize-winner Robert Mundell, the exchange rate is the value that the government promises that the currency it issues will have. A stable exchange rate means that the government is keeping the contract it has made with investors in foreign countries. To let the exchange rate float is to break this

contract — and everyone knows that markets work only if people do not break their contracts. Thus the replacement of the fixed exchange rate, administered-price Bretton Woods system by the floating exchange rate, market-price system of today is a very negative change.

What's the right answer? "It depends." Philosophy is all very well, but what should really matter are the details of how the choice of an exchange rate regime affects the economy.

Benefits of Fixed Exchange Rates

Under a floating exchange rate system, exporters and firms whose products compete with imported goods never know what their competitors' costs are going to be. Exchange rate–driven fluctuations in the costs to their foreign competitors are an extra source of risk, and businesses do not like unnecessary risks. The fact that exchange rates fluctuate discourages international trade and makes the *international division of labor* less sophisticated than it would otherwise be. Fixed exchange rate systems avoid these costs and encourage international trade by reducing exchange rate fluctuations as a source of risk. They avoid the churning of industrial structure — the pointless and inefficient shift of resources into and out of tradable goods sectors — as the exchange rate fluctuates around its fundamental value. That is an important advantage. That advantage was behind the decision of nearly all western European countries at the start of 1999 to form a monetary union: to fix their exchange rates against each other irrevocably, so that even their national currencies will eventually disappear.

Fixed exchange rate systems avoid some political vulnerabilities as well. Large exchange rate swings are a powerful source of political turmoil. This political turmoil is avoided by fixed exchange rate systems.

Costs of Fixed Exchange Rates

Under fixed exchange rates, monetary policy is tightly constrained by the requirement of maintaining the exchange rate at its fixed parity. Interest rates that are too low for too long exhaust foreign exchange reserves, and are followed either by a sharp tightening of monetary policy or by an abandonment of the fixed exchange rate. A floating exchange rate allows monetary policy to concentrate on maintaining full employment and low inflation at home — on attaining what economists call *internal balance*. By contrast, under a fixed exchange rate system the level of interest rates must be devoted to maintaining *external balance* — the fixed exchange rate. And fixed exchange rates have the disadvantage of rapidly transmitting monetary or confidence shocks: Interest rates move in tandem all across the world in response to shocks. The central bank must respond to any shift in international investors' expectations of future profitability or future monetary policy by shifting short-term interest rates.

This is the cost-benefit calculation facing those who have to choose between fixed and floating exchange rates. Is it more important to preserve the ability to use monetary policy to stabilize the domestic economy, rather than dedicating monetary policy to maintaining a constant exchange rate? Or is it more important to preserve the constancy of international prices, and thus expand the volume of trade and the scope of the international division of labor?

Canadian economist Robert Mundell set out the terms under which fixed exchange rates would work better than floating ones with his concept of an

internal balance

When unemployment is equal to its natural rate, inflation is unchanging, and GDP is equal to potential output.

external balance

When the trade surplus (or deficit) of a country is equal to the value of investors' new long-term investments abroad (or foreigners' new long-term investments here).

"optimal currency area." Mundell said the major reason not to have fixed exchange rates is that floating exchange rates allow adjustment to shocks that affect two countries differently. This benefit would be worth little if two countries suffer the same shocks, and react to them in the same way. It would also be worth little if factors of production possessed high mobility: Then the effects of shocks would be transient because labor and capital would rapidly adjust, and the benefits from different policy reactions to economic shocks would be small. (See Box 15.2.)

15.2

ARE WESTERN EUROPE AND THE UNITED STATES OPTIMAL CURRENCY AREAS? AN EXAMPLE

Today the two largest economic regions within which exchange rates are fixed are the United States and western Europe's "euro zone." California, for example, does not have a separate exchange rate vis-à-vis the rest of the United States. Almost all of the countries of western Europe are now committed to their common currency, the euro. Does this make economic sense? Or should there be a separate "California dollar" to allow California to have a different monetary policy than the rest of America?

Few economists today would maintain that western Europe's euro zone meets Robert Mundell's criteria for an optimal currency area. Shocks to the economy of Portugal are very different from shocks to the economy of western Germany. Southern Italy has few similarities in economic structure with Denmark. Vulnerability to different shocks would be relatively unimportant if factors of production were mobile. But the fact that different European countries have different languages means there is little chance that a boom in Denmark and a bust in Portugal will see large-scale migration to compensate.

Why then has western Europe embarked on monetary union? One reason is that some economists and policy makers hope that the benefits from economic integration are very large indeed — large enough to offset even substantial costs from adopting a common currency. But the main reason is that European monetary unification is not so much an economic as a political project: an attempt to knit Europe together as a single entity whether or not monetary union makes narrow economic sense.

Practically all economists today believe, by contrast, that the United States is an optimal currency area, although the U.S. economy's regions are no more subject to common shocks than western Europe's countries are. The mid-1980s saw the high dollar decimate midwestern manufacturing while leaving most of the rest of the country much less affected. The health of the economies of Texas and Oklahoma still depend substantially on the price of oil. Southern California's defense-industry boom and bust of the 1980s and early 1990s and northern California's high-tech boom and bust of the 1990s make it clear that California is so big a state that its component parts experience very different economic shocks. But even though the United States' component parts experience different shocks, factor mobility across the United States is remarkably high. Capital and workers move to where returns and wages are high with remarkable speed — fast enough that it is hard to believe that different parts of the United States could gain substantially from following the different monetary policies that separate currencies and floating exchange rates would allow.

As far as the United States, western Europe, and Japan are concerned, the issue of fixed versus floating exchange rates appears to have been decided: None of these three powers is willing to sacrifice its freedom of action in monetary policy. Within western Europe the answer also appears clear: Monetary union means that there is now one pan-European monetary policy, and Italy, for example, no longer retains the ability to use monetary policy to lower interest rates in Milan when unemployment is relatively high. Elsewhere in the world, the question is still under debate.

Moreover, fixed exchange rate systems have one more major disadvantage: They seem to make large-scale currency crises more likely. The decade of the 1990s saw three major large-scale currency crises, all of which threatened prosperity in the immediately affected countries, and all of which raised fears (initially at least) of their much wider spread to the world economy as a whole.

RECAP THE CHOICE OF EXCHANGE RATE SYSTEMS

Fixed exchange rate systems encourage international trade by reducing exchange rate fluctuations as a source of risk, but they also tightly constrain monetary policy. Is it more important to preserve the ability to use monetary policy to stabilize the domestic economy or to reduce risk by eliminating exchange rate fluctuations? That is the question — the reason that central bankers and finance ministers get paid the big bucks.

15.4 CURRENCY CRISES

The European Crisis of 1992

The first of the three major financial crises that hit the world economy in the 1990s came in the fall of 1992. In 1990 West German Chancellor Helmut Kohl reunified Germany, a country that had been divided since the end of World War II first into zones of occupation — French, British, American, and Russian — and then into two separate countries — East Germany and West Germany.

The two parts of Germany had very similar levels of economic development and economic structures before World War II. But since World War II they had diverged. West Germany had become one of the richest and most developed economies on Earth, while East Germany had turned into a standard communist economy with dirty industry, inefficient factories, and inadequate infrastructure. Chancellor Kohl undertook a program of massive public investment to try to bring East Germany up to the West German standard as quickly as possible.

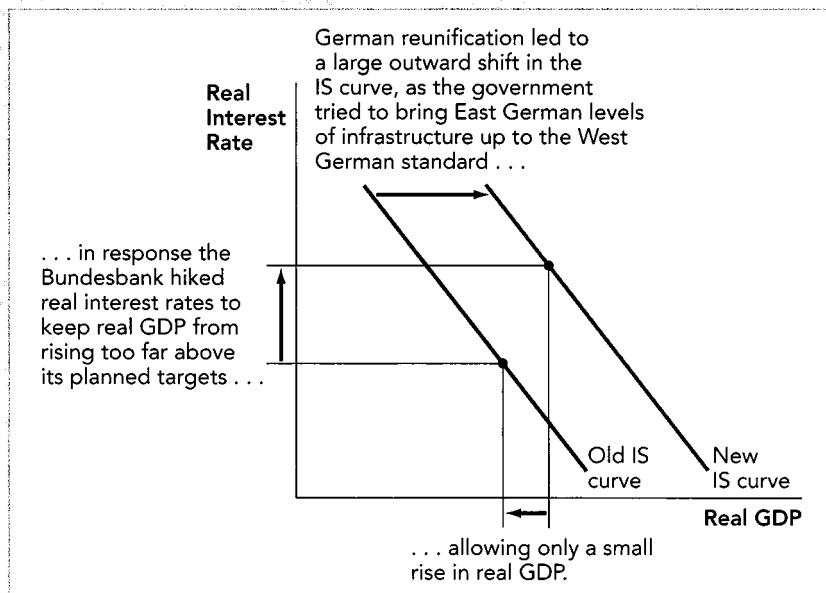
The expansion of German government purchases shifted the German IS curve to the right in the years after 1990. The German central bank, the Bundesbank, responded by raising real interest rates in order to keep real GDP in the range thought to be consistent with the Bundesbank's inflation targets (see Figure 15.8).

The rise in the real interest rate generated a rise in the German exchange rate vis-à-vis the dollar and the yen, and a sharp fall in German net exports as financial capital flowed into Germany. The other countries of western Europe had then fixed their exchange rates relative to the German mark as part of the European Exchange Rate Mechanism (ERM). Britain, France, Italy, and other countries found

FIGURE 15.8

German Fiscal Policy and Monetary Response in the Early 1990s

The reunification of Germany led to a large outward shift in the IS curve and a large increase in real interest rates as Germany's central bank, the Bundesbank, fought to keep real GDP from rising too far above its planned targets.



themselves trapped: The rise in interest rates in Germany required that they too increase interest rates because r^f had risen in the equation

$$r = r^f + \frac{\epsilon_0 - \epsilon^*}{\epsilon_r}$$

and r had to rise in response if the ERM was to be maintained. Without the surge of spending found in Germany and without the ability or desire to rapidly shift policy to run large deficits, such increases in interest rates threatened to send the other European economies into recession (see Figure 15.9).

Politicians in other European countries — Britain, Sweden, Italy, France, and elsewhere — promised that their commitment to their fixed exchange rate parity was absolute. They promised that high interest rates and the risk of a domestic recession were prices worth paying for the benefits of a fixed exchange rate system within western Europe itself. But foreign exchange speculators did not believe they would keep their promise to maintain the fixed exchange rate parity when unemployment began to rise.

Thus foreign exchange speculators' expectations of the long-run fundamental value of the real exchange rate, ϵ_0 , rose as well. This expectation that other European currencies would lose value vis-à-vis the German mark in the long run put their values under pressure in the short run as well.

The domestic real interest rate required to maintain the exchange rate parity, given by

$$r = r^f + \frac{\epsilon_0 - \epsilon^*}{\epsilon_r}$$

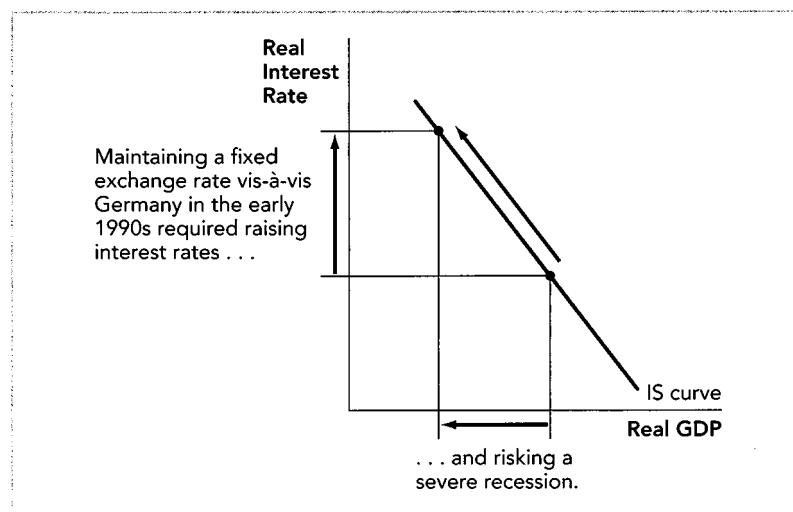


FIGURE 15.9
Effect of German Policy on Other European Countries

At the start of the 1990s governments in other western European countries were raising interest rates and contracting their economies, risking a recession, in order to maintain the parities of ERM exchange rates.

was rising not just because of higher real interest rates in Germany but also because of foreign exchange speculators' more pessimistic expectations. The governments of much of western Europe found themselves in a trap. Different governments undertook different strategies:

- Some tried to avoid the consequences of the shift in expectations. They spent reserves like water in the hope that a demonstrated commitment to maintain the parity would reverse the shift in speculator expectations. All this did was give international currency traders like George Soros the opportunity to make profits measured in the billions by betting on the abandonment of the fixed exchange rate. Economists Maurice Obstfeld and Ken Rogoff report that the British government may have lost \$7 billion in a few hours during the September 1992 speculative attack on the pound.
- Some tried to demonstrate that they would defend the parity no matter how high the interest rate required to keep the exchange rate fixed. The Swedish government raised its overnight interest rate to 500 percent per year for a brief time. But all this did was reinforce speculators' opinion that the political and economic cost of keeping the exchange rate parity was too high for governments that sought to win reelection.
- Finally, some abandoned their parity against the German mark and let their currencies float as for a while they turned monetary policy to setting interest rates consistent with internal balance.

In less than two months what had seemed a durable framework of fixed exchange rates in western Europe had collapsed into a floating-rate system.

But governments interested in long-run exchange stability within Europe regrouped. They proposed to try again to fix their exchange rates, with the European Monetary Union that began in January 1999. This time, however, they decided not to peg their exchange rates while keeping their national currencies (thus retaining

at least the possibility of someday changing parities), but to eliminate their separate national currencies entirely: not fixed exchange rates, but monetary union. The hope was to eliminate once and for all any fear or expectation that exchange rates might ever change again.

The Mexican Crisis of 1994–1995

currency crisis

A situation where a country's currency is in serious trouble relative to the exchange rates of other countries.

In the winter of 1994–1995 the second of the major currency crises of the 1990s hit the world economy. The Mexican peso crisis came as a shock to economists and to economic policy makers. Previous speculative attacks on and collapses in the value of currencies had occurred for one of two reasons. In situations of limited capital mobility, governments with overvalued exchange rates and large inflation-financed budget deficits had suffered speculative attacks. And in cases like western Europe in 1992, currencies had suffered speculative attacks when speculators judged that the policies needed to maintain fixed exchange rates had become inconsistent with the government's political survival.

Mexico, however, fit neither of these two cases. The government's budget was balanced, so an outbreak of renewed inflation was not generally expected. The government's willingness to raise interest rates was not in question: In the end the government of Mexico raised real interest rates to 40 percent per year during the crisis. The Mexican peso was not clearly overvalued: In the winter of 1993–1994 the Mexican government had conducted large exchange rate interventions and had eased monetary policy to try to keep the value of the peso from rising. Yet the Mexican peso lost half of its value in four months starting in December 1994. The peso fell from about 3.5 to about 7 to the U.S. dollar before recovering somewhat in the summer of 1995 (see Figure 15.10).

The sudden reversal of investor expectations about the long-run fundamental value of the Mexican peso was startling. At the start of 1994 Mexico had just joined the world's club of industrialized countries, the Organization for Economic Cooperation and Development (OECD). It had just entered into the North American Free Trade Agreement (NAFTA), which granted Mexico tariff-free markets for its products in North America. Expectations were that the Mexican peso would strengthen in real terms in the future, and that the profits from investing in Mexico were high.

Optimism eroded in 1994. At the start of the year a guerrilla uprising in the poor southern Mexican province of Chiapas cast doubt on political stability. Further doubt was cast by a wave of assassinations killing, among others, Luis Donald Colosio, the presidential candidate of the ruling Party of the Revolution (Institutionalized) (PRI). During the presidential election year of 1994 itself, the central bank raised the money supply, causing some international investors to worry that macroeconomic policy was more political and less "technocratic" than they had thought. All of these events plus a wave of pessimism reduced foreign exchange speculators' estimates of the long-run value of the Mexican peso and raised their assessment of the long-run fundamental value of the exchange rate, ϵ_0 .

During 1994 the Mexican government spent \$50 billion in foreign exchange reserves supporting the peso, believing at each moment that the adverse shift in expectations had to turn around. It did not. By the end of 1994 the Mexican government was out of foreign exchange reserves. And so it devalued the peso and let it float against the dollar.

The devaluation of the peso had destructive consequences, however. First, a great many — naive — investors in New York and elsewhere had believed the

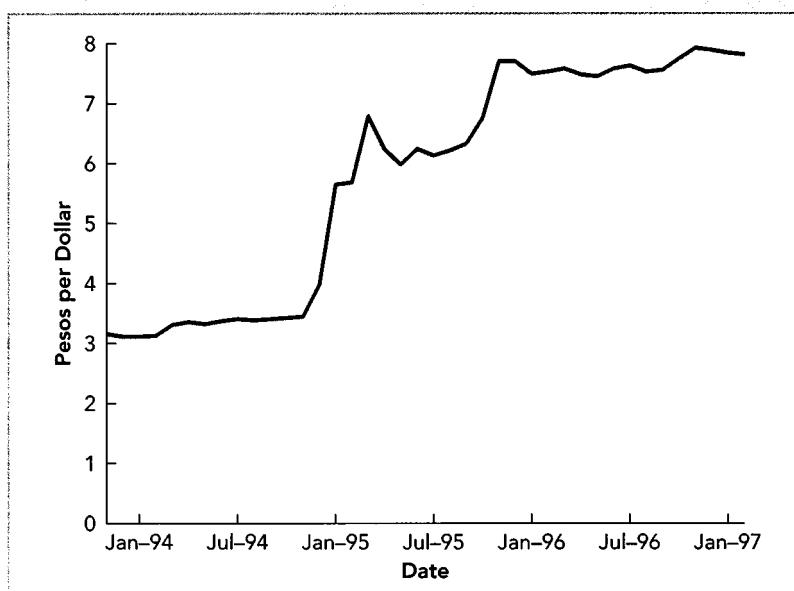


FIGURE 15.10
Mexico's Nominal Exchange Rate: The Value of the U.S. Dollar in Mexican Pesos

The magnitude and rapidity of the collapse of the Mexican peso at the end of 1994 came as a surprise.

Source: J. Bradford DeLong and Barry J. Eichengreen, "Between Meltdown and Moral Hazard: Clinton Administration International Monetary and Financial Policy," in Jeffrey Frankel and Peter Orszag, eds., *American Economic Policy in the 1990s* (Cambridge, MA: MIT Press, 2002), pp. 191–254.

Mexican government when it said that it would do whatever was necessary to defend the value of the peso. The increase in the value of the Mexican exchange rate ε led to a further fall in the perceived fundamental value of the peso — a rise in ε_0 — which added pressure for further depreciation and a further rise in the exchange rate ε . A more serious problem soon became clear: Much of the Mexican government's debt was indexed to the dollar in the form of securities called teso-bonos. Each depreciation of the peso raised the peso value of the Mexican government's debt, increasing the temptation for the Mexican government to default on its debt, and the resulting financial distress led to further rises in foreign exchange speculators' opinions of ε_0 .

The Mexican government seemed faced with a horrible choice. The first option was to raise interest rates to defend the peso, but adverse movements in foreign exchange speculator expectations meant that the level of interest rates that would be required by the formula

$$r = r^f + \frac{\varepsilon_0 - \varepsilon^*}{\varepsilon_r}$$

was a level that would produce a Great Depression in Mexico. This first option would produce catastrophe.

The second option was to keep interest rates low and let the value of foreign currency rise much further. This would mean that Mexican companies — and the Mexican government — would be unable to pay their dollar-denominated and dollar-interest debts. Companies would declare bankruptcy. The government would default on its debt. Mexican exports would fall because foreign creditors would try

to seize Mexican goods as soon as they left the country. Mexican imports would fall because foreign creditors would try to seize goods purchased by Mexico before they entered the country.

The result would be to delink Mexico from the world economy. Mexico's *foreign trade* would fall drastically. Meanwhile, international committees of lenders and creditors would thrash out a settlement of the bankruptcies with Mexican companies and the default with the Mexican government. This second option would produce catastrophe too. The Mexican government of Presidents Carlos Salinas and Ernesto Zedillo had bet Mexico's economic future on increased integration with the world economy and the use of foreign capital to finance domestic industrialization.

The U.S. government and the IMF tried to give the Mexican government more options. The Clinton administration proposed loan guarantees to Mexico. But these guarantees fell through because neither then-Speaker of the House Newt Gingrich nor then-Majority Leader of the Senate Robert Dole nor other congressional leaders were willing to spend political capital on the issues. The administration then made direct loans to Mexico out of the U.S. Treasury's Exchange Stabilization Fund. These built Mexico's foreign exchange reserves back to a level where they could support the peso to some degree without pushing domestic interest rates to Great Depression-causing levels.

These loans allowed the Mexican government to refinance its debt and helped restore confidence that the Mexican government would not be forced into hyperinflation or resort to default. As time passed, Wall Street investors calmed down too. They recognized that Mexico was still the same country with relatively bright economic growth prospects, with promises of financial support if necessary from the U.S. Treasury and the IMF, and with NAFTA-guaranteed tariff-free access to North America, the largest market in the world. Thus the Mexican economic meltdown of 1994–1995 was a short, sharp recession that reduced Mexican real GDP by about 6 percent, but that was then followed by resumed economic growth.

The central lessons were two. First, the views of foreign exchange speculators could change radically with extraordinary speed. Second, developing countries that had not carefully prepared beforehand were extremely vulnerable to the shocks that such changes in international expectations could deliver.

The East Asian Crisis of 1997–1998

Two and a half years after the beginning of the Mexican crisis, the third international financial crisis of the 1990s hit the world economy. For 20 years before 1997 the economies of the Asian Pacific rim had been the fastest-growing economies the world had ever seen. But in mid-1997 foreign investors began to worry about the long-run sustainability of the East Asian miracle and the growing overhang of non-performing loans in East Asian economies. They began to change their opinions of the fundamental long-term value ϵ_0 of East Asia's exchange rates.

In Thailand, Malaysia, South Korea, and Indonesia the values of domestic currency fell, and once again falling currency values caused a further swing in foreign exchange speculators' expectations of ϵ_0 . Indonesia was hit worst: Real GDP fell by one-sixth in 1998; the Indonesian currency, the rupiah, lost three-quarters of its nominal value against the dollar; and short-term real interest rates rose to 30 percent and nominal interest rates to 60 percent. Figure 15.11 shows the shock to two other currencies' exchange rates.

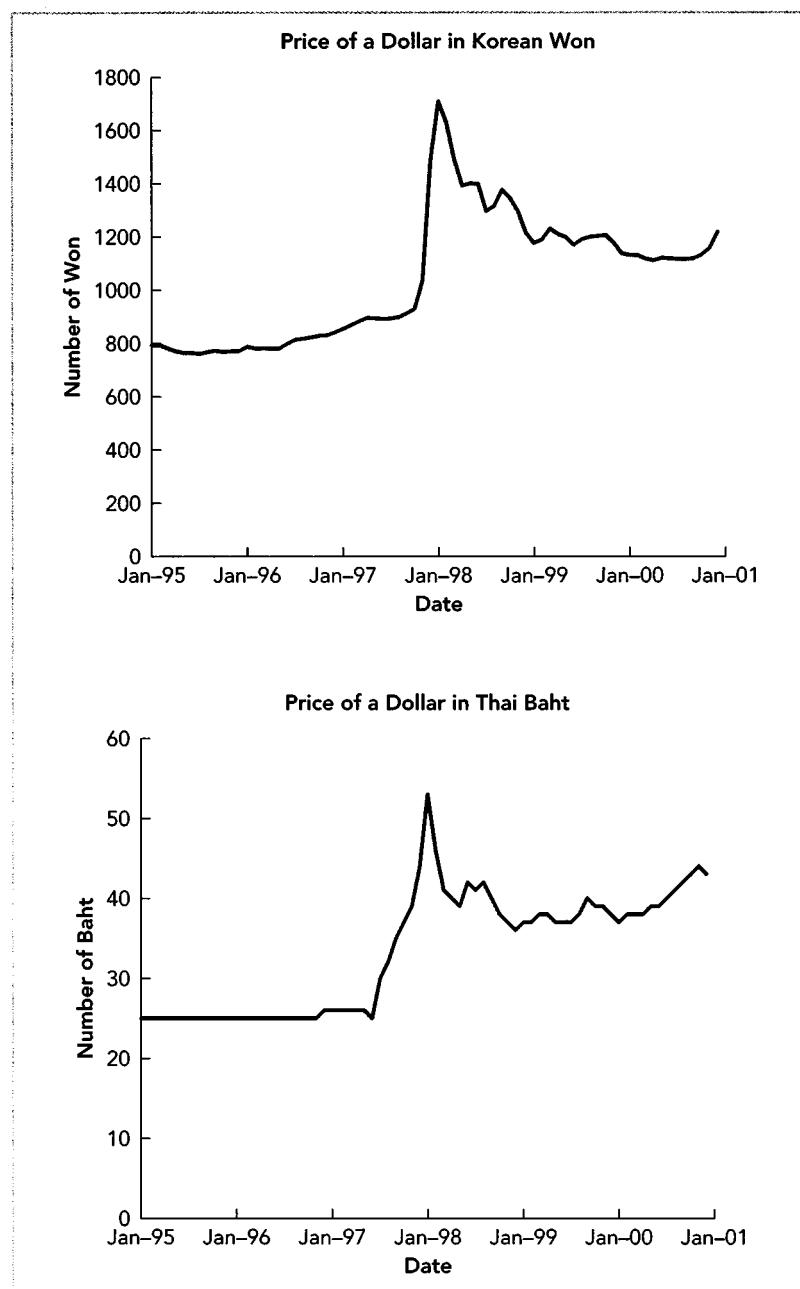


FIGURE 15.11
Exchange Rates during
the Asian Currency
Crisis

Before 1997 everyone saw East Asia's economies as having the best growth prospects in the world. In 1997 foreign investor opinion suddenly became much more pessimistic. But now it is optimistic again: Those who pulled their portfolios out of Korea, Thailand, and Malaysia during 1997 and 1998 have a hard time explaining what they were thinking.

Once foreign exchange speculators began lowering their estimates of the long-run value of investments in East Asia, other, deeper problems in the Asian economies became apparent and were magnified. As East Asian exchange rates fell, it became clear that many of East Asia's banks and companies had borrowed heavily abroad in amounts denominated in dollars or yen. They had used those borrowings to make loans to the politically well connected, or to make investments that turned out not to be profitable in the long run.

The fact that East Asia's financial system was based on close links between governments, banks, and businesses — and that it was very difficult to obtain financial accounts from any East Asian organization — increased fear that more East Asian banks and companies were bankrupt than had been thought. This caused a further increase in foreign exchange speculators' views of the long-run fundamental value of the exchange rate.

The vicious circle continued. Each loss of value in the exchange rate increased the burden of foreign-denominated debt and increased the likelihood of general bankruptcy. Each increase in the perceived burden of foreign-denominated debt caused a further loss of value in the exchange rate. Poor bank regulation had created a situation in which a small initial shock to exchange rate confidence could produce a major crisis. The shorter term the debt held by a country and its citizens, the more easily capital can flee — and the larger is the impact of the crisis.

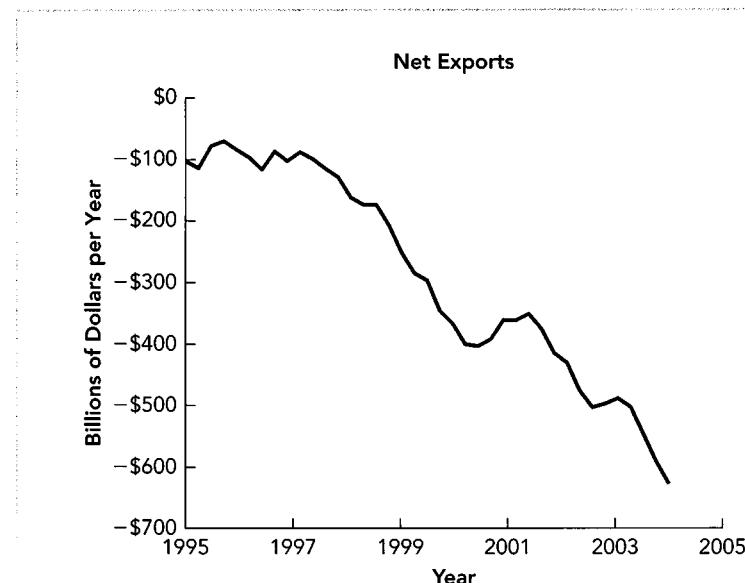
As the Asian crisis developed, the IMF stepped in with substantial loans to boost foreign exchange reserves, made in return for promises to improve bank regulation and reform the financial system. The hope was that short-term loans would allow East Asian economies to avoid catastrophe until the pendulum of Wall Street expectations began to swing back. The hope proved sound. Since mid-1998, investors in New York and elsewhere have remembered that East Asia's economies had been the fastest-growing in the world in the previous generation, and were in all likelihood good places to invest.

The Dollar in the 2000s

Where is the next currency crisis going to occur? One possibility is that it will occur in the United States. Since 1998 U.S. exports have stagnated and imports have grown so that at the start of 2005 the U.S. imports half again as much as it exports — a trade deficit of more than \$600 billion a year, as Figure 15.12 shows. Will foreigners be willing on net to invest some \$600 billion of their wealth in the United States each year, every year, without ever drawing down their wealth? Almost surely not. What will happen if foreigners' desired annual net investments in the United States fall to, say, \$200 billion a year? The dollar will fall in value, and on the rule of thumb that a 1 percent fall in the value of the dollar raises annual net exports in the long run by about \$10 billion, the fall in the dollar would have to be on the order of 40 percent.

Logically, currency speculators should want to be compensated for this risk — so interest rates in the United States would be above interest rates elsewhere — but they are not. This means one of two things: First, perhaps international economists' expectation of a decline in the U.S. trade deficit and a large fall in the dollar are wrong — something else is going to happen. Second, perhaps investors and speculators do not have rational expectations.

If the second possibility is the correct one, then a dollar crisis in the second half of the decade of the 2000s is a serious possibility. At some point speculators' expectations



Source: <http://www.economagic.com>.

FIGURE 15.12
The U.S. Current-Account Deficit

The U.S. trade deficit began to grow in the late 1990s as foreigners took some of their earnings from U.S. imports and spent them investing in the dot-com bubble. The deficit continued to grow to extraordinary size in the 2000s, in large part as we would expect from the model of Chapter 7: a cut in taxes produces a fall in net exports.

will begin to factor in the possibility of a large decline in the dollar, and that factoring-in will produce a steep fall in the dollar and a rise in U.S. interest rates. However, a dollar crisis — should it happen — would not be as serious an event as all these other financial crises we have seen over the past decade and more. In other countries — because so much of their foreign debt was denominated in dollars — a fall in the value of the currency raised the burden of international debt and worsened the crisis. In the United States — because so much of its foreign debt is denominated in dollars — a fall in the value of the dollar will lower the burden of international debt and ease the crisis.

French President Charles de Gaulle complained more than 40 years ago about the “exorbitant privilege” the United States had because of the key role played by the dollar as the currency in which contracts were written and which everybody wanted to hold as their reserves. This exorbitant privilege is still operating, making the United States less vulnerable to international monetary disturbances than other countries are.

Managing Crises

We can see the real exchange rate equation

$$\varepsilon = \varepsilon_0 - \varepsilon_r(r - r^f)$$

as offering a country a menu of choices for the value of foreign currency ε and the value of the domestic real interest rate r . The higher the domestic real

interest rate r , the more appreciated is the exchange rate and the lower is the value of ϵ .

If for any of a number of reasons speculators lose confidence in the future of the economy, their assessment of the fundamental price of foreign goods and currency, ϵ_0 , suddenly and massively shifts. The menu of choices that a country has for its combination interest rate r and the exchange rate ϵ suddenly deteriorates. If the interest rate r is to remain unchanged, the value ϵ of the real home currency price of foreign exchange must rise a good deal. If the exchange rate ϵ is to remain unchanged, then the domestic real interest rate r must rise a good deal. Raising interest rates appears unattractive because it will create a recession. No domestic purpose would be served by such a recession; it is just the result of foreign investors' change of opinion. Thus, letting the exchange rate depreciate would seem to be the natural, inevitable policy choice. A sudden panic by foreign exchange speculators is a sudden fall in demand for your country's products: International investors are no longer willing to hold your country's bonds at prices and interest rates that they were happy with last month. What does a business do when all of a sudden demand for the products it makes falls? The firm cuts its price. Perhaps a country faced with a sudden fall in demand for the products it makes should do the same — cut its price. And the easiest way for a country to "cut its price" is to let the home-currency value of foreign currency and goods rise.

Yet throughout the 1990s, whenever international investors suddenly turned pessimistic about investing in a country, observers reacted with shock and horror when the value of foreign currency rose. This was the story in the collapse of the European Monetary System in 1992, the collapse of the Mexican peso in 1994–1995, and the East Asian financial crisis of 1997–1998. In all these cases the trigger of the crisis was a sudden change of heart on the part of investors in the world economy's industrial core — in New York, Frankfurt, London, and Tokyo.

Economists will long argue whether it was the relative optimism of investors before the crisis or the relative pessimism of international investors after the crisis that was the irrational speculative wave. The right answer is probably "yes"; financial markets were excessively enthusiastic before the crisis and were excessively pessimistic afterwards. But why did such changes in international investor sentiment cause a crisis rather than an embarrassment? Why not let the exchange rate depreciate — the value of foreign currency rise — and keep domestic monetary and fiscal policy aimed at maintaining internal balance?

The answer appears to be that letting the value of foreign currency rise is dangerous if banks, businesses, and governments have borrowed massively abroad in foreign currencies. Then a depreciation of the exchange rate bankrupts the economy: The foreign-currency value of all the foreign-currency and business assets is brought down by the depreciation, while the home-currency value of their liabilities is unchanged. Such an interlinked chain of general bankruptcies destroys the economy's ability to transform household saving into investment and shifts the IS curve far and fast back to the left. Such chains of bankruptcies are the stuff of which Great Depressions are made.

Some specific steps should have been taken to reduce vulnerability to a crisis. Strongly discourage — that is, tax — borrowers from borrowing in foreign currencies. If you are going to accept free international capital flows (in an attempt to use foreign financing for your industrial revolution), then be sure that your exchange rate can float without causing trouble for the domestic economy. If your exchange rate

must stay fixed (to fight inflation or for other reasons), then recognize that an important part of keeping it fixed is controls over capital movements.

But once the crisis has hit, good options are rare. Is there a possible path to safety? Can you raise interest rates enough to keep the depreciation from triggering bankruptcy and hyperinflation while still avoiding a high-interest-rate-generated recession? Can you depreciate the exchange rate far enough to restore demand for home-produced goods without depreciating it so far as to bankrupt local businesses and banks?

Maybe.

The dilemmas are real. It is economic policy malpractice to claim that it is obvious that in a financial crisis interest rates should not be raised and the exchange rate should be allowed to find its own panicked-market level even if banks and firms have large foreign-currency debts. It is also economic policy malpractice to claim that in a financial crisis interest rates should be raised high enough to keep the exchange rate from falling at all. It's not that simple. So if sudden changes of opinion by international investors cause so much trouble, shouldn't we keep such sudden changes of opinion from having destructive effects? Shouldn't we use capital controls and other devices to keep international flows of investment small, manageable, and firmly corralled?

Once again, maybe.

The first generation of post-World War II economists — John Maynard Keynes, Harry Dexter White, and their students — would have said, "Yes." Sudden changes of opinion on the part of international investors can cause enormous damage to countries that allow free movement of capital. Such sudden changes of opinion are a frequent fact of life. Therefore, make it illegal, or at least very difficult, to borrow from and lend to, invest in, or withdraw investments from foreign countries. The second and third generations of post-World War II economists had a different view. They regretted that capital controls kept people with money to lend in the industrial core away from people who could make good use of the money to expand economic growth. The balance of opinion shifted to the view that too much was sacrificed in economic growth at the periphery for whatever reduction in instability capital controls produced. Moreover, a regime of capital controls encouraged corruption. Often it was the cousin of the wife of the vice minister of finance who received permission to borrow abroad. Thus, capital controls paved the way to kleptocracy: rule by the thieves.

So today we have the benefits of free international flows of capital. The ability to borrow from abroad does promise to give successful emerging market economies the power to cut a decade or two off the time needed for them to industrialize. It promises to give investors in the world economy's industrial core the opportunity to earn higher rates of return. But this free flow of financial capital also is giving us a major international financial crisis every three years or so.

What is to be done will be one of the major economic policy debates of the next decade. Should we try to move toward a system in which capital is even more mobile than it is today, but in which international financial crises may become an even more common occurrence? Or should we try to move toward a system in which capital is less mobile — more controlled — and in which some of the benefits of international investment are traded for less vulnerability to financial crises? We don't have to have a global economy as vulnerable to currency crises as the economy of the 1990s was.

15.3**THE ARGENTINEAN CRISIS OF 2001: AN EXAMPLE**

During the 1990s, some economists argued that the reason that economies such as Mexico, Korea, Thailand, Malaysia, Indonesia, and Brazil were subject to such sharp financial crises was that their exchange rates were not fixed enough. When a crisis developed, the fact that the government *could* change the exchange rate meant that financiers feared that the government *would* change the exchange rate. The result was large-scale *capital flight*, which triggered the devaluation financiers had feared, and the devaluation of the home currency set off the chain of threatened bankruptcies that turned an adjustment of international prices into a full-blown crisis. If, some economists argued, the government lacked the power to change the exchange rate, no one would fear devaluation, capital flight would be avoided, and the crisis would never occur.

Thus, in the aftermath of all these other crises, the Argentinean government of the 1990s believed that it had arrived at an institutional setup that would guarantee the credibility of its currency and eliminate any possibility of a crisis. It set up an independent *currency board* to manage its exchange rate, fixed its currency to the dollar, and obligated the currency board by law to make sure that the supply of cash money in the economy was no greater than the currency board's foreign exchange reserves. With one Argentinean peso equal to one dollar, and with the currency board having more dollars in its asset holdings than there were cash pesos in the Argentinean economy, the theory was that confidence in the fixed exchange rate would be complete. If people did begin to doubt the peg, they would trade their cash pesos for dollars at the currency board. The cash money supply would thus fall because the currency board would not spend but would retire the cash pesos it was offered. A falling money stock would raise the value of the peso. And as pesos became scarce and more valuable, confidence would return.

That was the theory.

The collapse of the Argentinean economy at the end of 2001 provides a test case for this theory. And the answer appears to be, "No." Even if—as the Argentinean government did—the government delegates control over the exchange rate to an external authority, a "currency board," and assigns the currency board the mission of keeping the exchange rate fixed, a large-scale financial crisis is still possible. And Argentina has had one: The peso collapsed at the end of 2001, and Argentinean GDP declined by 15 percent in 2002.

What happened? In practice, things worked differently than in theory. Argentina's federal and state governments did not balance their budgets. As long as the Argentinean economy was growing, the fiscal deficits were of little concern. But internal inflation made Argentina's exports noncompetitive. The fear that the currency board might someday end made Argentina's interest rates higher than those elsewhere. High interest rates tended to discourage investment. The resulting decline in real aggregate demand meant recession. Recession meant larger fiscal deficits.

In the end, a government deficit must lead to one of three things: Taxes must be raised, inflation must take hold and expropriate the debt holders, or the government must formally default. The failure of Argentina's government to effectively collect the taxes due it under law meant that as 2000 and 2001 proceeded, confidence that taxes would be raised diminished.

The currency board was a creature of the government. Would the government continue to let the currency board exist if the consequences were (1) a recession and (2) a sharp cutback in government spending as the government's sources of

borrowing dried up and as the currency board refused to print more money to cover the government's deficit? Faced with a growing national debt, the currency board no longer served as a source of confidence — that the government lacked the power to change the exchange rate was no longer reassuring. And so the same process of large-scale capital flight that had produced the earlier crises was set in motion in Argentina at the end of 2001 as well. Currency speculators bet "No" on the future of the currency board. They were right. And Argentina at the end of 2001 suffered the first big currency crash of the third millennium.

The lesson from Argentina is that the formal structure of institutions matters less than the spirit of the political and economic system that supports them. Argentina's currency board of the 1990s was sound in theory, but not in practice.

RECAP CURRENCY CRISES

Three major (and many more minor) financial crises hit the world economy in the 1990s. The western European crisis of 1992 came about because foreign exchange speculators (correctly) doubted the commitment of other European countries to maintain their fixed parity with Germany as German interest rates rose. The Mexican crisis of 1994–1995 came about because foreign exchange speculators (incorrectly) doubted the commitment of the Mexican government to low inflation and economic reform, and because the fact that Mexico's government had borrowed heavily in dollars meant that a reduction in the value of the peso destabilized Mexico's finances. The East Asian crisis of 1997–1998 came about because foreign exchange speculators (correctly) feared that much recent investment in East Asia had been unproductive and (incorrectly) feared that the age of fast growth in East Asia was over, and because heavy dollar borrowings by East Asian companies meant that a reduction in the value of their currencies threatened to send much of East Asia's manufacturing and financial corporations into bankruptcy.

Chapter Summary

1. For most of the past century, the world has operated with fixed exchange rates — not, as today, with floating exchange rates.
2. Under fixed exchange rates, monetary policy has only very limited freedom to respond to domestic conditions. Instead, the main goal of monetary policy is to adjust interest rates to maintain the fixed exchange rate.
3. Why would a country adopt fixed exchange rates? To make it easier to trade by making foreign prices more predictable and less volatile. Fixed exchange rate systems increase the volume of trade and encourage the international division of labor.
4. Nevertheless, in the past generation countries usually concluded that freedom to set their own monetary policies to satisfy domestic concerns is more important than the international integration benefits of fixed exchange rates.
5. An exception is western Europe, which has permanently and irrevocably fixed its exchange rates via a monetary union.
6. Wide swings in foreign exchange speculators' views of countries' future prospects caused three major currency crises in the 1990s.
7. Such currency crises, although triggered by speculative changes in opinion, were greatly worsened by poor bank regulation and other policies that threatened to send economies subject to capital flight into a vicious spiral ending in depression and hyperinflation.

Key Terms

floating exchange rates (p. 438)
 fixed exchange rates (p. 438)
 gold standard (p. 438)

currency arbitrage (p. 439)
 foreign exchange reserves (p. 440)
 internal balance (p. 451)

external balance (p. 451)
 currency crisis (p. 456)

Analytical Exercises

1. Why does a country's fixing the value of its currency in terms of gold also fix its nominal exchange rate?
2. Why do many economists think that a gold standard tends to put contractionary and deflationary pressure on economies that adhere to it?
3. What are the principal benefits of fixed exchange rates?
4. What are the principal costs of fixed exchange rates?
5. Why did the 1990s see so many international financial crises?

Policy Exercises

1. Suppose that foreign exchange speculators' believed value for the long-run fundamental value of the real exchange rate suddenly rises by 30 percent, from 100 to 130. How does the interest rate increase required to keep the exchange rate constant in the face of this shift depend on the interest sensitivity of the exchange rate parameter ε_r ? Under what circumstances would you think that the parameter ε_r would be large? Under what circumstances would it be small?
2. Look in the back of the book for the annual values of the U.S. real exchange rate. Suppose that the parameter ε_r is 1,000; then a swing of 1 percentage point in domestic real interest rates is associated with a 10-point change in the exchange rate. By how much (and in which direction) would interest rates have to have changed in 1985 to push the real value of the U.S. exchange rate to the value it reached in 1990? By how much (and in which direction) would interest rates have to change today to push the real value of the exchange rate back to the value it reached in 1990? Would either of these shifts improve the condition of the domestic economy?
3. Suppose that a developing country with low capital mobility finds that foreign exchange speculators' views of the long-run fundamental value of its currency have

suddenly shifted upward to 130, but that it wishes to maintain its pegged exchange rate ε^* of 100 and also keep domestic interest rates from rising above foreign interest rates. In the formula

$$r = r_f + \frac{\varepsilon_0 - \varepsilon^*}{\varepsilon_r} + \frac{\varepsilon_R}{\varepsilon_r} (\Delta R)$$

if $\varepsilon_R = 1,000$, $\varepsilon_r = 1,000$, and the relevant period of time is one month, how fast will the country lose reserves if it tries to maintain both its pegged exchange rate and the (relatively) low real interest rate? How high would it have to raise the domestic real interest rate above foreign rates to stop its loss of reserves?

4. Suppose you are asked to analyze whether Europe's monetary union was a mistake. What kinds of evidence would you look for to try to make up your mind?
5. Suppose you are asked whether some small Latin American country should dollarize — that is, fix its exchange rate with the United States once and for all by adopting the U.S. dollar as its own internal currency. What kinds of evidence would you look for to try to determine whether such dollarization is a good idea or not?

CHAPTER

16

Changes in the Macroeconomy and Changes in Macroeconomic Policy

QUESTIONS

How has the structure of employment and production changed over the past century? How has the business cycle changed? How has economic policy changed?

What are future prospects for successful management of the business cycle?

Why does unemployment in Europe remain so high?

Why has growth in Japan been so slow for the past decade and a half?

16.1 CHANGES IN THE MACROECONOMY

The Past

Back in Chapters 4 and 5 we analyzed economic growth as a process of rising capital stocks, productivity levels, and living standards. We gave short shrift to the fact that economic growth is also a process of structural change — of shifts among occupations, industries, and forms of business activity. And these changes mean that the patterns of aggregate economic activity called business cycles that are studied in macroeconomics change too. Consumers' opportunities and spending patterns change, industries grow and shrink, the role of international trade steadily expands. The role of the government changes too, rising sharply during the New Deal era of the 1930s and the Great Society era of the late 1960s and early 1970s. It would be surprising indeed if the patterns of macroeconomic fluctuations remained unchanged as all these factors that underpin the macroeconomy change.

Over the past century the structure of modern industrial economies has changed, by some measures at least, more than in the entire previous millennium. Between the year 1100 and the start of the U.S. Civil War in 1860 the share of the labor force engaged in agriculture fell from perhaps 80 percent to perhaps 50 percent. But between the Civil War of the 1860s and the end of the twentieth century the share of the U.S. labor force engaged in agriculture fell from 50 percent to 2 percent, as shown in Figure 16.1. Today in America gardeners, groundskeepers, and producers and distributors of ornamental plants outnumber farmers and farm laborers.

The decline of agriculture is not the only major shift in the economy's occupational and industrial distribution. A century ago perhaps 40 percent of the labor force was engaged in mining, manufacturing, and construction — the nonagricultural industries that still required heavy lifting. Today perhaps 25 percent of the labor force is so engaged. The fall in relative employment in these industries has been offset by a rise in service-sector employment — both traditional services and what one might call information-intensive services.

Moreover, a hundred years ago the government's social insurance state was barely in embryo: We had the remnants of the Civil War pension system and the start of health and safety and economic regulation, but little else of the large edifice that is the twenty-first century social insurance state. A hundred years ago the tax system was not at all progressive. A hundred years ago nearly all households found it very difficult to borrow in order to see themselves through a year of low income and of unemployment.

Today, by contrast, the American financial system lends immense amounts of money to all kinds of consumers. In standard economic theory, this should allow them to smooth their consumption spending. Households should be able to greatly reduce the impact of changes in their incomes on changes in consumption, and so reduce the marginal propensity to consume. Such reductions in the marginal propensity to consume should carry along with them a substantial reduction in the size of the multiplier. The same holds true for the fiscal automatic stabilizers of progressive taxes and social insurance, which appear to exert a powerful stabilizing force on the economy. They were not present a century ago.

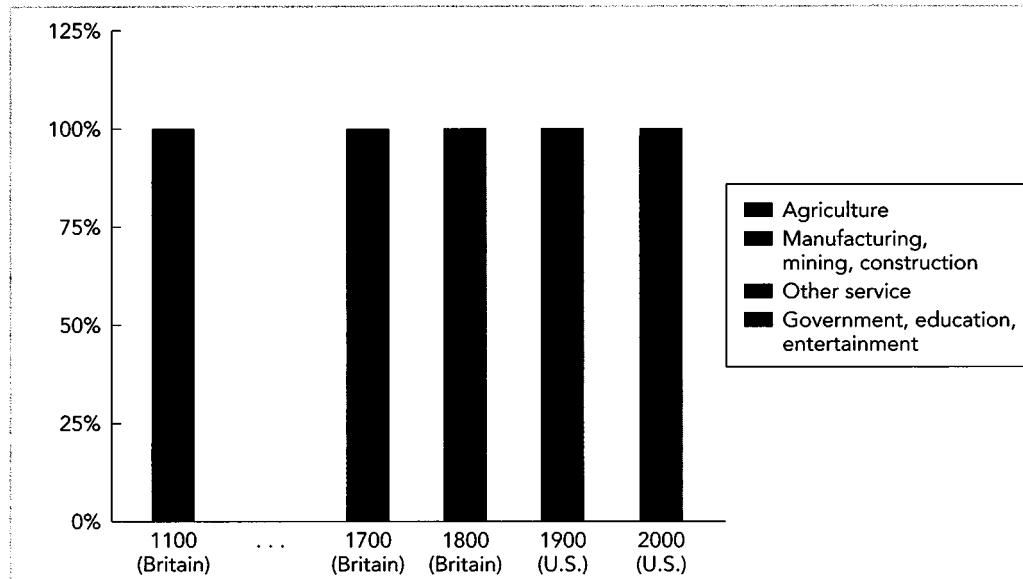
The past century has also seen the rise of financial automatic stabilizers — the most important of which is deposit insurance. One major factor making depressions (most notably the Great Depression) larger in the distant past was the fear that banks might fail, which induced people to pull money out of banks and hide

financial automatic stabilizers

Features of the financial system, such as deposit insurance, that help to prevent stress on the financial system from culminating in total collapse.

FIGURE 16.1

Occupational Distribution of the Labor Force A thousand years ago almost everyone was a farmer. Even in 1900, nearly one-third of the labor force was made up of farmers. Today the occupational distribution of the labor force is very different. The industries of the industrial revolution — manufacturing, mining, and construction — still employ a quarter of our labor force. But most of today's workers are in the service sector, many of them in information-intensive services.



Source: Authors' calculations from *Historical Statistics of the United States* and other sources.

it under their mattresses. Such sudden increases in the demand for cash during financial panics caused interest rates to spike, investment to fall, and production to decline. Today the existence of a large deposit insurance system has all but eliminated this fear.

Still another change has come in the pace and direction of material progress. Back in the late nineteenth century the bulk of improvements in labor productivity came from *capital deepening*: the buildup of the infrastructure and the factories of the country. In the twentieth century the bulk of improvements in labor productivity came from improvements in the efficiency of labor as a result of improvements in science and technology: inventions and innovations in materials production, materials handling, and organization.

The share of economic activity oriented toward the future increased as well. Research and development became not a casual by-product of the rest of economic activity, but an organized branch of industry and a key component of investment. At least partly as a result, labor efficiency growth in the twentieth century proceeded at twice the pace of labor efficiency growth of the nineteenth century. And few if any signs suggest that the pace of growth in the early twenty-first century will be slower.

TABLE 16.1
Business Cycle Patterns

Period	Typical Swing in Unemployment	Typical Swing in Nonfarm Unemployment	Proportion of Time Spent in Recession
1870–1910	2.3%	4.4%	NA
1886–1915	2.9	4.8	22%
1901–1930	1.4	1.9	30
1916–1945	7.2	8.7	28
1931–1945	8.1	10.1	18
1946–1975	1.2	1.3	19
1976–1998	1.3	1.3	11
1946–1998	1.5	1.5	15

Source: Authors' calculations from estimates provided by Christina Romer, "Spurious Volatility in Historical Unemployment Estimates," *Journal of Political Economy* 94, no. 1 (February 1986), pp. 1–37; and from *Historical Statistics of the United States* (Washington, DC: Government Printing Office, 1975).

Yet in spite of all of these changes in the structure of the economy, the U.S. economy's business cycle has continued. The patterns of the business cycle we see today would seem familiar to those who watched business cycles late in the nineteenth century. As Table 16.1 shows, there are some signs that fluctuations in unemployment have become smaller in recent years (and many signs that the Great Depression of the 1930s involved an extraordinarily violent business cycle). But in spite of a number of structural changes that would seem likely to change the size and duration of the business cycle, business cycles today are surprisingly similar to those of a century ago. Different changing factors appear to have largely offset each other.

The Future

We should not imagine that economic structural change is over: It will continue. We can already see some of the future changes that will transform the macroeconomy, for they are already under way.

For example, the past two generations have seen a great easing in credit — an increase in financial flexibility that allows more consumers to borrow more on less collateral. This will continue, diminishing the importance of liquidity constraints and making consumption spending less dependent on income as consumers are better able to plan for the future.

The increase in financial flexibility will also make interpretation of financial markets more difficult — and is thus likely to make monetary policy somewhat more difficult to conduct. International trade will continue to expand. The odds are that international investments will become easier to make, and so the speed at which capital flows across national borders will increase. And labor markets are likely to continue to change as well.

Consumption

Already liquidity constraints — the inability to borrow and the consequent fact that consumption spending is limited by income — play a relatively small role

financial flexibility

A situation in which a large number of different financial instruments are traded on thick and liquid markets.

liquidity constraints

An inability to borrow.

in determining consumption spending in America. They certainly play a much smaller role than at the beginning of the twentieth century, or even early in the post-World War II period. Economists' theories tell us that if liquidity constraints are absent, then the marginal propensity to consume should be very low. The level of consumption should depend on one's estimate of one's lifetime resources, and it should be affected by changes in current income only to the extent that changes in current income change one's estimate of lifetime resources.

Now economists' standard theories may overstate the case. Tying your current level of spending to your current level of income is a simple, reasonable rule of thumb for managing your affairs. The time needed to do better than you would by using simple, reasonable rules of thumb may simply not be worth spending. And as economist Chris Carroll of Johns Hopkins has pointed out, reasonably strong evidence indicates that American households are both *impatient* (i.e., wish to shift more consumption from the future into the present) and *prudent* (i.e., unwilling to take a significant chance of seeing their future standard of living fall substantially). If true, then such households' patterns of behavior would look very much like the simple consumption functions on Chapters 6 and 9 even if there were no hindrances to borrowing.

Thus the marginal propensity to consume may remain at some constant fraction significantly greater than zero. The increasing ease of borrowing may not lead the multiplier to completely disappear. Nevertheless, the multiplier is likely to grow still smaller over time. It will surely play a smaller role in the economy (and in economic policy, and in economics textbooks) in the future than it has in the past.

Globalization

Globalization has, from one perspective, been going on for centuries. But it continues to accelerate. The future is likely to see international trade continue to expand even more rapidly. The growth in trade, depicted in Figure 16.2, will also lower the multiplier: A greater portion of changes in domestic spending will show up as changes in demand for foreign-made goods. So the economy at home will be even less vulnerable to domestic shocks that disturb employment and output. However, increased international integration means that the domestic economy is

globalization

The ongoing process by which barriers to the free flow of commodities, capital, and information across countries are reduced.

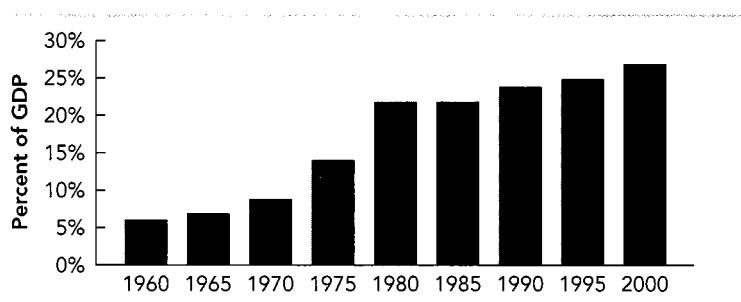


FIGURE 16.2

Globalization:
Merchandise Imports
as a Share of Total
Goods Production

Since 1960 the share of merchandise imports has quadrupled relative to total production of goods.

more vulnerable to foreign shocks: Recession abroad that lowers demand for exports will have repercussions at home.

Accompanying the increase in international trade will be an increase in the magnitude of international financial flows. The odds are that international investments will become easier to make. And the odds are—as means of international communication increase—that investors in one country will become much more confident in making investments in another. So the speed with which capital flows across national borders will increase.

Yet in Chapter 15 we saw that increased flow of capital across national borders is a potential source of financial crisis and macroeconomic volatility. In the East Asian crisis of 1997–1998 a sudden shift in investors' expectations meant that \$100 billion a year in international capital flows that had financed investment in East Asia was no longer there. That \$100 billion a year had financed the employment of 20 million people working in investment industries—digging sewer lines, building roads, erecting buildings, and installing machines—as both domestic and foreign investors bet that there was lots of money to be made in East Asia's industrial revolution. These 20 million East Asian workers had to find new jobs outside of industries engaged in construction and making capital goods. The fall in the value of East Asian currencies went a long way to bringing the supply of and demand for foreign exchange back into balance. Falling exchange rates made East Asian goods more attractive to European and American purchasers, pushing East Asia's economies back to rapid growth.

But what caused the sudden sharp shift in investment patterns? Unfortunately for economists, unfortunately for economics as a social science, unfortunately for the people of East Asia, and unfortunately for others who live in countries at risk of financial crisis, we cannot find any convincing disturbing cause proportional to the large effect. The shift in Wall Street's desires to invest in East Asia appears to have been impelled much more by the trend-chasing and herd instincts of Wall Streeters—a community of people who talk to each other too much, and whose opinions often reflect not judgments about the world but simply guesses about what average opinion expects average opinion to be—than by any transformation in the fundamentals of East Asian economic development.

Here we have reached the limits of economics. Economists are good at analyzing how asset markets work if they are populated by far-sighted investors with accurate models of the world and long horizons. Economists are even good at pointing out that such asset markets can be subject to multiple equilibria—situations in which it is rational to be optimistic and rational investors are optimistic if they think that everyone else is optimistic, and in which it is also rational to be pessimistic and rational investors are pessimistic if they think that everyone else is pessimistic. But that is all they can say.

Note that the process of international investment may still be worth supporting. It does promise powerful benefits: faster industrialization on the developing periphery and higher rates of return for investors from the industrial core, as well as diversification to reduce risk. These benefits may well outweigh the costs of international financial crises. Nevertheless, the next generation of business cycles will likely be judged to have gone well or ill depending on whether the financial crises generated by cross-border financial flows are handled well or badly.

Monetary Policy

The increase in financial flexibility that reduces the multiplier will also make it more difficult to read the financial markets, and probably to conduct monetary policy. Monetary policy works, after all, because the central bank's open-market operations change interest rates. These operations have large effects on interest rates because the assets traded — Treasury bills, on the one hand, and reserve deposits at regional Federal Reserve banks, on the other hand — play key roles in finance. Few substitute assets can serve the functions that they serve.

But as financial flexibility increases, any one kind of asset will become less and less of a bottleneck. There will be more ways of structuring transactions, and more kinds of financial instruments will be traded. Thus in the future, changes in the supply of Treasury bills likely will have less effect on interest rates than they do today. Open-market operations are likely to become somewhat less effective, and monetary policy somewhat more difficult to conduct, in the future.

Will this make much of a difference? Nobody knows. But monetary policy today is very effective at controlling production, employment, and prices — albeit with long and variable lags. Even a considerable reduction in the power of open-market operations would still leave central bankers with more-than-ample tools to carry out whatever kinds of policies they wished. The fear that increases in financial instability will rob central banks of their power to control economies is at least a generation in the future.

Will these ongoing and future changes in the structure of the macroeconomy have as little effect on the relative size of the business cycle as past changes appear to have had? To answer that question we need to look at the history of macroeconomic fluctuations, which we do in the next section.

Inventories

Fourth and last of the changes that we can foresee is that improvements in information technology will improve businesses' ability to control their inventories. Mismatches between production and demand — unanticipated large-scale inventory accumulation or drawdowns — have been a principal source of fluctuations in unemployment and output over the past century. Better information technology may well reduce this component of macroeconomic instability. But how large this reduction will be is, once again, something that nobody knows.

RECAP CHANGES IN THE MACROECONOMY

The future is likely to bring a continued increase in the liquidity of the economy and a relaxation of borrowing constraints. People will find borrowing easier and easier, hence their spending will be less closely tied to their current income, and the marginal propensity to consume will fall. International trade and financial markets are likely to become increasingly integrated, but at least as far as financial markets are concerned it is not clear that this is a good thing. Over time, the power and effectiveness of monetary policy will likely decline as increased financial options erode the key role played by commercial bank deposits in finance. And firms will probably become better at managing their inventories, so that inventory fluctuation-driven business cycles will become largely a thing of the past.

16.2 THE HISTORY OF MACROECONOMIC FLUCTUATIONS

Estimating Long-Run Changes in Cyclical Volatility

Assessing changes in the size of the overall business cycle turns out to be harder than it looks. The obvious thing to do is to compare the cyclical behavior of real GDP and unemployment over the last century. But good-quality data exist only for the post–World War II period. The pre–World War II data are much spottier. The Federal Reserve Board index of industrial production begins only in 1919. The Commerce Department GDP series begins only in 1929. The Bureau of Labor Statistics unemployment rate series begins only in 1940. And there is good reason to think that pre-1950 data are less reliable than post-1950 data.

Professor Christina Romer of the University of California–Berkeley has demonstrated that the procedures used to construct pre-1950 data tended to artificially inflate the cyclical volatility of the data. If you simply use the estimates reported in *Historical Statistics of the United States*, you will be comparing pre–World War II apples to post–World War II oranges. On the other hand, a consistent division of the past century-plus into recessions and expansions, as used in Table 16.2, shows little difference in the size of recessions. The average pre–World War I recession was about two weeks shorter than the average post–World War II recession.

cyclical volatility

The amount of variation in the size of swings from peak to trough over time.

TABLE 16.2

Length of Recessions and Expansions since 1886

Pre–World War I recessions (months to trough) are almost exactly the same length as post–World War II recessions. Post–World War II expansions (months from trough to peak), however, are half again as long as pre–World War I expansions.

1886–1916			1920–1940			1948–Present		
Year of Peak	Months to Trough	Months from Trough to Next Peak	Year of Peak	Months to Trough	Months from Trough to Next Peak	Year of Peak	Months to Trough	Months from Trough to Next Peak
1887	5	66	1920	14	26	1948	11	45
1893	13	23	1923	14	32	1953	10	39
1896	12	39	1927	9	21	1957	8	24
1900	8	31	1929	34	61	1960	10	106
1903	8	40	1937	10	18	1969	11	36
1907	11	19	1939	3		1973	16	58
1910	16	37				1980	6	12
1914	6	17				1981	16	98
1916	8					1990	8	119
						2001	7	
Avg.	9.7	34.0		14.0	31.6		10.1	53.7

Source: Christina Romer, "Remeasuring Business Cycles" (NBER Working Paper 4150), <http://papers.nber.org/W4150>, published subsequently in *Journal of Economic History* 54 (September 1994), pp. 573–609; and authors' calculations.

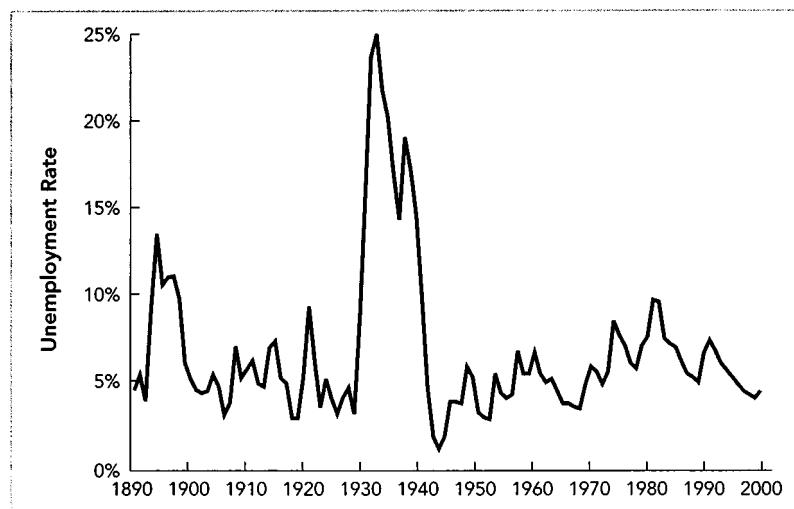


FIGURE 16.3
The Great Depression Relative to Other Business Cycles: U.S. Unemployment

Calculating fluctuations in unemployment according to a methodology consistent with the post-World War II data reveals that past unemployment estimates contained in *Historical Statistics of the United States* overstated the size of the depression of the 1890s.

Source: The 2004 edition of *The Economic Report of the President* (Washington, DC: Government Printing Office); *Historical Statistics of the United States* (Washington, DC: Government Printing Office); and Christina Romer, "Spurious Volatility in Historical Unemployment Estimates," *Journal of Economic History* 94, no. 1 (February 1986), pp. 1–37.

We can reach a few solid conclusions about the changing cyclical volatility of the American economy. The first and most obvious fact is the extraordinarily large size of the business cycle during the interwar period — the 1920–1940 period that came after World War I and before World War II. The Great Depression that began in 1929 was only the largest of three interwar business cycles. Other major contractions in economic activity took place in 1920–1922 and 1937–1938 (see Figure 16.3).

A second clear conclusion is that in the post–World War II era the business cycle, measured relative to the size of the economy, has been a little bit but not much smaller than before World War I. The shrinkage in the business cycle appears to be between 25 and 30 percent. The postwar business cycle is a somewhat smaller animal, but it would seem to be of the same species.

Thus many of the changes in the economy since 1900 must have roughly canceled each other out. The decline of agriculture as a share of employment and production (as a rule not very susceptible to the industrial business cycle) has been offset by the rise in importance of relatively acyclical services (also not very susceptible to the business cycle). An increase in the life span of capital equipment built with more durable materials might seem likely to increase cyclical volatility because more economic activity takes the form of long-term bets on the future. But this has apparently been offset by faster technological obsolescence, which reduces the effective economic life of investments in fixed capital. A smaller multiplier due to reduced liquidity constraints on households has presumably had some effect. But perhaps keeping spending proportional to income remains a useful rule of thumb even as credit becomes widely available, and so perhaps credit availability has not done as much to reduce the multiplier as economists' theories claim.

Economic Policy

How Economic Policy Has Worked

Yet if we look a little deeper, we see that business cycles today are not the same animals that they were before the Great Depression. The fall in the multiplier, the arrival of automatic stabilizers, and the increasing power of central banks have allowed monetary policy to offset many of the kinds of shocks that generated pre-Depression business cycles. The absence of significant stabilization springs from the fact that the increasing power of central banks has created a new class of shocks to the economy: recessions deliberately induced by monetary authorities to curb rising inflation. The post–World War II economy appears to have had fewer small recessions caused by shocks to the IS and LM curves. **Stabilization policy** has worked, in that it allows the central bank working in combination with automatic stabilizers to react when the economy threatens to turn down into recession because of any sudden shock.

Before 1916 it was impossible for the U.S. government to have any effect on planned expenditure. Government purchases and net taxes were so small relative to economic activity that no fiscal policy variation short of fighting a major war could materially shift the IS curve and change equilibrium real GDP. The pre–World War I government also lacked, until the founding of the Federal Reserve in 1914, the ability to affect the level of interest rates. Neither fiscal stabilization policy nor monetary stabilization policy as we know them today was possible before World War I.

By the end of World War II the power of stabilization policy and the government's commitment to manage aggregate demand were both firmly established. The war left the United States with a federal government that annually spent about one-fifth of GDP, and a government committed to countercyclical fiscal policy. Before World War II it had been a commonplace of political and policy-making discourse that taxes should be raised and spending cut to try to balance the budget in a recession. By the 1950s this doctrine was dead; the automatic stabilizers of the federal budget were in place.

The emergence of a significant progressive income tax made government revenues substantially procyclical. The emergence of unemployment compensation, food stamps, and welfare led government spending to have a substantial automatic countercyclical component. By the 1960s the federal government believed that it ought to be undertaking countercyclical discretionary fiscal policy as well (even though it has never been able to succeed in doing so). In monetary policy a similar shift had been accomplished near the beginning of the post–World War II period. By the early 1950s the U.S. Treasury and the Federal Reserve had agreed—in their Accord of 1951—that the principal task of the Federal Reserve was to use monetary policy to stabilize the economy.

Since then the Federal Reserve has attempted to use monetary policy, within the limits placed on it by long and variable lags, to stabilize the economy and to moderate recessions. Both overall survey studies and detailed studies of cases like the interest rate cuts that followed the stock market crash of 1987 teach the lesson that the Federal Reserve has had considerable success in cutting short recessions and in accelerating growth in the early stages of the subsequent economic expansion.

Automatic stabilizers as well have clearly played a role in moderating the business cycle. Yet a third innovation in economic policy—deposit insurance—has

stabilization policy

Policy aimed at avoiding recessions and undue inflation by keeping total aggregate demand growing smoothly.

had effects that are harder to quantify. However, as Christina Romer observes, “The obvious starting point is the observation that financial panics were ubiquitous before World War I and almost nonexistent since World War II . . . there were major panics in 1890, 1893, 1899, 1901, 1903, and 1907—all of them the source of substantial contractionary pressure on real GDP.” Perhaps the effects of deposit insurance have been large as well; we are not really sure.

How Economic Policy Has Not Worked

But if economic policy since World War II has prevented or moderated many recessions, it has caused recessions as well. The existence of policy-induced recessions like those of 1981–1982 and 1990–1992 is what explains why there has not been a more dramatic reduction in the size of the business cycle over time. At least four times in the United States since World War II the Federal Reserve has engineered a recession, or has willingly accepted a substantial risk of a recession, in order to accomplish its policy goal of curbing inflation. It has had to curb an inflation rate that has crept upward into an uncomfortably high range.

If the prewar boom-and-bust business cycle was driven by, in John Maynard Keynes’s phrase, the “animal spirits” of investors’ shifts from optimism to pessimism and back again (and by financial panics), the post–World War II boom-and-bust business cycle has been driven by economic policies that have allowed rises in inflation, followed by the development of a consensus within the Federal Reserve that the rise in inflation must be reversed.

Why have economic policy makers in the post–World War II era found themselves repeatedly driven to risk recession in order to fight inflation? In the late 1940s inflation was allowed to accelerate because the Federal Reserve had adopted the mission of keeping interest rates low to reduce the cost of financing the huge national debt incurred during World War II. The Federal Reserve was not satisfied with this mission, and in fact negotiated the Treasury–Federal Reserve Accord of 1951 to remove it from its list of policy objectives.

In the 1960s and 1970s inflation was allowed to accelerate for reasons that economists still debate. Berkeley economist DeLong has stressed historical accidents and the lingering memory of the Great Depression. Stanford economist John Taylor stresses mistaken economic theories held in the early 1960s—in particular, the Phillips curve model of Samuelson and Solow constructed under the assumption that inflation expectations were and would remain static. Political scientists like Edward Tufte stress political business-cycle considerations.

At the first, surface level, the United States had an unstable macroeconomy in the 1970s because no influential policy makers—until Paul Volcker chaired the Federal Reserve in the 1980s—would place a sufficiently high priority on keeping inflation from rising. As long as inflation remained relatively low, it was not seen as a crisis, and so other goals took precedence among every group of economic policy makers. Thus presidents, members of Congress, and members of the Federal Open Market Committee were willing to accept the risk of increasing inflation to achieve other goals. Only after inflation had risen—only after it had reached the level of a political crisis—did a consensus develop that priorities needed to be changed, and steps were taken to reduce inflation.

Under this interpretation, the United States after World War II had a boom-bust, stop-go business cycle because the political system could pay attention to only one phenomenon at a time: When inflation wasn’t a crisis, it wasn’t an issue.

policy-induced recessions

Recessions started not by swings in consumer or investor confidence, but by contractionary monetary policy.

Only with the acceleration of inflation toward the end of the 1970s did political sentiment begin to shift. For rising inflation did become a severe political problem in 1979. Paul Volcker was then nominated and confirmed as chair of the Federal Reserve in a political environment in which controlling inflation — rather than reducing the unemployment rate — was the highest priority for economic policy. The Volcker-led Federal Reserve quickly signaled its intention to place first priority on controlling inflation by shifting its operating procedures to place a greater emphasis on money supply targets.

At a second, deeper level, the United States had a burst of inflation in the 1970s that required a painful recession cure in the 1980s because economic policy makers during the 1960s had dealt their successors a bad hand: an unfavorable Phillips curve. Thus the policies of the 1960s left economic policy makers of the 1970s with a painful dilemma: either higher-than-usual inflation or higher-than-usual unemployment. Bad cards coupled with bad luck made inflation in the 1970s worse than anyone expected it might be. And unsuccessful attempts to find a way out of this dilemma gave the economy the boom-bust cycle of the 1970s.

And at a third, deepest level, the truest cause of the inflation of the 1970s was the memory of the Great Depression. The Great Depression made it impossible for a while to believe that the business cycle was a fluctuation *around* rather than a shortfall *below* potential output and potential employment. The memory of the Great Depression made everyone skeptical of taking the average level of capacity utilization or the unemployment rate as a measure of the economy's sustainable productive potential.

Only after the experiences of the 1970s were economic policy makers persuaded that the flaws and frictions in American labor markets made it unwise to try to use stimulative macroeconomic policies without limit. Only after the experiences of the 1970s were policy makers persuaded that the minimum sustainable rate of unemployment attainable by macroeconomic policy was relatively high, and that the costs — at least the political costs — of even moderately high one-digit inflation were high as well.

That the post-World War II gains from stabilization policy appear to have been relatively small is somewhat depressing. Nearly 50 years ago Milton Friedman warned that stabilization policy, if pursued overly aggressively by policy makers who did not understand its limits, could easily turn into destabilization policy. His gloomy warning appears very close to being correct. Yet important lessons may have been learned.

RECAP THE HISTORY OF MACROECONOMIC FLUCTUATIONS

The pre-World War II boom-and-bust business cycle was driven by investors' shifts from optimism to pessimism and back again. The post-World War II boom-and-bust business cycle has been driven by economic policies that have allowed rises in inflation, followed by a Federal Reserve-caused recession to reverse the rise in inflation. There is reason to hope that the modern Federal Reserve has learned how to eliminate or at least reduce the size of these inflation-fighting recessions.

16.3 UNDERSTANDING THE GREAT DEPRESSION

But if the business cycle has remained in spite of — and in part because of — active macroeconomic policy, it is important to remember that active macroeconomic policy has made a disaster on the order of magnitude of the Great Depression nearly inconceivable. To see how bad things could get in an extreme situation when economic policy does not do its job, we need only to look back 75 years at the Great Depression.

The Magnitude of the Great Depression

The speed and magnitude of the economy's collapse during the first stages of the Great Depression were unprecedented. Nothing like it had been seen before, and nothing like it has been seen since. From full employment in 1929, real GDP fell until it was nearly 40 percent below potential output by 1933 (see Figure 16.4). Investment collapsed: By 1932 real investment spending was less than one-ninth what it had been three years before. And by 1933 unemployment had reached a quarter of the labor force.

In our analytical framework, understanding why investment and real GDP fell so far so fast between 1929 and 1933 is straightforward. They did so because of an extraordinary rise in real interest rates. Real interest rates that had been 4 percent in 1929 spiked to nearly 13 percent by 1931 and stayed high throughout 1932 (see Figure 16.5 on page 480). With such high real interest rates, investment spending naturally fell off.

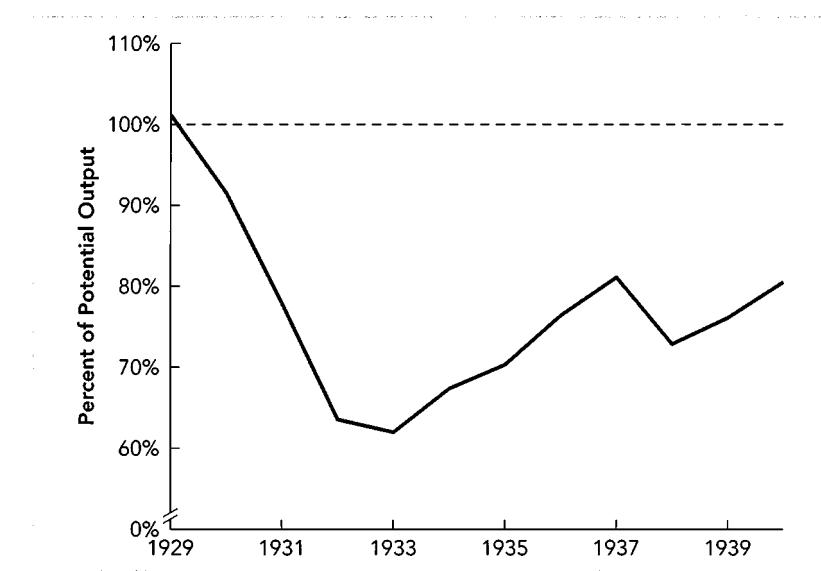
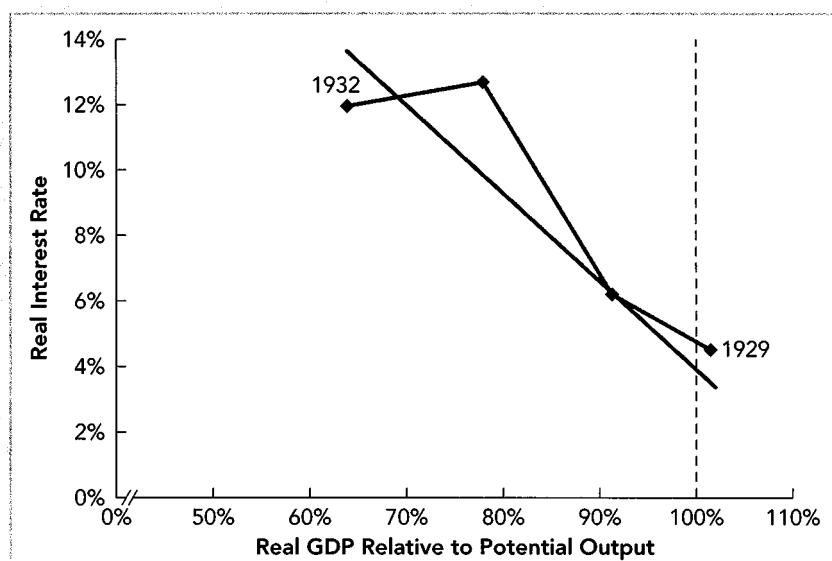


FIGURE 16.4
Real GDP Relative
to Potential Output
during the Great
Depression

The Great Depression saw the steepest fall ever in real GDP relative to potential output.

FIGURE 16.5
Movement along the IS Curve: The Great Contraction, 1929–1932

Sharp rises in expected real interest rates due to deflation and rising risk premiums pushed the economy far up the IS curve between 1929 and 1932.



Source: Authors' calculations from *Historical Statistics of the United States* (Washington, DC: Government Printing Office, 1975).

After 1932 investment spending remained low, averaging less than half its 1929 value for the rest of the Great Depression decade even though real interest rates returned to more normal values. Why didn't the return of real interest rates to normal values cause a revival of investment? Because the magnitude of the Great Depression itself caused businesses to put off expanding their capacity. In 1933, with real GDP less than two-thirds of potential output, practically every business in the United States had excess capacity and hence no immediate incentive to invest at all. The very depth of the Great Depression caused a steep fall in baseline investment I_0 in the investment equation

$$I = I_0 - I_r r$$

Thus even a restoration of real interest rates to normal levels was not sufficient to restore the economy to full employment.

Deflation and High Real Interest Rates

So why did real interest rates rise so high between 1929 and 1932? The immediate, proximate cause of high real interest rates was rapid deflation: rapid sustained falls in prices that, when combined with moderate nominal interest rates, produced very high real interest rates, as shown in Figure 16.6.

What caused the deflation? The first thing was the depth of the Great Depression itself: Falling production, employment, and demand produced steep falls in prices, which caused high real interest rates that reduced demand, production, and employment still further. But saying that the Great Depression caused itself makes little sense. An initial shock must have occurred to start the downward spiral that was the Great Depression.

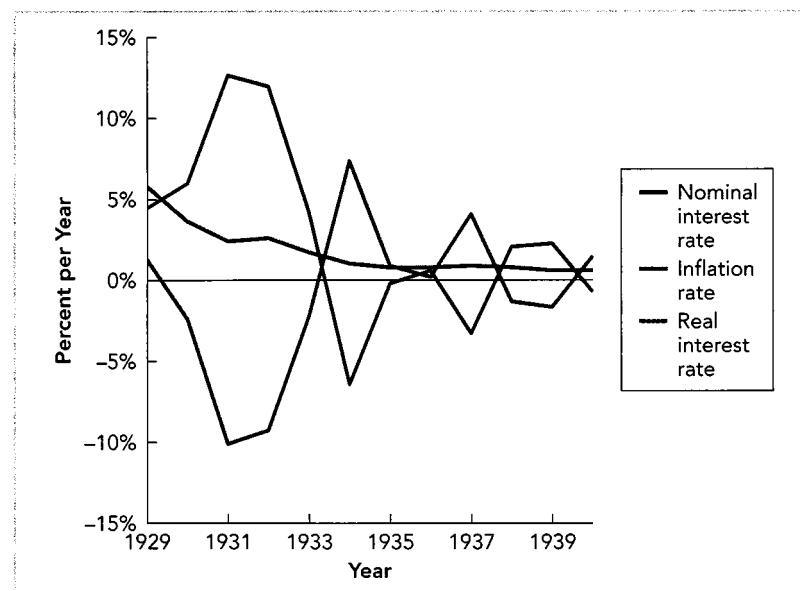


FIGURE 16.6
Real and Nominal Interest Rates and the Inflation Rate in the Great Depression

Nominal interest rates on Treasury securities fell rapidly between 1929 and 1933. But such cuts in nominal interest rates did not keep real interest rates from rising sharply; deflation played a big role too.

Source: Authors' calculations from *Historical Statistics of the United States* (Washington, DC: Government Printing Office, 1975).

The Initial Shock

Economists have proposed many candidates for the shock that triggered the Great Depression. Perhaps the stock market crash of 1929 reduced wealth and increased uncertainty, causing a downward shift in the baseline level of consumption. Perhaps the availability of consumer credit in the 1920s caused a consumption spending boom that then came to a natural end. Perhaps there was excessive residential investment in the 1920s because builders failed to realize how the restrictions on immigration put into place in the mid-1920s would affect housing demand in the long run. Perhaps the recognition that the housing stock was too large triggered a downward shift in the baseline level of investment. Perhaps the Federal Reserve's 1928 increases in interest rates, an attempt to reduce stock market speculation, triggered the initial slump.

Practically any analyst soon reaches the conclusion that the response was disproportionate to the initial shock. Somehow the American economy at the end of the 1920s was very vulnerable in the sense that a small shock could cause a big depression. It is this disproportion between the hard-to-find initial shock and the subsequent depression that makes many economists fear that the economy will be unstable if not managed by appropriate government policies.

Consequences of the Price Level Decline

Economists have reached a consensus that a sufficiently aggressive and activist monetary policy could have stemmed the price decline, and so ended the Great Depression much earlier if undertaken rapidly and aggressively enough. Policies of massive federal deficits funded by money-printing, coupled with aggressive open-market

operations to increase the monetary base, could have, if carried far enough, produced inflation. And without the high real interest rates produced by deflation in the early 1930s, it is hard to see how there could have been a Great Depression.

Falling price levels reduce real GDP through two separate channels. The first is the real interest rate channel that we saw above: The real interest rate is the nominal interest rate minus the expected inflation rate, so deflation that is expected to continue leads to high real interest rates, to a move up and to the left along the IS curve, and to falling real GDP and employment.

But there is a second channel as well. Unexpected falls in the price level redistribute wealth from debtors to creditors. Those businesses that are heavily in debt find that they cannot pay, and so they go bankrupt. Those financial institutions that have loaned to heavily indebted businesses find that their loans are worthless, and so they go bankrupt as well. Deflation destroys the web of credit that channels funds from savers through banks and other financial institutions to businesses wanting to invest. More than one-third of U.S. banks failed in the first years of the Great Depression. And without the web of financial intermediaries to channel investment through the financial markets, maintaining or restoring the flow of investment becomes very difficult.

These effects of deflation are long-lasting. Even after real interest rates have returned to normal, the deflation-driven destruction of the web of financial intermediation will continue to depress investment. So it was in the Great Depression. Only with the cleaning-up of the insolvent parts of the banking system and rises in prices after the abandonment of the gold standard did recovery begin.

The memory of the Great Depression was an important factor that made the Federal Reserve unwilling to raise interest rates during the dot-com stock market bubble of the 1990s and eager to lower interest rates far and fast after the stock market began to decline. Heading off any possibility of a deflationary spiral of bankruptcy like the one that happened in the 1930s was the Federal Reserve's highest priority in the early 2000s. Prominent economists — monetarist Milton Friedman, and former Council of Economic Advisers Chair Michael Boskin among them — made much of the structural similarities between 1929–1934 and 1999–2004. In their view, economic policy makers deserve extremely high marks in the early 2000s for having learned the lessons taught by the Great Depression, and for applying them.

RECAP THE GREAT DEPRESSION

The Great Depression was the largest macroeconomic disaster in history. The greatness of the Great Depression was the result of economic policy makers' failure to stem the tide of deflation that the stock market crash of 1929 and the initial recession set in motion. As prices declined, firms and banks became insolvent, and the entire network of financial intermediation that finances investment broke down. Recovery could not come until rising prices diminished the fear of future bankruptcies and until creditors and investors in financial markets could determine which banks and firms were still solvent and thus credit-worthy. This required, first, the cleaning-up of the insolvent parts of the banking system and, second, the rises in the general price level that followed Roosevelt's abandonment of the gold standard.

16.4 MACROECONOMIC POLICY: LESSONS LEARNED

Stabilization

For almost all of your lives — “you” being the typical reader of this textbook — the business cycle has been relatively quiescent. Even the recession of 2001 was small, as recessions go. It was nothing like 1982 or 1975, let alone 1933. A substantial difference in business-cycle behavior can be seen if we divide the post–World War II era into two periods, with the breakpoint chosen at the end of the Volcker disinflation in the early 1980s. The pre-1984 years show much more business-cycle volatility than do the post-1983 years, as Table 16.3 indicates.

One possibility is that the period since 1984 has been the result of good luck — that business-cycle macroeconomic performance has been good because shocks have been few and rarely had large effects on the economy. But as time passes and as the volatility of output and inflation remain relatively low, the notion that the recently stable U.S. macroeconomy is just the result of good luck becomes less and less likely.

Learning

Thus we look at the second possibility: that lessons have truly been learned from the experience of the 1960s and 1970s. The late 1980s through the middle of the first decade of the 2000s was not only an era of relatively stable economic growth but also an era of low inflation. Recessions have been few and growth relatively steady since the early 1980s, in large part because inflation has been firmly under control. A lack of inflation has meant that the Federal Reserve has not had to risk a recession to control inflation.

This leads to the hope that the monetary policy authorities have gained sufficient experience and expertise at using their policy tools to successfully carry out stabilization policy. Perhaps the first three decades of the post–World War II era saw little stabilization of the business cycle because of repeated policy mistakes:

TABLE 16.3

Post-Volcker Stabilization of the U.S. Economy: Standard Deviation of Percentage Changes

Since the mid-1980s the U.S. economy has been astonishingly, remarkably stable. Typical business-cycle movements in the unemployment rate or in real GDP have been half the size they were from 1948 to 1984.

Series	1948–1984	1985–Present
Industrial production	5.7%	2.0%
GNP	2.8	1.1
Commodity output	5.3	3.2
Unemployment rate	1.2	0.5

Source: Christina Romer, “Changes in Business Cycles: Evidence and Explanations” *Journal of Economic Perspectives* 13 (Spring 1999), pp. 23–44; and authors’ calculations.

overoptimism with respect to the possible sustainable rate of economic growth, followed by recessions to demonstrate that the central bank was, after all, serious about controlling inflation.

Prospects

Perhaps the more recent era shows how much more stable our economic system can be with successful institutions that understand the limits of their power. But whether the growth of aggregate demand has been smoother because economic policy makers have recognized the limits of what they can achieve, because of the skill of Paul Volcker and Alan Greenspan, because of better economic theories to guide policy—or simply because of good luck—is not clear. Clearly, however, every time in the past a “new era” or a “new economy” has been proclaimed, the same old business cycle has soon returned.

The expansion of the 1920s led economists to hope that the newly constructed Federal Reserve had learned how to stabilize output by eliminating the fluctuations in interest rates that caused financial crises. Irving Fisher, the most prominent monetarist of his day, went so far as to claim on the eve of the 1929 crash that stock prices had reached a “permanent and high plateau.” The prolonged expansion of the 1960s led the Department of Commerce to change the name of its *Business Cycle Digest* to the *Business Conditions Digest*, for it seemed silly to have a publication named after a phenomenon that no longer existed. Both President Eisenhower’s and President Johnson’s Council of Economic Advisers chairs, Arthur Burns and Walter Heller, agreed that substantial progress in economic science and policy making toward economic stability had opened up new dimensions of political economy.

One can be optimistic about the future of macroeconomic policy, counting up all the lessons that economists and policy makers successfully learned over the course of the twentieth century. One can be especially optimistic from the perspective of the United States today. From that perspective macroeconomic policy appears remarkably successful. Unemployment is very low, at levels that have rarely been seen in a generation. Inflation is also low, at consistently low levels that have not been seen in a generation either. And in recent years measured productivity growth has been very rapid, as a result primarily of the technological revolutions in information and communications technology and secondarily—for a few years anyway—as a result of the Clinton administration bet in the early 1990s that deficit reduction would lead to a high-investment, high-productivity-growth, high-income-growth recovery.

RECAP MACROECONOMIC POLICY: LESSONS LEARNED

The extraordinary stability of the U.S. economy since the mid-1980s suggests that the Federal Reserve has learned important lessons about how to conduct monetary policy: make sure its commitment to fighting long-run inflation is ironclad and credible; look far ahead in estimating the effects of policies; do not be afraid to take preemptive action against dangers—whether rising inflation or rising unemployment—that are not yet visible but that the Federal Reserve’s forecasting models suggest are imminent.

16.5 MACROECONOMIC POLICY: LESSONS UN- OR HALF-LEARNED

One can also be pessimistic about the future of macroeconomic policy. One can count up all the lessons that economists and policy makers did not learn, or half-learned, or learned and then forgot over the course of the twentieth century. Certainly a look outside the United States, either at Japan, or at the financial-crisis-ridden emerging economies, or at Europe with its stubbornly high unemployment, does not lend strength to the claim that traditional business-cycle patterns have come to an end.

Lessons Unlearned: High European Unemployment

Europe currently is not in a Great Depression. Nevertheless, unemployment rates in western Europe are dangerously, disturbingly high. Until very recently unemployment has averaged nearly 10 percent in the zone of countries that now share the common currency of the euro (see Figure 16.7).

Up until the end of the 1970s, unemployment in western Europe had been lower — sometimes substantially lower — than unemployment in the United States. But starting in the 1970s European unemployment began to ratchet upward. Unemployment rose during recessions, yet it did not fall during economic expansions. During the recession of the Volcker disinflation at the start of the 1980s, western European and U.S. unemployment rates were about equal. But during the later 1980s and 1990s the trend of U.S. unemployment was down; the trend of European unemployment was stable or upward.

In the United States the comovements of unemployment and inflation over 1960–2004 can be understood by using the standard Phillips curve. The Phillips

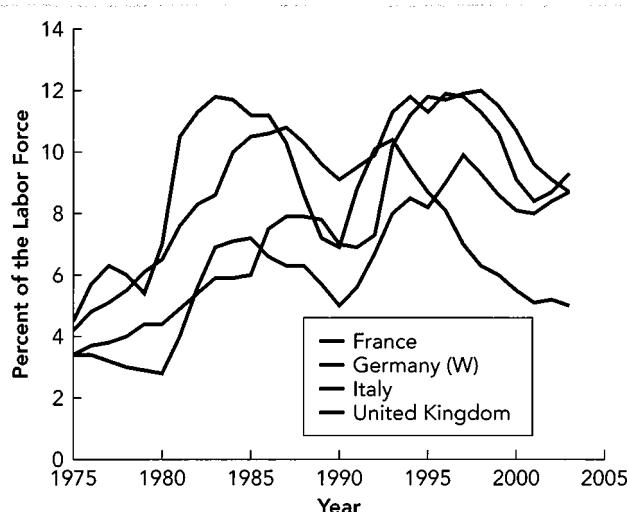


FIGURE 16.7

European Unemployment

The growth of unemployment in the four largest western European countries between 1975 and 2003 is of concern to economists and policy makers.

curve shifts out in the 1970s as everyone begins to expect higher inflation and demographic factors cause the natural rate of unemployment to rise. The Phillips curve shifts back in the 1980s and 1990s as people regain confidence in the Federal Reserve's commitment to low inflation and as changing demographic factors cause the natural rate of unemployment to fall. The story does not fit badly. Movements in the expected rate of inflation reflect changes in the economic policy environment. Movements in the natural rate of unemployment are relatively small, and can be linked to plausible factors.

In western Europe, by contrast, this standard Phillips curve never fit the historical experience very well. Each policy episode from 1970 on — supply shocks, the Volcker disinflation, the recession of the early 1990s — seemed to shift the Phillips curve further out, and to further raise the natural rate of unemployment. It seemed as if this year's natural rate of unemployment was equal to whatever unemployment had happened to be last year.

The dominant view expressed in Europe since the early 1990s has been that high European unemployment was the result of labor market rigidities. Europe possessed laws, restrictions, and regulations that made it too difficult for firms to hire new workers cheaply at a relatively low wage, and too difficult for firms to fire workers (and thus forward-looking firms were reluctant to hire workers). Thus it was too expensive to conduct a labor-intensive business in Europe or to adjust to changes in the economic environment.

According to this dominant view, high unemployment in Europe is an equilibrium level that is what economists call **classical unemployment**: It arises not from any deficiency of aggregate demand, but simply from the fact that the state's regulations keep the labor market from clearing. The state's regulations boost the cost of employing the marginal worker far above the extra revenue the typical firm would gain from employing an extra worker.

But the "rigidities" in the European labor market were stronger in the 1960s — when European unemployment was very low — than they are today. It is not that the natural rate of unemployment in Europe has always been high; it is that each additional adverse shock that increases unemployment seems to increase the natural rate as well. Thus many economists who have examined European unemployment dissent from the conventional wisdom of the editorial writers and the politicians. They tend to see western Europe not as locked into high unemployment, but as in a reversible situation. Just as increases in unemployment in the 1970s and 1980s raised the natural rate of unemployment in Europe, so decreases in the rate of unemployment in the late 2000s would in all likelihood lower the natural rate of unemployment in Europe.

A Grand Bargain?

Economists' views of western European unemployment thus suggest there is potential for much improvement. Central bankers and governments could shift to a more expansionary monetary policy. As demand expands, people will find that the natural rate of unemployment is falling. The falling natural rate of unemployment will create still further room for demand expansion and for further unemployment rate reduction.

Central bankers may fear that the economists' view is wrong and that the conventional wisdom is right — that attempts to expand demand and reduce unemployment a little bit will lead to accelerating inflation as unemployment falls below its (high) current natural rate. Therefore begin the process with some steps to

classical unemployment

When unemployment arises not because aggregate demand is too low, but because government regulations or market power keep the labor market from clearing and keep labor demand by firms below labor supply.

eliminate labor-market rigidities: Reduce employers' contributions to social security, reduce severance costs, transfer unemployment insurance money from the payment of benefits to assistance with job searching, and allow the minimum wage to fall. These steps should leave central bankers confident that there is room to expand demand in the context of a falling natural rate of unemployment.

But governments find that such steps to initiate the process of demand expansion can be portrayed as an attack on the standard of living of the unemployed—as an antiworker, antihuman policy. Only if governments are confident that reform of the social insurance system will be accompanied by stronger demand and higher employment will they be willing to undertake their part of the grand bargain. Otherwise they will fear that—with high interest rates and slow demand growth—social insurance system reform will merely change high classical unemployment to high Keynesian unemployment, and in the process create mass poverty. And only if central banks are confident that their expansionary monetary policies will be accompanied by social insurance system reform would it make sense for them to risk lower interest rates and a change in monetary policy.

Even if the conventional wisdom is right, such a grand bargain promises to make everyone—the currently unemployed, the currently employed who pay taxes to support the social insurance system, politicians dealing with high unemployment, central bankers accused of being out of touch with human experience—better off. And if the economists' view is right—if the principal determinant of a high natural rate of unemployment in Europe is the fact that unemployment has been high in Europe for a long time—then the benefits to such a grand bargain are overwhelmingly large.

Yet European politicians and central bankers have been unable to learn how to deal with their high, stubborn rates of unemployment. The current macroeconomic policy near gridlock has been ongoing for nearly two decades, with no end in sight.

Lessons Half-Learned: Japanese Stagnation

The End of the Bubble Economy

The standard analysis of how the Japanese economy entered its present period of stagnation is straightforward. The Japanese stock market and real estate market rose far and fast in the 1980s, to unsustainable “bubble” levels. And eventually the market turned, and both the real estate and stock markets collapsed.

When stock and real estate prices collapsed, it was discovered by creditors that lots of enterprises and individuals had borrowed heavily against their real estate and security holdings, putting up their real estate and their stocks as collateral. After the collapse, not only were those who had borrowed heavily bankrupt, but the banks and other institutions that had loaned them money were bankrupt as well: The value of the collateral they had accepted was no longer enough to repay the lenders' creditors.

One problem was that no one was exactly sure which institutions were bankrupt—which institutions had liabilities in excess of their assets. Thus no one was eager to lend money to anyone: You might well never see your money again if the organization you loaned it to was one of those that had extended itself during the bubble economy of the late 1980s. A second problem was regulatory forbearance: the belief that the best way to solve the problem was to pretend that it did not exist, try to let business go on as usual, and hope that a few good years would allow all of the institutions that were “underwater” to make enough in profits to repay their debts even given the low value of the collateral that they had accepted.

bubble economy

When a country's stock and real estate markets have risen far and fast to unsustainable “bubble” levels that cannot be justified on the basis of fundamental values.

These two problems together meant that investment spending was depressed. Financial institutions exist to channel money from savers with purchasing power to businesses that can use that purchasing power to expand their capital. But in the aftermath of the collapse of the bubble, no one really wanted to lend — knowing whether the organization wanted the money to invest or to try to paper over some of its previous losses was impossible.

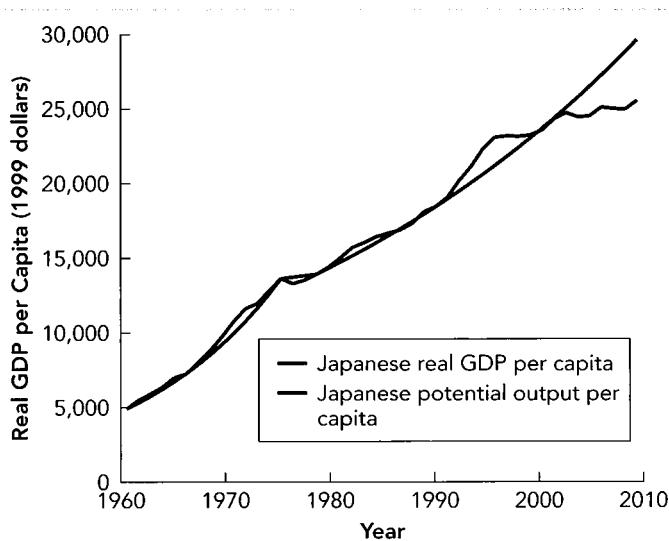
The situation was analogous to the collapse of investment spending in the Great Depression, when the chain of deflation and bankruptcies had similar effects. The collapse of the Japanese financial bubble of the 1980s depressed consumption and investment spending. Banks' and other institutions' large bets on the real estate market meant that the collapse of the bubble put them underwater — with assets and lines of business that were worth less than the debt they already owed that they had borrowed to speculate in real estate. Who will invest in a business — or a bank — if they fear that their money will be used not to boost profitability but instead to pay back earlier creditors?

Thus Japan has fallen into more than a decade of economic stagnation. Growth since 1990 has been almost zero, as Figure 16.8 shows. Unemployment has risen to levels previously unheard-of in Japan. The IS curve has shifted far to the left. And nothing seems to correct it: Even extremely low nominal interest rates are not sufficient to boost investment and aggregate demand.

What should economic policy makers do in such a situation? The answer to what you should do to recover from such a state of depressed aggregate demand is “everything.” You should have the government run a substantial deficit (although, as E. Cary Brown of MIT pointed out in the 1950s, it requires truly awesome deficit spending — on the order of deficit spending in World War II — to reverse a Great Depression like that in the United States in the 1930s or a Great

FIGURE 16.8
The Japanese Bubble Economy

Japan's output per capita outstripped potential output during the late 1980s bubble. But the bubble burst with the Japanese stock market crash at the beginning of the 1990s, and Japanese economic growth has since been extremely slow. What was the fastest growing of the major industrial economies has become the slowest growing.



Stagnation like that in Japan today). You should have the central bank push the interest rate it charges close to zero (to make it very easy and cheap to borrow money).

If that isn't enough, you should try to deliberately engineer moderate inflation. If demand is depressed because people think investing in corporations is too risky, change their minds by making the alternative to investment spending even more risky. If the alternative is hoarding your money in cash, then eat away a share of its real purchasing power every year with inflation.

So far Japan has changed its fiscal policy to run big deficits (but, as any student of the Great Depression would suspect, they haven't been big enough). Japan has lowered its short-term safe nominal interest rates to within kissing distance of zero, and has convinced the markets that this low-interest rate policy will not be easily or quickly reversed. As of the beginning of 2005, many forecasters have turned optimistic about the future of the Japanese economy. But the fact of a decade and a half of near stagnation remains. The lessons of the Great Depression have been only half-learned.

Lessons Half-Learned: Moral Hazard

Even in the United States, some of the lessons on economic policy taught by the past century of experience seem to have been only half-learned. Consider the problem of dealing with financial crises: those moments when large and highly leveraged financial institutions have failed or are about to, and when people genuinely fear that a chain of bankruptcies is about to be triggered.

In such a situation the fear that the organization to which one might lend will fail greatly retards lending. The flow of funds through financial markets will slow to a trickle, as savers conclude that keeping their wealth close at hand in safe forms is a much better opportunity than lending it to organizations that are probably bankrupt. Thus such a financial crisis is likely to see the IS curve shift far and fast to the left as the level of investment spending collapses. If this leftward shift in the IS curve is not stemmed, there will be a recession and the financial crisis will rapidly become worse as businesses that were solvent at normal levels of production and sales find that the falloff in demand has bankrupted them.

What to do in such a situation was first outlined a century and a quarter ago by Walter Bagehot, editor of *The Economist* in the mid-1800s and one of the most influential economic journalists of his time. The government needs to rapidly close down and liquidate those organizations that are fundamentally bankrupt. If they would be bankrupt even if production and demand were at normal levels relative to potential, then they should be closed. The government needs to lend money—albeit at a high, unpleasant, penalty rate—to organizations that would be solvent if production and demand were at normal levels, but that nevertheless suffer a cash crunch now. The key is twofold: Government support is necessary to prevent a deep meltdown of the entire financial system, but government assistance must be offered on terms unpleasant enough and expensive enough to prevent people from wishing in advance to get into a situation in which they need to draw on it. Moreover, the government must accept that its ability to distinguish between the two classes of institutions is imperfect, and that it will inevitably make mistakes.

Yet more and more in the political discussion over economic policy one hears the claim that government provision of liquidity and support in a financial crisis is dangerous—that it causes “moral hazard” because organizations place

moral hazard

The danger of imprudent, improper, or dishonest behavior in economic situations where actions are not easily or routinely monitored.

riskier and riskier bets counting on government support to bail them out if things go wrong. The right policy in a financial crisis, those who fear moral hazard say, is a completely hands-off one. A century and a quarter of experience suggests that this is only a half-truth. Moral hazard is a problem, but so is a Great Depression. The balancing point is hard to determine: Bank and financial regulators must impose rules that restrict the growth of moral hazard, assistance in times of financial crisis must be expensive and painful to the organization drawing on the government, and yet the worst outcome — a freezing-up of the financial system and a severe recession — must be guarded against. To focus on only one of these three rather than balancing between them is to recommend bad economic policy.

Yet the U.S. government seems to have a hard time performing this balancing act. As of the beginning of 2005, the big worry was the status of the large mortgage finance institutions — Fannie Mae and Freddie Mac. Did the government maintain the proper balance between providing assurances of system stability and guarding against moral hazard? Almost all economists would say, "No." And all remembered that fifteen years earlier similar problems had blown up the *savings-and-loan* institutions sector of the American banking system.

The Ultimate Lesson

It is strange that neither European nor Japanese governments appear to have learned the lessons that macroeconomists have to teach. It is also strange that fundamentals of crisis policy that seemed settled more than a century ago are still up for grabs in America's political debate. The principal lesson is that it seems very hard to learn the lessons of history.

Thus the future of economic policy seems likely to be similar to the past. Gross mistakes will be made, historical analogies will be misapplied, and economists and other observers after the fact (and sometimes during the fact) will find major policy mistakes made by governments and central banks to be inexplicable: We will genuinely be unable to figure out just what the people who made the decisions were thinking.

So do not mistake the steady hand on the monetary policy tiller and the relatively placid business cycle that the United States has experienced since the mid-1980s for the way things will be in the future.

RECAP MACROECONOMIC POLICY: LESSONS UN- OR HALF-LEARNED

Western Europeans have not learned how to combine policies to gain structural flexibility with policies to expand demand, and so western Europe remains trapped with inflexible labor markets and slack demand. Japanese policy makers have finally learned the importance of cleaning up the banking system in the aftermath of a financial crisis in order to restore possibilities for growth, but they needed fifteen years to do so. American policy makers continue to struggle with the dilemmas of deposit insurance and moral hazard. If many lessons taught by history about how to conduct macroeconomic policy have been successfully learned, many have not.

Chapter Summary

1. The structure of the economy has undergone mammoth changes over the past century, yet these changes appear to have had relatively little impact on the size of the business cycle.
2. Stabilization policy as we know it was impossible a hundred years ago; yet it is now performed routinely and aggressively.
3. Since World War II, stabilization policy has had successes and failures. Its principal failure has been that it has generated recessions to fight inflation, and these policy-induced recessions have kept policy from successfully stabilizing the economy to a greater degree.
4. In the past two decades, stabilization policy in the United States has been very successful. Is this just good luck, or is it a pattern? We shall see.
5. Certainly from the U.S. perspective there is every reason to be optimistic about the future of macroeconomic policy and of the macroeconomy.
6. From a European perspective there is less reason to be optimistic: European governments and central banks have not learned how to deal with their high levels of unemployment.
7. From a Japanese perspective there is a little more reason to be optimistic: After 15 years, the Japanese government seems to have finally learned how to deal with its financial meltdown.
8. Even from a U.S. perspective, it seems to be hard to learn the lesson that good economic policy during an economic crisis is not a matter of clinging to one principle, but of balancing the conflicting requirements of several valid principles.

Key Terms

financial automatic stabilizers (p. 468)	cyclical volatility (p. 474)	bubble economy (p. 487)
financial flexibility (p. 470)	stabilization policy (p. 476)	moral hazard (p. 489)
liquidity constraints (p. 470)	policy-induced recessions (p. 477)	
globalization (p. 471)	classical unemployment (p. 486)	

Analytical Exercises

1. What changing factors since the start of the twentieth century would make one expect business cycles to become larger?
2. What changing factors since the start of the twentieth century would make one expect business cycles to become smaller?
3. As the macroeconomy continues to change in the twenty-first century, do you expect business cycles to become larger or smaller?
4. Why has production become more stable in the United States since the early 1980s?
5. Why does unemployment remain high in Europe today?

Policy Exercises

1. How, in your view, is the way the Federal Reserve conducts monetary policy likely to change over the next generation?
2. If the government's share of GDP in spending shrinks over the next generation, what in your view is likely to happen to the size of the business cycle?
3. How, in your view, will increased ease of international trade and increased international capital mobility change the workings of the macroeconomy over the next generation?
4. What steps would you take to try to reduce European unemployment, and how might those steps backfire?
5. What steps would you have taken to end Japan's current depression, and how might those steps have backfired?

CHAPTER

17

The Future of Macroeconomics

QUESTIONS

What might the future of macroeconomics bring? How might the macroeconomics taught two decades from now differ from what is taught today?

What have been the principal changes in the way macroeconomics is taught over the past quarter century?

What changes had taken place in the 20 years previous to that?

What direction will macroeconomics take if the real-business-cycle research program proves more successful? If the new Keynesian research program proves more successful?

How will economists in the future understand the foundations behind the power of monetary policy?

The past 16 chapters of this book have given a historically informed, long-run, growth-stressing, largely new-Keynesian view of macroeconomics. But that is not all of macroeconomics — there are other currents of thought and other live research programs. What is the past, and what might be the future of macroeconomics? This chapter takes a look back at the history of macroeconomics, and then looks forward and sketches a few outlines of what the future of macroeconomics might be.

If one thing is certain, it is that we will know different (and, we hope, know more about) macroeconomics in a decade than we do today. What will be taught in macroeconomics courses in 20 years will not be the same as what is taught today.

17.1 THE PAST OF MACROECONOMICS

The Age of John Maynard Keynes

Macroeconomics as a discipline is to a remarkable extent the creation of John Maynard Keynes. His 1936 book *The General Theory of Employment, Interest, and Money* shifted economic research and macroeconomic thought into new and different directions that have led us where we are today. The *General Theory's* extraordinary impact was in large part a result of the then-ongoing Great Depression. Other and previous approaches to understanding business cycles had little useful to say about it. Keynes had a lot to say.

Keynes's book emphasized (1) the role of expectations of future profits in determining investment, (2) the volatility of expectations of future profits, (3) the power of the government to affect the economy through fiscal and monetary policy, and (4) the multiplier process, which amplified the effects of both private-sector shocks and public-sector policies on aggregate demand. It swept the intellectual field and shaped modern macroeconomics.

By a decade or so after World War II much of the analytical apparatus used in this textbook was already in place. The IS-LM model was developed by economists John Hicks and Alvin Hansen. Other economists developed the approaches used in this textbook to understanding consumption (Milton Friedman and Franco Modigliani), investment (Dale Jorgenson, James Tobin, and many others), and the relationship between interest rates and the money supply (James Tobin once again, along with many others). The difference between the behavior of the macroeconomy in the flexible-price long run and the fixed-price short run was clarified by many economists (here Franco Modigliani was again a major contributor). The Solow growth model that is the workhorse of Chapters 4 and 5 was developed by — no surprise — Robert Solow.

This is not to say that the bulk of this textbook stands as it would have been written back in 1960. Macroeconomics textbooks in 1960 had next to no discussion of the relationship between production and inflation. They had little discussion of expectations. The short run was seen as lasting for decades, and analysis of the long-run flexible-price model was rarely included in undergraduate courses. Textbooks in 1960 also downplayed monetary policy and emphasized fiscal policy: Investment was seen as responding little to changes in interest rates, and estimates of the multiplier were much higher than we believe today to be correct for now or for then.

The Age of Milton Friedman and Robert Lucas

Between 1960 and 1980 a good deal of the rest of the meat of this textbook was added to macroeconomic views. Powerful critiques of the then-established conventional wisdom of macroeconomics were made first by Milton Friedman and then by Robert Lucas, both of whom made their intellectual home at the University of Chicago.

Milton Friedman's critique of the then-dominant tradition in macroeconomics had four major parts. The first was that the standard models of the time greatly overestimated the government's ability to manage and control the economy. Great uncertainty, long lags, and variable effects of policy actions placed extremely tight limits on the ability of the government to smooth out recessions and avoid periods of high unemployment. The second was that the standard models greatly overestimated the power of fiscal policy and greatly underestimated the power of monetary policy. The third was that the measurement of the money supply told you most of what you needed to know about how economic policy was working.

The fourth was the idea of the natural rate of unemployment, developed by Friedman and Edward Phelps in the second half of the 1960s. To the extent that macroeconomists in the early 1960s talked about aggregate supply and inflation at all, they tended to follow the lead of economists who took the location of the short-run Phillips curve to be fixed. A given level of unemployment would produce a fixed, unchanging rate of inflation with no feedback of past inflation on expected inflation and no shifts in the natural rate of unemployment. Friedman and Phelps argued that high past inflation would raise expected inflation, and that if unemployment were kept below its natural rate, then the Phillips curve would shift upward over time, generating higher and higher inflation.

The “stagflation” of the 1970s proved Friedman and Phelps to be completely correct on their fourth point. In less than a decade the economics profession shifted to the “accelerationist” Phillips curve that we use today. Friedman's first and second points also became part of the received wisdom. Only the claim that the money supply was the sole important variable for understanding macroeconomic policy failed to win broad acceptance.

But Milton Friedman's “monetarist” critique was only the first half of the successful revisionist challenge to the doctrines of the post–World War II Keynesians. The “rational-expectations” macroeconomists—Robert Lucas, Thomas Sargent, Robert Barro, Finn Kydland, Edward Prescott, and others—argued that Keynesian economics had systematically failed to think through the importance of expectations.

The rational-expectations economists assumed that people were doing the best they could to figure out the structure of the economy in which they lived. Because standard Keynesian models did not pay enough attention to expectations, the models failed to recognize that systematic changes in economic policy would change the parameters of the consumption and investment functions as well as the location of the Phillips curve. Thus macroeconomic models that took estimated consumption functions, investment functions, and Phillips curves as building blocks would blow up in the face of policy makers.

Once again the critique was incorporated into the mainstream quite rapidly. As MIT economist Olivier Blanchard puts it, the “idea that rational expectations was the right working assumption gained wide acceptance . . . not . . . because all macroeconomists believe that people, firms, and participants . . . always form

monetarism

The theory, very popular in the 1970s and the early 1980s, that fluctuations in interest rates had little impact on money demand, so that stabilizing national product and employment could be carried out in a smooth and straightforward fashion by stabilizing the rate of growth of the money stock.

Keynesianism

The school of thought, developed from the ideas of John Maynard Keynes, that emphasizes (1) the role of expectations of future profits in determining investment; (2) the volatility of expectations of future profits; (3) the power of the government to affect the economy through fiscal and monetary policy; and (4) the multiplier process, which amplifies the effects of both private-sector shocks and public-sector policies on aggregate demand.

expectations rationally . . . [but because] rational expectations appears to be a natural benchmark, at least until economists have made progress . . . understanding . . . actual expectations." By the mid-1980s the intellectual structure of the version of modern macroeconomics presented in this book was largely complete.

And since? The late 1980s and 1990s were a time of idea generation and exploration, as macroeconomists explored and tested a large number of different ideas and models. It was an age in which the set of possible approaches expanded, but in which the mainstream policy-analytic position of macroeconomists did not shift much. If the past is any guide, such a period of exploration and experimentation will eventually be followed by another period of successful critique, during which the mainstream of macroeconomics will once again change substantially and rapidly as it did in the 1970s and early 1980s.

What might the future of macroeconomics bring?

RECAP THE PAST OF MACROECONOMICS

John Maynard Keynes's 1936 book *The General Theory of Employment, Interest, and Money* swept the intellectual field, shaped modern macroeconomics, and set the groundwork on which the analytical apparatus used in this textbook was built. Milton Friedman's critique in the 1960s established that the then-standard models greatly overestimated the government's ability to manage and control the economy. Friedman's critique was reinforced by a further critique led by Robert Lucas that established that Keynesian economists had failed to think through the importance of expectations. Since the Lucas critique a lot of ideas have been generated and explored in macroeconomics, but the views held on economic policy issues today are as they were shaped by Keynes, Friedman, and Lucas.

17.2 THE FUTURE OF MACROECONOMICS: "REAL" BUSINESS CYCLES

One Possible Road

One place where the future of macroeconomics might lie is in the theory of "real" business cycles. The fundamental premise of this line of thinking is that all the other macroeconomists took a wrong turn a long time ago. It is more than half a century since economists turned away from this line of analysis—the brainchild of Austrian economist Joseph Schumpeter—and toward that of the monetarists and Keynesians. One possibility is that this was, in the long run, a mistake.

John Maynard Keynes, Irving Fisher, Milton Friedman, Paul Samuelson, and all of the economists working in both Keynesian and monetarist traditions believe that there are two key elements to understanding business cycles. First, you need to understand the determinants of nominal aggregate demand. Second, you need to understand the division of changes in nominal aggregate demand into changes in production (and employment) on the one hand and changes in prices (inflation or deflation) on the other. Thus Keynesians and monetarists think about the velocity of money, the determinants of investment spending, the

real business cycles

A boom generated when rapid technological innovation opens up new industries and new possibilities for investment. An adverse supply shock can generate a real-business-cycle recession.

multiplier, crowding out, the natural rate of unemployment, the rate of expected inflation, the Phillips curve, and other related topics.

To real-business-cycle economists in the Schumpeterian tradition like Edward Prescott, most of this is a waste of time. There are changes in nominal aggregate demand, but their impact falls mostly on prices and only a little on output and employment. To understand the roots of real fluctuations—fluctuations in the real economy—you need to follow a different road.

The theory of real business cycles begins with the fundamental assumption that the same theory that determines what happens in the long run—the theory of economic growth—should also be applied to explain fluctuations in production and employment in the short run. It is not that real-business-cycle theorists assume that prices are never rigid, or that markets always clear, or that every price paid for every good balances supply and demand at that moment. Instead, real-business-cycle theorists assume that the price rigidities and patterns of sluggish adjustment that Keynesians and monetarists see are simply not very relevant. They assume that a reasonable first approximation is to suppose that the money supply and the level of potential output determine the price level, and that the level of potential output at any moment is more or less equal to actual real GDP. They believe strongly in the classical dichotomy: Real fundamentals effectively determine the values of real quantities like GDP even in the short run, and nominal variables (like the money stock) determine the values of nominal quantities (like the price level).

The Unevenness of Economic Growth

Some years there are adverse cost shocks—the tripling of world oil prices in 1973, for example. In such years it makes no sense to produce at what had been the normal level of economic output. The normal level balances social benefits and social costs: When social costs increase, the last 1 percent of output produced is certainly no longer worth the resources in people's time, used-up capital, depleted natural resources, and so on, that it consumes. So when an adverse cost shock hits the economy, a recession ought to follow and people ought to spend less time working. That's what an efficient economy would look like. Conversely, when a favorable cost shock hits the economy, it is advantageous to produce as much as possible: Because goods and services can then be produced at low cost, workers should work extra shifts and heavy demands should be placed on other resources.

But these are not the only "real" shocks to the economy's production possibilities that happen. Entrepreneurs have to guess at the future of technological development and the value of new investment. At moments when rapid technological innovation opens up new industries and new possibilities for investment, the stock market will be high and the returns to investment large; thus investment spending will be high and an efficient economy will be in a boom even though the new technologies have not yet increased real output. Current productivity is not especially high. But putting much new capital in place is uniquely profitable.

At other moments entrepreneurs will realize that they and those who came before them have been overly optimistic. Branches of industry that have been built up turn out to be unpromising. The socially optimal thing to do is not to invest, but instead to retrench: to cut back on investment spending and scrap capital until emerging opportunities for profitable large-scale investment become clear. Most of the work on real-business-cycle theory has concentrated on the effect of

cost — supply — and productivity shocks on output. But shocks to future technologies are just as “real” in that they involve changes in the economy’s long-run production possibilities. And they are large: Just look at the technology section of your newspaper, or visit Silicon Valley.

Supply Shocks (Oil Prices, for Example)

In some episodes, real-business-cycle theory is clearly right. The Keynesian tradition assumes that business cycles are produced by *demand* shocks that have no effect on potential output. But some short-run shocks to the economy have had powerful effects on potential output by reducing — or increasing — aggregate *supply*. Supply shocks like the 1973 tripling of world oil prices reduce potential output. Inventions and innovations can be positive productivity shocks that increase the level of potential output.

In 1973, as a side effect of that year’s Arab–Israeli war, the world price of oil tripled. The Organization of Petroleum Exporting Countries exerted its market power to restrict the worldwide supply of oil and raise the price. Capital- and energy-intensive production processes that had made economic sense and been profitable with oil costing less than \$3 a barrel became unproductive and unprofitable with oil costing \$10 a barrel. Thus potential output fell because it was now more profitable to use technologies that economized on oil by intensively using other factors of production such as labor. The efficiency of labor E in the production function fell.

Such an adverse supply shock lowers the level of potential output and current GDP, raises inflation, and is also likely to generate an increase in the domestic real interest rate. Why? Because a fall in GDP due to an oil price increase or some other adverse supply shock reduces income and so reduces the flow of private saving into financial markets. The supply shock of 1973 was the most powerful disturbance to the American economy in the 1970s.

Analyzing Real Business Cycles

It is easy to see how uneven invention and innovation patterns might be a powerful source of large real business cycles — business cycles driven by the fundamental technological dynamic of the economy. Suppose that the most common shifts in technology involve (1) a sudden step up in the efficiency of labor, accompanied by (2) a sudden rise in investment demand as it becomes more profitable for a business to enlarge its capital stock. Such a shock has a supply component — an increase in this year’s potential output — and an investment demand component — an increase in this year’s investment demand. How does the economy’s full-employment equilibrium shift in response to such a combined shock? We add together the effects of a positive supply shock — the reverse of the oil price decline — and the effects of an investment boom driven by investors’ increasing optimism.

In the flexible-price model we built in Chapter 7, the increased profitability of investment expands investment demand, shifting the investment demand curve to the right. But the positive technology shock does more than just make investment more profitable: It boosts the current efficiency of labor as well. Higher productivity means higher income, which means more saving, which shifts the total saving line to the right as well. The increase in investment demand tends to raise the interest rate; the increase in saving caused by higher income tends to lower it.

Which dominates? Suppose that the investment demand condition dominates. Then this positive-technology shock to both the efficiency of labor and the profitability of investment has produced

- A rise in output.
- A sharp rise in investment.
- A decline in the exchange rate: a decrease in the value of foreign currency and an increase in the value of domestic currency.
- A decrease in net exports and an increase in foreign saving: an increase in the flow of foreign capital into the country to finance domestic investment.

These shifts in the economy are typically found in a business-cycle boom. Perhaps these Schumpeterian forces are the principal cause of the booms and recessions that we see in our economy.

Is this theory of real business cycles a promising theory of short-run economic fluctuations? Economists disagree. Perhaps fewer economists think that real-business-cycle theory is a progressive research program this year than thought so a decade ago, but that could change—and probably has, with the award of the 2004 Economics Nobel Prize to Finn Kydland and Edward Prescott for their work on real-business-cycle theory.

Whether you think that real-business-cycle theory is promising depends on answers to three questions:

- Should the fact that a reduction in work hours shows up as some people becoming wholly unemployed change one's interpretation of what causes a decline in total hours worked?
- Should the fact that many wages and prices are not flexible lead one to assign a prominent role to monetary factors as causes of real fluctuations in output and employment?
- How large are technology shocks to the economy, anyway?

Problems of Real-Business-Cycle Theory

Unemployment

Real-business-cycle theory assumes that the total number of hours worked at any moment is largely determined by how many hours it makes sense for people to work. The supply of hours worked is set at the point where the marginal displeasure of working an extra hour is just about equal to the marginal social product of an extra hour's work, given the marginal value of extra goods for consumption or for investment purposes.

When the marginal social product of labor is high—when labor is more than usually productive or when an increase in work hours, and thus of total product, can take advantage of extremely valuable opportunities to invest—workers are willing to work more hours. When labor is relatively unproductive, or when highly valuable investment opportunities are scarce, it makes sense for total work hours to fall. Instead of spending extra time on the job producing output of relatively little marginal value, take a week or two off and go on an extra vacation, or spend some extra time with the kids.

Such a willingness to work more hours when the incentive to work is relatively high and fewer hours when the incentive to work is relatively low is called an intertemporal substitution of labor. As an example, consider a student who needs to (1) take classes and (2) earn money to save toward some goal. Taking classes

and earning money at the same time is hard, so the choice is between either working in the summer and taking classes in the winter or working in the winter and taking classes in the summer. If the student works in the summer and gets paid at the end of the summer, then at the end of the winter the student will have $W_S(1 + r/2)$ dollars — the sum of his or her summer wage and the interest for half a year that he or she would earn by banking that money until it is needed at the end of the winter. If the student works in the winter, then at the end of the winter the student would have W_W dollars.

The real relative wage between the summer and the winter is thus equal to

$$\frac{W_S(1 + r/2)}{W_W}$$

The higher this quantity, the more likely the student is to choose summer rather than winter work. Thus the incentive to work hard now — accept lots of overtime, say — depends on three things: the wage now, the wage expected in the future, and the real interest rate. Increases in the first and the third tend to lead people to postpone recreation and other nonwork uses of time to the future. Increases in the second tend to lead people to cut back on work effort now. If people are highly willing to shift their hours of work from season to season or from year to year, then one would expect fluctuations in current productivity and technological opportunities to lead to substantial fluctuations in employment.

But critics of real-business-cycle theory think that analyzing the total amount of hours worked in the economy as if it were like the decisions of a representative worker makes little sense. They point out that people change their weekly work hours by relatively little. People in the labor force want to work. Total work hours fall not because people have chosen to work shorter shifts and avoid overtime, but because people have lost their jobs. The unemployment rate fluctuates substantially over the business cycle. And high unemployment in a recession is not a market-clearing phenomenon: People don't say they are "taking an extra vacation" or "out of the labor force because wages will be higher next year"; people say they are "unemployed."

Advocates of real-business-cycle theory say that this critique misses the point. People stay unemployed because they would rather spend more time searching for a better job that matches their skills and pays more than the job they could get today. And the job they could get today pays relatively little either because labor productivity is not high or because there are no extremely valuable uses in investment or consumption for the good produced by an extra amount of work.

Technology and Real Business Cycles

According to real-business-cycle theories, production fluctuates because of the changing value of output and the changing productivity of the economy. When production technology improves, more is produced. When unique opportunities for investment open, more is produced. Perhaps recessions are times in which increases in costs — the tripling of oil prices in 1973, say — make it socially inefficient to run factories near capacity. Perhaps recessions are times in which everyone recognizes that too much has been invested, and that it is better to cut back on investment than to continue to build up capital that adds little to the economy's productive capacity.

The part of the theory that explains booms—rapid rises in output—as the result of the rapid diffusion of technology and a sharp increase in the efficiency of labor is highly plausible. But how can it describe recessions or depressions, during which production does not grow at all but declines? Does the efficiency of labor decline because of technological regress? Are we supposed to believe that production was lower in 1991 than in 1990 because businesses had forgotten how to use their most productive modes of operation? This seems unlikely. Thus the Schumpeterian approach may well provide a correct theory of booms—or at least some booms. But how this approach could provide an accurate account of recessions and depressions or of the high levels of cyclical unemployment found in times of recession and depression is difficult to see.

Critics of real-business-cycle theory concentrate their fire on the claim that the economy experiences large negative shocks to productivity. They claim that increases in costs like the 1973 oil shock are the exception rather than the rule. Critics tend to be silent on whether downturns in investment are to be understood as rational reactions to news about future growth and productivity, and have little to offer as alternative explanations of why investment fluctuates so much.

Money and Real Business Cycles

Real-business-cycle theorists tend to argue that monetary policy has little impact on production and employment, and that fluctuations in the money stock and interest rates are mostly reactions to changes already taking place in output and employment. But the Federal Reserve certainly believes that it makes decisions about the level of interest rates, that it affects the level of the money supply, and that its decisions cause changes in the level of production and output. Either everyone in the Federal Reserve's conference room is hopelessly deluded (and what they think are their decisions are instead the result of fluctuations in real activity that they do not consciously know about at the time they make their votes) or monetary policy has a powerful impact on production and employment.

Assessment

If we thought this line of research is truly the future of macroeconomics, we would have written a different book. Nevertheless these theorists make important points, especially those in what could be termed the Schumpeterian wing of the real-business-cycle tradition. Economic growth is *not* smooth. It *does* proceed sector by sector. Shifts in investment—big backward-and-forward moves in the position of the IS curve—do arise out of changing beliefs about the current productivity of the economy and the future value of new investment.

The existence of real-business-cycle theory is a call for all economists to spend more time thinking about the determinants of investment fluctuations: either tying them to changes in productivity and the value of investment or developing useful social-psychological theories of the shifts in animal spirits that cause such large movements in investment over time. Our guess is that a lot of what is now called real-business-cycle analysis will be incorporated into mainstream macroeconomics over the next two decades as the theory of growth is integrated with the theory of business cycles and as economists make progress in understanding why investment is so volatile.

RECAP THE FUTURE OF MACROECONOMICS: “REAL” BUSINESS CYCLES

Real-business-cycle theorists see booms as generated when rapid technological innovation opens up new industries and new possibilities for investment. At such moments the stock market will be high and the returns to investment large, so investment spending will be high. Real-business-cycle theorists see recessions as generated when entrepreneurs conclude that those who came before them have been overly optimistic. The socially optimal thing to do is not to invest, but instead to retrench, to cut back on investment spending and scrap capital until it becomes clear where there will be opportunities for profitable large-scale investment.

17.3 THE FUTURE OF MACROECONOMICS: NEW KEYNESIAN ECONOMICS

The second possible future for macroeconomics sees the continued development of the mainstream research program, as its weaknesses and incoherencies are slowly repaired.

Certainly the area of modern macroeconomics that is in least satisfactory shape is the area of aggregate supply. Why do changes in nominal aggregate demand show up as changes in the level of production and employment, and not just as changes in the level of prices? Since at least the 1930s, the mainstream of macroeconomics has attributed the sluggishness of aggregate supply — the fact that the Phillips curve has a slope, and is not vertical — to stickiness in wages and prices. Thus fluctuations in the nominal level of aggregate demand cause fluctuations in output and employment. But where does this stickiness and slow adjustment of wages and prices come from? After all, business cycles appear to be so unpleasant and costly to society as a whole that by now we should have found a way to greatly reduce the harmful macroeconomic consequences of price stickiness.

Thus a possible future direction for macroeconomics is a deep investigation into the sources of sluggish wage and price adjustment and of aggregate supply. This research program has gained the name new Keynesian economics.

Menu Costs

Prices do not adjust immediately and completely in the short run because changing them is costly. A restaurant must print up a new menu; a mail-order firm must send out a new catalog. Economists call these costs of changing prices menu costs. They are what lead firms to adjust prices once in a while — not, with a few exceptions, every second. In most cases such menu costs are small: The cost a firm incurs to change its prices is not much. But “small” does not mean “unimportant.” As macroeconomists George Akerlof, Janet Yellen, and Greg Mankiw have stressed, small menu costs at the level of an individual firm, in theory at least, can have large effects on the economy as a whole.

A price adjustment or a failure to adjust prices on the part of one firm affects other firms. Whenever one particular business lowers its price, it frees up a little bit of nominal purchasing power. The extra nominal purchasing power that would

price stickiness

A condition that exists when wages and prices do not move smoothly and immediately to keep supply equal to demand in the labor and goods markets.

menu costs

The costs to a firm of changing the price(s) of a good(s) or service(s).

have been spent buying that particular firm's product (but that wasn't spent because the price was lowered) is instead free to be spent on products made by other firms. As long as total nominal spending remains constant, a decline in one firm's price slightly increases demand for other firms' products. New Keynesian economists call this phenomenon an aggregate demand externality.

Because of such aggregate demand externalities, as long as total nominal demand is fixed, the economy as a whole benefits more by one firm's reduction in price than that one firm does. But the firm decides whether to cut its price depending on whether the benefit to the firm from cutting its price exceeds the menu costs the firm must pay. Thus the economy can get stuck in a situation in which no firm reduces its price — because no firm can see a private benefit in excess of its menu cost — even though the economy as a whole would benefit by vastly more than the sum of menu costs if all businesses were to reduce their prices.

Staggered Prices and Coordination Failures

Even if menu costs are not important, the fact that one firm's best choice for its price depends on the prices that other firms are charging may lead to sluggish adjustment in wages and prices even though individual prices are theoretically free to move without hindrance.

Macroeconomist John Taylor was the first to consider an economy in which large groups of workers sign multiyear labor contracts. Those who negotiate their wages in years divisible by three will look forward at what demand and supply on the labor market is likely to be, but they will also look sideways, at firms that negotiated their labor contracts one or two years ago. Thus the wage negotiated this year will depend not just on what will happen but on what people one or two years ago — when the last set of contracts were signed — thought was likely to happen. The aggregate wage and price levels will thus exhibit inertia even without barriers to price flexibility when renegotiations occur, just because of the institutional structure of the economy.

Are such coordination failures caused by the fact that agents in the economy do not all make long-run decisions at the same time or are unable to commit to deciding in similar ways important causes of business cycles? Two decades ago economists thought that the answer was almost surely yes. Many studies were written comparing the U.S. system of wage negotiation with other, more centralized systems found in Germany and Japan that seemed less likely to lead to coordination failures.

Today, because of the relatively good macroeconomic performance of the U.S. economy, theories that point out structural flaws in U.S. macroeconomic institutions receive little attention. The theoretical point, however, remains unsettled.

coordination failures

Failures of firms to change prices to respond quickly to the marketplace or in concert with other firms.

Assessment

At the moment these ideas about the microfoundations of price stickiness are at the stage of just-so stories: plausible and possible mechanisms, but only that. There are no convincing quantitative analyses of just how much sluggishness in wage and price adjustment is contributed by each possible cause. There are no tests of one theory against another, and no predictions of the magnitude of price inertia that should emerge from any of the possible theoretical causes. In this sense, the theory

of aggregate supply today is in a position roughly analogous to the position of the theory of aggregate demand just before John Maynard Keynes.

We have no doubt that the mechanisms of business cycles should be a large part of the future of macroeconomics. We should be able to learn a lot about which models of business cycles are potentially useful by turning theories loose on perhaps the greatest macroeconomic laboratory available: the extant record of macroeconomic historical statistics. A robust and useful theory of business cycles should be able to account for the patterns seen in the long-run data for many countries.

The historical evidence suggests that business-cycle models that do not put monetary economics at the center of their analysis are inconsistent with the evidence on the behavior of real interest rates. Events like the comparative pattern of national recoveries from the Great Depression cannot be understood without placing prices that are sticky at the center of the analysis as well. Thus we think that the new Keynesian research program is likely to play a stronger role in the future of macroeconomics than the real-business-cycle research program. But then again, we could be wrong.

RECAP THE FUTURE OF MACROECONOMICS: NEW KEYNESIAN ECONOMICS

Why do changes in nominal aggregate demand show up as changes in the level of production and employment, and not just as changes in the level of prices? The mainstream of macroeconomics has attributed this to stickiness in wages and prices. But where does this stickiness come from? One possibility is that small costs of changing prices on the part of individual firms have large effects because a price adjustment or a failure to adjust prices on the part of one firm affects other firms through aggregate demand externalities. Another possibility is that prices and wages are sticky because agents in the economy do not all make long-run decisions at the same time.

17.4 DEBTS AND DEFICITS, CONSUMPTION AND SAVING

Debts and Deficits: Ricardian Equivalence

Chapter 14 detailed economists' standard view of debts and deficits. Fiscal deficits stimulate the economy in the short run as long as the central bank does not take action to neutralize the fiscal stimulus. In the long run, however, debts and deficits crowd out investment and shift the economy to a less favorable steady-state growth path.

But this standard view has been subject to a powerful challenge that may become an important part of the future of economics. Whether it is successful or not, this challenge is likely to change the way we think about how the government's budget affects the economy. This alternative view of the long-run (and also the short-run) effects of debts and deficits is called "Ricardian equivalence," after David Ricardo, who does not seem to have held the view; it should be called "Barroviaan equivalence," after its most effective and powerful advocate, Harvard macroeconomist Robert Barro.

Ricardian equivalence

The hypothesis that households will cut consumption whenever they see a government deficit, anticipating higher future taxes that will be raised to pay off that deficit.

Robert Barro's View

Think of it this way: The government is, in a sense, our agent. It buys things for us (government purchases) and it collects money from us to pay for the things it buys on our behalf. The moneys it collects from us are called taxes. Sometimes the government collects as much from us as it buys on our behalf: Then the government budget is balanced. Sometimes the government collects less from us than it spends on our behalf: Then the government budget is in deficit, and the government makes up the deficit by borrowing money now and implicitly committing to raise taxes to repay the debt (interest and principal) at some time in the future.

Suppose that the government spends an extra \$1,000 on your behalf and at the same time raises your taxes by \$1,000. Because your after-tax income has gone down by \$1,000, you cut back on consumption spending. Now suppose that the government spends an extra \$1,000 on your behalf, but doesn't raise taxes — instead it borrows the \$1,000 for one year, and announces that it is going to raise taxes next year to repay the debt.

What is the difference between these two situations? In one case, the government has collected an extra \$1,000 in taxes from you this year. In the other case, the government has announced that it will collect an extra \$1,000 in taxes from you next year. In either case you are poorer. In the first case you cut back on your consumption. Shouldn't you cut back on your consumption in the second case too — set aside a reserve to pay the extra taxes next year, and invest it, perhaps in the bonds that the government has issued? After all, the effect of the government policy on your personal private wealth is identical in the two cases.

Robert Barro would say yes. He would say that what matters for the determination of consumption spending is not what taxes are levied on you this year, but what all of the changes in government policy tell you about the value of the total stream of taxes this year, next year, and on into the future. Government policy thus ought to affect consumption only to the extent that it tells you how much the government is going to spend — and thus what will be the total lifetime tax bill levied on your wealth.

Counterarguments

Many economists point out that the theoretical elegance of Barro's view is broken by a number of different considerations, including the following:

- **Myopia.** Perhaps people are not far-sighted enough to fully work out what an increased deficit in the present implies for their future taxes.
- **Liquidity constraints.** Barro's argument implicitly assumes that people can borrow and lend readily. If a good many people can't borrow and lend — they would spend more if only they could borrow on reasonable terms — then you would expect consumers to react to tax cuts by increasing consumption spending even if they knew full well that the government was going to recapture those tax cuts with tax increases later.
- **Beneficiaries and payers differ.** I am the beneficiary from increased spending this year, but the extra taxes that the government will exact two decades hence may well not be paid by me but by someone who isn't even in the labor force today.

But are any of these — or all of them together — really enough to make us confident that changes in the timing of taxes (holding government spending patterns constant) will have a big effect on overall consumption? Even if Barro's challenge

myopia

Short-sightedness. A failure to look far enough ahead into the future.

liquidity constraints

An inability to borrow.

to the conventional wisdom is unsuccessful, it will become clear that his challenge is unsuccessful only when we have a much better understanding of how and why people divide their income between consumption and saving.

Consumption and Saving

In the early part of the twentieth century, justifying a relatively high marginal propensity to consume was relatively easy. Most households had little if any savings. Most households found themselves unable to borrow. Hence they were liquidity-constrained: They wished to spend more today, but they could not find anyone to lend them the liquid wealth to enable them to do so. Thus one would expect a boost to income to generate a large rise in consumption spending. Add to this the fact that buying consumer durables is in a sense as valid a way of saving for the future as putting money in the bank; then a high marginal propensity to consume and a strong multiplier process seem easy to understand.

The past 50 years, however, have seen steady and large increases in the flexibility of the financial system. Few Americans today are without the ability to borrow to increase current consumption should they so wish. Those Americans whose liquidity is constrained today receive a very small portion of total income, and a small portion of increases in total income. Thus economists' theories would predict that in the aggregate the marginal propensity to consume would have dropped far by today, and that the multiplier process would be more or less irrelevant to aggregate demand. Nevertheless, consumption still declines significantly when the economy goes into recession.

This consumption puzzle is another substantial hole in today's current macroeconomic knowledge. Many economists are trying to close it. Some, like Johns Hopkins macroeconomist Chris Carroll, argue that typical consumers are both impatient and prudent. Prudence makes them unwilling to borrow. Impatience makes them eager to spend increases in income. Thus the fact that improvements in financial flexibility mean that consumers *could* borrow doesn't mean that they *will*. Other economists focus on the persistence of income changes and say that current income is a good proxy for permanent income and hence should be a strong determinant of consumption. Still others—led by Chicago economist Richard Thaler—argue that the time has come for economists to throw the simple-minded psychological theory of utility maximization overboard and to take seriously what psychologists have to say about how humans reason.

How this hole in macroeconomists' understanding of consumption and saving will be resolved is unclear. But the resolution will clearly have a powerful impact on the debate over debts and deficits.

17.5 DOES MONETARY POLICY HAVE A LONG-RUN FUTURE?

When the Federal Reserve uses open-market operations to affect interest rates, it does so because its purchases or sales of Treasury bills raise or lower the supply of bank reserves in the economy, and so make it easier or harder for businesses

to borrow money. But total commercial bank reserves in the United States amount to less than 0.5 percent of GDP. A typical open-market operation is a few billion dollars.

In the context of an economy in which annual GDP is more than \$11 trillion and in which total wealth is something like \$40 trillion, how is it that a swap of one government promise to pay (a Treasury bill) for another (a dollar bill) can cause big changes in the cost of borrowing money, and ultimately in the level and composition of economic activity? This question has not been asked often enough in the past hundred years. Economists have tended to assume that monetary policy is powerful and that the reasons for its power are relatively uninteresting. They have by and large ignored the fact that to shift from an extremely tight monetary policy in which long-run nominal GDP growth is zero to a loose one in which long-run nominal GDP growth is 10 percent per year requires that the Federal Reserve increase purchases of Treasury bills by an average of only some \$20 million a day.

Monetary policy is certainly powerful. But in at least one of the potential futures of macroeconomics the reasons for its power become very interesting indeed. For it is at least possible that the future evolution of the financial system might undermine the sources of influence that monetary policy today possesses.

The reasons that monetary policy has power today that economists usually bring forward rest on what Harvard macroeconomist Benjamin Friedman calls—politely—a series of . . . familiar fictions: Households and firms need currency to purchase goods . . . nonbank financial institutions [cannot] create credit . . . [and] so on.”

The standard explanation is that open-market purchases of Treasury bills increase the reserve balances held by the banks where the sellers of the Treasury bills receive payment. Thus the total volume of reserves in the banking system as a whole rises, and the banking system responds to this increase in reserves by increasing total credit in the economy by more than 10 times the reserve increase. Because commercial banks must hold reserves, and because only the Federal Reserve can change the total amount of reserves, it has a uniquely strong ability to affect interest rates. In the standard story the central bank’s power is further boosted because everyone in financial markets takes its actions today as a powerful signal of what its actions will be in the entire future.

This Federal Reserve power, however, would be of little use if nobody much cared about keeping deposits at commercial banks, and nobody used reserve-backed commercial bank deposits as transactions balances. Looking to the future, it’s likely that more and more transactions will be carried out not through cash or check but through credit cards, debit cards, smart cash cards now used in Europe, or other forms of electronic funds transfer at points of sale.

Will the future hold a gradual weakening of central bank power? Macroeconomists know that central banks today are powerful and are likely to remain so for at least a generation. But forecasting beyond that point requires a deeper knowledge and better models of the sources of central bank power than macroeconomists currently possess. This is thus another area in which the macroeconomics taught in the future is likely to be substantially different from the macroeconomics taught in the past.

Chapter Summary

1. Modern macroeconomics has its origin in the Keynesian theories of the Great Depression and the immediate post–World War II era.
2. Modern macroeconomics was reforged by the monetarists under Milton Friedman in the 1960s and 1970s and by the rational-expectations economists led by Robert Lucas in the 1970s and 1980s.
3. Perhaps the focus on aggregate demand will turn out in the long run to have been a false road. Perhaps a better theory of the macroeconomy can be built up out of the theory of real business cycles in the Schumpeterian tradition.
4. Perhaps the future of macroeconomics lies in a more detailed investigation of aggregate supply. Perhaps uncovering the reasons that prices are sticky will lead to the next wave of progress in macroeconomics.
5. The entire conventional analysis of debts and deficits is under challenge by Robert Barro, who argues that individuals are far-sighted and closely linked, and that they take action to neutralize the effects of many government policies.
6. The conventional analysis of consumption — the permanent income hypothesis — is also under challenge by more psychological approaches to understanding consumption.
7. The other possible interesting direction in which macroeconomics might evolve relates to the future of monetary policy. How will the coming of the “new economy” and the changing institutional framework of transactions and settlements affect the power of monetary policy?

Key Terms

monetarism (p. 495)
Keynesianism (p. 495)
real business cycles (p. 496)

price stickiness (p. 502)
menu costs (p. 502)
coordination failures (p. 503)

Ricardian equivalence (p. 504)
myopia (p. 505)
liquidity constraints (p. 505)

Analytical Exercises

1. What are the principal pieces of real-business-cycle theory?
2. Why is it possible that real-business-cycle theory will play a much larger role in macroeconomics courses in the future than in the present?
3. In what areas do new Keynesian economists concentrate their research?
4. What is Ricardian equivalence? Why might it not be a good approximation to the way individuals actually behave?
5. Why do some economists fear that monetary policy is going to lose its effectiveness?

Epilogue

Epilogue

Macroeconomics is not now and never will be “complete.” Physicists talk about someday arriving at a “Theory of Everything,” after which there will be no more fundamental physics — just materials science and applied physics and physical chemistry and biochemistry and biology. Nothing like that will ever happen to macroeconomics. Macroeconomics will not become “complete” in our lifetime. It will not become “complete” in your lifetime.

There are several reasons for this. The first is that the subject is complicated. The economy is complicated. The fact that markets do not work perfectly, and that market imperfections are macroeconomically important, makes it complicated. The unique role of expectations — and the fact that the (expected) future can influence and “cause” the past — makes it complicated.

A second reason that macroeconomics will never be complete is that macroeconomists are pursuing an ever-changing and ever-moving target: As the economy changes, its macroeconomic behavior changes as well. Four centuries ago (if there had been a macroeconomics course then) the macroeconomics of harvest failures would have been a big topic. Today it isn’t. Back when John Maynard Keynes wrote, unions were of first-order importance in understanding the macroeconomy. Today that is no longer the case. In the first few post–World War II decades, foreign trade simply wasn’t that important for the U.S. macroeconomy. Now it is.

Many of what we see as important topics today will be dismissed as irrelevant a generation or a century from now. And much of what those societies will need answers to is unimportant to us, or unknown to us.

Here at the end of the book is a very convenient place to quickly look back over the entire text. There are a great many things that macroeconomists do know. And this is the place to summarize them, before going on to discuss what macroeconomists don’t know, and what we believe macroeconomists will never know.

WHAT ECONOMISTS KNOW . . .

. . . About the Current State of the Economy

A great deal of what economists know, they know because they can rely on the statistics collected by governments. Thus economists know what is an astonishing amount about the current state of the economy. Economists have good estimates of the scope of economic activity. Economists have good estimates of the level of potential output. Economists have good estimates of the current real wage level, of the amount of unemployment, and of the general state of the labor market. They have good estimates of the rate of inflation.

Economists’ knowledge of the long-run pace of economic growth is, however, much more partial and incomplete. As we discussed in Chapter 5, the size and extent of the biases inevitably present in the national income and product accounts remain elusive. Moreover, economists’ knowledge of the current state of the economy comes with a substantial lag: Economists know much more about the state of the economy last year than they do about the state of the economy today.

All in all, the NIPA system — and the other largely government-collected economic statistics — gives us a remarkable amount of knowledge. Certainly the amount of easily and publicly available information about the state of the American macroeconomy today dwarfs the knowledge that even the best-informed in previous

centuries had, or even the knowledge that the leaders presiding over the centrally planned economies of the twentieth century had of the real state of affairs.

. . . About Long-Run Economic Growth

Economists also know a surprising amount about the preconditions for successful long-run growth. We understand demography: Malthus, the population explosion, the demographic revolution, and the importance of education. We know that back before the Industrial Revolution living standards were very low because in the race among human fertility, diminishing returns, and technological development, the third — technological development — lost. We know that once human populations pass a threshold level of material prosperity and literacy, population growth rates slow down drastically — the experience of western Europe suggests that negative population growth may be in humanity's future after the middle of the next century. And we know that once through the demographic transition technological progress and technology transfer make for an economic future that looks very bright indeed, at least judged by the yardstick of the average generation since the invention of agriculture.

Economists understand the importance of a high rate of investment for achieving successful economic growth — both because capital goods amplify our skills and capabilities and because much of modern technology that increases total factor productivity works only if it is accompanied by embodied in, the right kinds of capital goods. A high rate of investment is key to a rapidly growing and relatively prosperous economy.

Economists also know that better technology — understood in both a broad and a narrow sense — is the single most important key to sustained progress in material standards of living. And here economists have fallen down on the job: Macroeconomists know much less about the development and diffusion of this truly important source of growth, technology, than we should. But it is completely clear that a high rate of investment to generate a high capital-output ratio, a strong commitment to education to create a skilled and literate workforce (and a low rate of population growth), and better technology are the goals of economic policy as far as the long run is concerned.

Economists do know some important things about how to achieve these goals of economic policy: The role of the government in economic development has become increasingly clear over the past generation. Clearly, achieving successful long-run growth by relying on the market system to coordinate economic activity is much easier than relying on central planning and central commands. Market economies appear to function well only if they are coupled with strong legal and institutional protections for private property. Overly mighty governments — governments that regard other people's things as the government's property — appear to be very bad for economic growth.

Clearly, too, government policy needs to provide the market economy with the right incentives and signals if it is to function: Activities with negative externalities like pollution need to be penalized; activities with positive externalities like research and development need to be encouraged. Thus a government that protects property rights, promotes education, and promotes innovation seems important as a precondition for successful economic growth.

But our knowledge of economic growth is incomplete. The links between different kinds of investment and rates of total factor productivity growth and the

mechanisms underlying the transfer of technology from rich countries to poor countries remain elusive.

... About Business Cycles, Unemployment, and Inflation in the Long Run

Economists know that market economies are robust things. In the long run — and exceptional circumstances like the Great Depression aside — the market economy does tend to return to a position of nearly full employment. Markets for goods and for labor do — absent large blockages — reach something like a supply-and-demand equilibrium. In a recession it is safe to predict that the next five years will bring a boom. In a gigantic boom it is safe to predict that the next five years will bring a slowdown.

Thus economists know that shifts in government spending will crowd out (or crowd in) consumption and investment. They know that shortfalls of national saving or booms in investment will bring inflows of capital and the trade deficits needed to finance them. They know that the central bank's policy is in the long run the absolutely crucial determinant of the price level and the inflation rate.

... About Business Cycles, Unemployment, and Inflation in the Short Run

Economists know that the basic Keynesian sticky-price model still provides a good guide to the basic determinants of the level of planned expenditure. And the Phillips curve diagram still provides a guide — not necessarily a good guide, but the best one we have — to the relationship between the level of real GDP and the rate of price increase.

Because planned expenditure is the principal determinant of the level of GDP in the short run, anything that affects planned expenditure affects employment and output: fiscal policy, monetary policy, expectations, shocks to components of demand, shocks to the financial markets, changes in the international environment — all of these produce shifts in the equilibrium level of output. And economists have a pretty good grasp of how and why.

Economists know that aggregate demand interacts with aggregate supply — the Phillips curve — to generate the inflation rate. And economists know that the Phillips curve is extremely volatile. The natural rate of unemployment can undergo substantial shifts much more rapidly than the changing composition of the labor force would suggest is possible. The expected rate of inflation depends critically on expectations of the central bank's competence and commitment to price stability.

... About the Making of Macroeconomic Policy

Thus governments attempting to stabilize the economy face a hard task of damping out many kinds of shocks. Their task is made harder because shifts in economic policy have uncertain and delayed effects on spending: Policy affects output and prices with long and variable lags. Perhaps the first lesson of stabilization policy is that governments should not overestimate their power and attempt to do too much. The second lesson is that monetary policy is the most useful discretionary stabilization policy tool. And the third lesson is that automatic stabilizers — the fiscal automatic stabilizers in the government's budget and the financial automatic

stabilizers of deposit insurance — are important factors that help limit the need for discretionary stabilization policy.

Economists have learned over the past two decades that peacetime inflation at a level high enough that it becomes an important part of voters' consciousness — inflation at a rate of even 10 percent per year — is politically unacceptable in modern industrial democracies. Voters appear to hate and loathe politicians who preside over such episodes of inflation. Why even moderate inflation should be viewed so negatively is somewhat of a mystery: Economists' attempts to model costs of inflation have a difficult time coming up with costs that justify the high political value of low inflation. It may be that people simply dislike the greater uncertainty that inflation generates. It may be that people are simply making a mistake — that they should not dislike inflation as much as they do. But for whatever reason, in any modern democracy, successful control of inflation clearly must be a very high priority for public policy.

At the root, the ultimate determinant of inflation is growth in the money supply. Control the rate of growth of the money supply, and you control inflation. A central bank that loses sight of this goal will find itself unable to control inflation. But that is not all that economists know about controlling inflation. We also know that controlling inflation is easy — can be accomplished at low cost — if and only if investors, managers, and workers have confidence in the central bank's commitment to control inflation. Central bank credibility is the most important asset in order to make control of inflation easy and cheap. Central bank credibility is the most valuable thing a central bank can have — and is the most costly thing to regain once it is lost.

Economists know that in the short run the level of GDP and of employment depends on the level of planned expenditure for goods and services. Thus a good macroeconomic policy that seeks to avoid unnecessary unemployment and inflation must walk a fine line. Planned expenditure must be high enough to eliminate unnecessary unemployment, but not high enough to generate accelerating inflation or (worst of all) to call into question the central bank's commitment to low inflation.

WHAT ECONOMISTS DON'T KNOW — BUT COULD LEARN . . .

... About the Long-Run Relationship between Kinds of Investment and Productivity Growth

The list of what macroeconomists don't know is, unfortunately, longer than the list of things they do know. First, large chunks of the process of long-run economic growth remain a mystery. Macroeconomists cannot prescribe to poor countries the policy mix that would enable them to duplicate the rapid convergence of Japan or Italy to industrial-core status that we have seen since World War II. Macroeconomists cannot prescribe to rich countries how to maximize their rates of economic growth and appropriately discounted levels of economic welfare. Macroeconomists do not know what is the right degree of "openness" for the world economy. They do not know at what point we would get the most benefits from international trade and investment flows while suffering the lowest costs from international financial market-generated economic instability.

But in these areas, at least, macroeconomists can learn. The history of the world over the past century provides a lot of lessons about the sources of long-run growth

and stagnation. And the future will continue to provide more such lessons. As long as economists are willing to take fresh looks at the world and revise their beliefs in response to new information, macroeconomists in a generation will know much more about long-run growth than we do today.

... About the Short-Run Determinants of Investment

Ultimately the key issue dividing the new Keynesian and the real-business-cycle schools of macroeconomists is the sources of shifts in investment. The most common large-scale macroeconomic shock hitting a modern industrial market economy is, in Keynesian language, an inward (or outward) shift in the IS curve caused by an investment slump (or boom) accompanied by a fall (or a swift rise) in the stock market. The most common large-scale macroeconomic shock hitting a modern industrial market economy is, in real-business-cycle language, an upward (or downward) shift in expected future productivity that would lead a rational and benevolent social planner to increase (or decrease) investment, and a well-functioning market economy mimics the decisions that would be made by a social-welfare-maximizing benevolent social planner.

Which of these descriptions is correct? Are the big shocks to investment that we see better thought of as optimal responses of the market to news about future profits and technological opportunities? If so, then the real-business-cycle research program will be the most fruitful over the next generation. Is this shock more accurately seen as one of the less-than-rational shifts in social-psychological opinion that John Maynard Keynes referred to as “animal spirits”? If so, then the new Keynesian research program is likely to pay the highest dividends over the next generation.

This question of the most important determinants of domestic investment booms is closely tied to the key issues in international finance. Why are international financial markets so vulnerable to financial crises? They have been so over the past century. And what is the appropriate response to constrain governments from engaging in disturbing policies that set the stage for such policies? Is it to reduce the magnitude of cross-border trade and financial flows, or to adopt more aggressive policies to intervene to support countries afflicted by financial crises?

As of the start of 2005, these questions are acquiring extra urgency for the United States, where a financial crisis has gone from being an unthinkable event five years ago to a quite possible event as of the beginning of 2005.

The only true answer is that macroeconomists today do not know. This area will be one of the major political flashpoints of the next generation. It will also be one of the major battlegrounds — and hopefully areas of the progress of knowledge — for macroeconomic theory over the next generation.

... About the Impact of Government Policy on the Economy

A lot is still not known about how and why government policy affects the economy. Macroeconomists still argue about the relative roles played in generating short-run business cycles of “monetary” shocks and “real” shocks. Macroeconomists for the most part feel that eliminating noise in the price system ought to yield powerful benefits. But these gains from achieving low and stable inflation have not hitherto been demonstrated. And why voters seem so averse to inflation when its measured economic costs appear relatively low remains a mystery.

Thus many fundamental questions about government policy remain up for grabs. How aggressively should central bankers pursue stabilization policy? The answer to that question depends on the solutions to the mysteries noted in the paragraph above. How much should we worry about large government deficits? The answer turns on whether or not Ricardian equivalence is roughly correct, and that depends in turn on the determinants and motivations of households' consumption and saving decisions.

. . . About the Microfoundations of Macroeconomics

Thus we come to the final set of things that economists do not know — but might someday find out. Macroeconomists do not understand aggregate consumption and saving decisions in the economy. They do not understand what determines the large shifts in the natural rate of unemployment seen over the past 30 years. Nor do they understand what can be done to constructively lower the natural rate of unemployment, or even what the natural rate of unemployment should be. Clearly it is worthwhile for the average worker who loses a job to spend some time unemployed searching for a new job. But how much?

And last, what are the underlying reasons that wages and prices are slow to respond to shifts in aggregate demand?

These questions about the “microfoundations of macroeconomics” have been at the top of the agenda for economic research at least since the end of World War II. Looking back, we should be somewhat depressed to realize how little progress has been made, and how much the live microfoundational issues of today are those that economists like Franco Modigliani were worrying about immediately after World War II.

WHAT ECONOMISTS WILL NEVER KNOW . . .

. . . Chasing an Ever-Moving Target

The natural sciences are characterized by a strong sense of progress toward a goal: Knowledge advances, and the amount of unknowns left to be understood shrinks. The social sciences are not as able to show progress. More is known, yes. But we are chasing an ever-moving target: One economist's joke is that you can give the same exam every 20 years, as long as you remember that the right answers will change.

Macroeconomics is a science of what might be called emergent phenomena. The marginal propensity to consume, the slope of the IS curve, the velocity of money — these are not basic, unchanging, fundamental quantities that can be measured and described once and for all. They are, instead, summary rule-of-thumb characterizations of phenomena that emerge from the billions of economic decisions made by hundreds of millions of workers, consumers, and firms. Thus we should expect macroeconomic “truth” to change over time as our economy changes.

So if there is a final lesson, it is this: Keep an open mind. Recognize that some of the things taught in this book will turn out to be wrong or incomplete. And recognize that the questions that people want macroeconomics to answer will change in the future as well, both because the economy will change and because macroeconomics is the handmaiden of policy, which is a subbranch of politics. And as politics changes, the questions that policy makers will ask of macroeconomists will change as well.

Glossary

A

accelerating inflation When inflation is rising yearly, so that this year's inflation is greater than last year's inflation, which is greater than inflation in the year before. Not only are prices rising, but they are rising at an increasing proportional rate. Accelerating inflation is typically found when the unemployment rate is lower than the natural rate of unemployment, or when the economy is hit by an adverse supply shock like a sharp oil price increase.

accelerationist Phillips curve Found when inflation expectations are adaptive, that is, the expected rate of inflation that determines the position of the Phillips curve is equal to last year's rate of inflation. Each extra percentage point rise in expectations of inflation shifts the entire Phillips curve upward by 1 percentage point. Thus if unemployment falls and remains below the natural rate, inflation will accelerate.

accommodation A strategy for economic policy in which the central bank does not counteract but reinforces the consequences of a shock. For example, consider an adverse supply shock that boosts inflation. A policy of accommodation would not increase real interest rates to fight inflation, but would instead allow real interest rates to fall and so further boost inflation.

adaptive expectations Expectations of the future formed by assuming the future will be like the past. Usually applied to expectations of inflation: Adaptive inflation expectations forecast future inflation by assuming it will be equal to inflation in the recent past. Adaptive expectations of inflation are one of the three cases economists typically analyze; the other two are static inflation expectations and rational inflation expectations.

AD-AS diagram See AS-AD diagram.

aggregate demand Also called planned expenditure. Total spending — by consumers, investing firms, the government, and the international sector — on final goods and services. When the details of national income accounting are considered, differences between aggregate demand, national product, GDP, and national income are caused by differences in their exact definitions. At the eagle's-eye level of analysis used in most of this book, however, the circular flow principle means that aggregate demand, national product, GDP, and national income are all equal.

aggregate demand (AD) curve A downward-sloping relationship between planned expenditure and the price level, plotted on the AS-AD (or aggregate supply-aggregate demand) diagram. This inverse relationship is produced because a higher price level means a lower real money stock, higher interest rates, lower investment spending, and gross exports and lower planned expenditure.

aggregate demand-aggregate supply diagram See AS-AD diagram.

aggregate demand line Usually called the planned expenditure line. Found on the income-expenditure (or Keynesian cross) diagram, which shows planned expenditure on the vertical and national income on the horizontal axis. An important part of the sticky-price, short-run business-cycle model. The planned expenditure line shows total spending — aggregate demand — as a function of the level of national income. The slope of the planned expenditure line is the MPE — the marginal propensity to expend income on domestic goods. The intercept of the planned expenditure line is the level of autonomous spending.

aggregate supply The quantity of final goods and services that firms produce given their existing stocks of plant, equipment, and other capital, and given the prevailing wage and price levels. In the flexible-price business-cycle model of Chapters 6 through 8 (and in the growth model of Chapters 4 and 5), wages and prices adjust so that in equilibrium, aggregate supply is equal to the economy's potential output. In the sticky-price model of Chapters 9 through 12, aggregate supply in the short run is an increasing function of the inflation rate (and thus of the price level).

aggregate supply (AS) curve The curve on the AS-AD (aggregate supply-aggregate demand) diagram that shows the dependence of firms' production on the inflation rate (and thus on the price level): the higher the inflation rate, the more goods and services are produced. The aggregate supply curve and the Phillips curve are different ways of expressing the same economic relationship.

analytic geometry The idea that graphs and equations are two different ways of expressing the same concepts. It allows lines and curves on a graph to represent algebraic equations — and algebraic equations to represent lines and curves on a graph. In economics, it is the use of graphs and diagrams as an alternative to equations and

arithmetic for expressing economic relationships. In mathematics, it is the branch of mathematics that relates geometry and algebra. Often called Cartesian geometry because much of it was invented by René Descartes.

animal spirits Waves of optimism and pessimism — perhaps irrational or self-confirming — about the future of the economy that affect investment spending. Shifts in animal spirits push stock market and other asset prices up and down, and they lead businesses to increase and decrease how much they spend on investment. A term often used by John Maynard Keynes as part of his argument that private investment spending was inherently unstable and that strong stabilizing monetary and fiscal policies were needed to control the natural fluctuations of the business cycle.

anticipated monetary policy Found when workers, managers, and investors have rational expectations of inflation. Anticipated monetary policy is then those shifts in the money stock or interest rates that they had anticipated in advance. Under rational expectations, anticipated changes in monetary policy have no effect on production or unemployment, but they do have powerful effects on prices.

appreciation An increase in value, usually on the part of a currency. The opposite of depreciation. When an appreciation is sudden and is the result of an explicit change in policy by a government, it is called a revaluation. An appreciation of foreign currency is an increase in the value of the exchange rate. By contrast, an appreciation of the dollar is a fall in the value of the exchange rate.

arbitrage Earning profits by buying a good or an asset in one place (or time) and selling it in another place (or time) where its price is higher. In this book, arbitrage is used to derive equilibrium conditions in financial markets: In equilibrium, no arbitrage opportunities are left for financiers to exploit. Thus, for example, any differential in interest rates paid on investments at home and investments abroad must be offset by an expected change in the exchange rate.

AS-AD diagram It plots real GDP (relative to potential output) on the horizontal axis and the price level (or the inflation rate) on the vertical axis. On this diagram the aggregate demand curve shows how planned expenditure varies with the price level (or the inflation rate); the aggregate supply curve shows how firms' total production varies with the price level (or the inflation rate). Equilibrium is where the curves cross, and thus where production is equal to sales, inventories are stable, and there is neither upward nor downward pressure on production or prices.

authorities Central bank authorities with the discretion to respond to specific circumstances as they see fit. Contrasted with rules in a debate over the best way to conduct monetary policy.

automatic stabilizers In a recession, tax revenues automatically decline as incomes fall, and social insurance spending automatically rises as more people qualify for food stamps, unemployment insurance, and other social welfare expenditures. The government budget automatically swings toward a deficit, providing a stimulus to aggregate demand, whenever private demand drops. Similarly, it automatically swings toward a surplus, reducing aggregate demand, whenever private demand rises. The structure of the government's tax and spending programs thus automatically provides a degree of stabilization to aggregate demand. These fiscal automatic stabilizers are the only form of fiscal policy in the United States that works rapidly and effectively to reduce the size of the business cycle.

autonomous consumption Written C_0 . That component of consumption spending that is independent of the level of national income.

autonomous spending Written A . Those components of planned expenditure that are independent of the level of national income. A higher level of autonomous spending is an upward shift in the planned expenditure line on the income-expenditure diagram. A higher level of autonomous spending increases equilibrium planned expenditure by an amount equal to the boost in autonomous spending times the multiplier. Autonomous spending A is equal to autonomous consumption C_0 , plus investment I , government purchases G , and gross exports GX : $A = C_0 + I + G + GX$.

B

bads The opposite of "goods." Elements produced by an economy that diminish consumers' welfare, and that would constitute a subtraction from GDP in some better, future system of social accounts to measure economic welfare. Bads include congestion (waiting in traffic jams), pollution, increases in crime (which increase measured GDP to the extent that they trigger greater expenditures on security), and the depletion of valuable resources (which are thus removed from the wealth of future generations).

Bagehot rule The principle that in a financial crisis the government needs to keep functioning those financial institutions and other businesses that are fundamentally sound and to — rapidly — close down and liquidate those organizations that are fundamentally bankrupt. If they would be bankrupt even if production and demand were at normal levels relative to potential, then they should be closed. If they would be solvent if production, demand, and asset prices were at their normal levels, the government needs to lend them as much money as they need to keep functioning through the crisis — albeit at a high, penalty rate.

balance of payments account The accounting system used to measure and comprehend a country's economic relations with the rest of the world. The balance of payments account has three parts: The current account tracks a country's imports and exports of goods and services; the capital account tracks a country's gross investment of capital abroad and foreigners' gross investment of capital at home; and, under a fixed exchange rate system, the official settlements account tracks changes in governments' exchange reserves.

balanced budget When the government's tax receipts equal its spending. Since there are many possible ways of accounting for tax receipts and for spending, the concept of a balanced budget is a fuzzy one.

balanced growth When a country has converged to its long-run balanced-growth path, and has a capital-output ratio equal to its equilibrium value (K/Y)*, which is found by dividing the country's saving-investment rate s by the sum of the labor force growth rate n , the efficiency-of-labor growth rate g , and the capital depreciation rate δ : $(K/Y)^* = s/(n + g + \delta)$.

balanced-growth equilibrium capital-output ratio The value of the capital-output ratio to which an economy with constant saving, depreciation, labor-force growth, and efficiency growth rates converges over time. Sometimes called the steady-state capital-output ratio. The balanced-growth capital-output ratio is calculated by dividing the investment share of national product by the sum of the labor-force growth, technology growth, and depreciation rates.

balanced-growth path The path toward which national product per worker tends to converge as the capital-output ratio converges to its balanced-growth equilibrium value. In analyzing long-run growth it is often easiest to first calculate an economy's balanced-growth path, and then to use the fact that the economy tends to converge to that path.

bank assets The sum of a bank's reserves and the loans it has made (and thus that people owe it). Bank assets are equal to the sum of a bank's liabilities — its deposits and its borrowings — and shareholders' net worth.

bank deposits Sums of money that people and organizations have taken to and placed in the bank for convenience, safe-keeping, and profit. Deposits are usually classified as either checking-account deposits (which can be transferred to others by writing checks) and saving-account deposits (which must be withdrawn or transferred into some other form before they can be spent). But there are other forms as well: certificates of deposit or money market account deposits, for example.

bank liabilities How much a bank owes to other people and organizations. The sum of the deposits that people have made in the bank, any direct borrowings that the bank itself has undertaken, and any bonds that the bank itself has issued.

bank reserves Cash held in bank vaults, or money that banks have on deposit at the local branch of the Federal Reserve. A bank's reserves are the amount of money it can pay out to depositors easily and immediately, without selling less than perfectly liquid assets, calling in loans, or borrowing itself. Bank regulators require that banks maintain a specified level of reserves in proportion to the total deposits that they have accepted. Changing reserve requirements is a way that the Federal Reserve affects the money supply.

bank run Before deposit insurance, when the depositors in a bank fear that it is insolvent, and so all at once demand that the bank liquidate their deposits for cash.

base year In the construction of an index, the year from which the weights assigned to the different components of the index are drawn. It is conventional to set the value of an index in its base year equal to 100.

baseline autonomous spending Written A_0 . Those components of autonomous spending that are independent of the level of the interest rate.

behavioral relationship One of the two key kinds of equations that appear in economic models. (The "equilibrium condition" is the other kind.) A connection between economic variables that is the result of people's actions — how consumers change their spending in response to changes in income, how businesses change employment in response to changes in inventories, how foreign exchange speculators assess the length of time that interest rates in the United States will remain higher than interest rates abroad, and so forth.

bond A tradable financial instrument that is a promise by a business or a government to repay money that it has borrowed. A discount bond is a short-term promise to pay a fixed sum on the date that the bond matures. A coupon bond is a promise to periodically pay out coupon interest payments until the bond matures, and then to repay the bond's principal value at maturity.

bond market The set of places and communication links along which governments and others bid for, offer, and trade bonds. Economists often say that interest rates are determined by supply and demand in the bond market. These days the bond market is largely a computer network — numbers on bond traders' computer screens, and electronic offers to buy and sell.

bond rating Some financial information services rate bonds, thus telling investors how safe and secure an investment a particular bond is. The highest-rated bonds are rated AAA.

boom A situation in which production is above long-run trend and has been growing rapidly, in which employment is high and unemployment is low, and in which nearly everyone is optimistic about the future of the economy.

bubble economy When a country's stock and real estate markets have risen far and fast to unsustainable "bubble" levels that cannot be justified on the basis of fundamental values. Bubbles are driven by investors' belief in the "greater fool" theory: Even though they may be fools for buying stocks and bonds at overvalued prices, somewhere out there is a greater fool who will soon buy the securities from them at even higher prices. At some point, however, the greater fool theory turns out to be false, the markets turn, and values on the stock and real estate markets crash. Today when economists refer to the bubble economy, they are typically referring to Japan in the late 1980s.

budget balance The net state of the government's finances. When government spending equals tax receipts, economists say that the budget is in balance or that the budget balance is zero. When spending exceeds taxes, the government's budget is in deficit. When taxes exceed spending, the government's budget is in surplus.

budget deficit The difference between government spending and taxes when the first is larger than the second. In sticky-price short-run models, a budget deficit raises aggregate demand: The government's purchases of goods and services inject more spending power into the economy than the government's net taxes are withdrawing from the economy. In flexible-price models, a budget deficit lowers national saving and investment: Money that would otherwise have been borrowed by businesses and used to finance investment in new plant and equipment is borrowed by the government instead.

budget surplus The difference between the government's spending and the government's revenues when the second is larger than the first. In sticky-price short-run models, an increase in a budget surplus lowers aggregate demand: The government's purchases of goods and services inject less spending power into the economy than the government's net taxes are withdrawing from the economy. In flexible-price models, an increase in a budget surplus raises national saving and investment: The government's retirement of its debt injects purchasing power into financial markets that is then borrowed by businesses and used to finance investment in new plant and equipment.

Bureau of Economic Analysis A bureau in the U.S. Department of Commerce charged with estimating macroeconomic data. The Bureau of Economic Analysis maintains the national income and product accounts, the NIPA.

Bureau of Labor Statistics A bureau of the U.S. Department of Labor charged with keeping track of key labor market and living standard data. The Bureau of Labor Statistics calculates the unemployment rate and the consumer price index (CPI).

Burns, Arthur Chair of the Federal Reserve Board from 1970 to 1978. Before that, he had been a senior member of Richard Nixon's White House staff, chair of Dwight Eisenhower's Council of Economic Advisers, and president of the National Bureau of Economic Research. One of Nixon's relatively few long-time friends.

business cycle A short-run fluctuation in the output, income, and employment of an economy. A political business cycle is one produced by policy actions implemented for political gain. A real business cycle is a boom generated not by stimulative monetary or fiscal policies or by the irrational animal spirits of investors, but by rapid technological innovation opening up new industries and new possibilities for investment.

business structures One of the components of investment spending. The construction of buildings, railroad tracks, bridges, or other things that are not machines, not inventory, yet improve the productive capacity of businesses.

C

capital Produced goods, like machines, buildings, transportation infrastructure, or inventories, that amplify the economy's productive potential.

capital account That part of the international balance of payments that covers investment flows from one country to another. When gross investment in foreign countries by domestic citizens is greater than gross investment in the home country by foreigners, economists say that there is a capital outflow. When gross investment in foreign countries by domestic citizens is less than gross investment in the home country by foreigners, we say there is a capital inflow. The capital account and the current account must match: When there is a capital inflow, the current account must show a trade deficit — an excess of imports over exports — of equal magnitude; when there is a capital outflow, the current account must show a trade surplus — an excess of exports over imports — of equal magnitude.

capital accumulation Increases in a country's capital stock when gross investment is greater than depreciation.

capital deepening Increases in an economy's capital-labor ratio.

capital flight When a collapse of confidence in a country's economic policy leads investors to try to pull their investments out of a country and invest them somewhere else. Capital flight is associated with a sharp depreciation in the value of the currency and poses very difficult economic policy choices.

capital flows Net investment by the citizens of one country in another — the "flow" of financial capital from one country to another. When there is a net outflow of capital from a country, the outflow is equal to its trade

surplus — net exports. When there is a net inflow of capital into a country, the inflow is equal to its trade deficit — imports minus exports.

capital inflow Net investment by the citizens of one country in another — the “flow” of financial capital from one country to another.

capital intensity The ratio of the capital stock to total potential output (K/Y) which describes the extent to which capital, as opposed to labor, is used to produce goods and services.

capital mobility The extent to which it is easy for investors to place their wealth in or pull their wealth out of other countries.

capital-output ratio The economy’s capital stock divided by potential output. In the economic growth chapters, Chapters 4 and 5, the capital-output ratio is the key variable in the economic growth model. Over time, economies converge to balanced-growth paths along which the capital-output ratio is at a constant, equilibrium level. The equilibrium capital-output ratio is equal to the share of national product that is saved and invested, divided by the sum of the depreciation, labor-force growth, and labor efficiency growth rates.

capital share The share of national income that is received as income by the owners of capital: the sum of profits, rent, and net interest divided by total national income. If the economy is competitive — without monopolies — and there are no major external benefits to investment in the economic growth process, then in equilibrium the capital share of an economy will be equal to the diminishing-returns-to-investment parameter of its aggregate production function.

capital stock The economy’s, or sometimes a firm’s, total accumulated stock of buildings, roads, other infrastructure, machines, and inventories. The greater the capital stock, the more productive the average worker. A substantial chunk of long-run economic growth is due to increases in the capital stock.

cash budget balance A way of measuring the government’s budget balance called “cash” because it does not take account of changes in the value of government-owned assets or of the future liabilities owed by the government. It is just cash paid in minus cash paid out.

cash flow The difference between a business’s revenues and its immediate cost of doing business. Cash flow is available for the business to return to its shareholders in dividends, use to buy back its stock or its bonds on the financial market, or spend on increasing its capital stock through investment.

CBO See Congressional Budget Office.

central bank The arm of a national government that controls the money supply and the credit pattern of an economy, and usually oversees and regulates the banking system as well. The Federal Reserve system — the Board

of Governors in Washington, DC, and the 12 regional Federal Reserve banks in Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, Kansas City, St. Louis, Dallas, Minneapolis, and San Francisco — is the United States’ central bank.

certificate of deposit A type of bank account that is one step less liquid, and thus one step less moneylike, than a savings account. You give your money to the bank. In return it gives you a “certificate of deposit” that you can redeem after a fixed period of time to get your money back with interest. However, if you try to cash in your certificate of deposit early, you will suffer, as the advertisements all say, “substantial penalties for early withdrawal.”

chain-weighted index An index constructed not by choosing one particular year as the base year and calculating the index value for every year using the base-year weights, but by “chaining” together year-to-year changes. That is, each year-to-year change in the index is calculated using that particular year as the base year. These calculated changes in the index are then linked together to create the index level values. Chain-weighted indexes avoid problems that fixed-weight indexes develop as time passes and the base-year weights used to construct the index become less and less relevant.

checking account deposits Often called “demand deposits” because the bank pays them out whenever the depositor demands (usually by writing a check that the check recipient’s bank then presents to the depositor’s bank). Because it is so easy to use checking account balances to pay for goods and services, checking account deposits are included in every possible measure of the money stock.

circular flow The central, dominant metaphor in macroeconomics, and the way of looking at the macroeconomy that underlies the national income and product accounts. Every economic transaction is made up of a flow of goods or services and of an offsetting flow of purchasing power in the opposite direction. Every economic agent has an income and an expenditure, and the two must match. Thus purchasing power flows from businesses to households and back in a circular fashion.

classical assumption The assumption that wages and prices are flexible.

classical dichotomy When real variables (like real GDP, real investment spending, or the real exchange rate) can be analyzed and calculated without thinking about nominal variables (like the price level or the nominal money stock). If the classical dichotomy holds, then economists also say that money is neutral: Changes in the money stock do not affect the real variables — income, production, and employment in the economy. They also say that money is a veil — a covering that does not affect the shape of the face underneath.

classical unemployment When unemployment arises not because aggregate demand is too low, but because government regulations or market power keep the labor market from clearing and keep labor demand by firms below labor supply.

closed economy An economy in which international trade is so small a share of national product that exports and imports can be ignored. Contrast with an open economy, in which trade and capital flows have important effects on real GDP and other economic variables.

commodity futures A contract that allows you to “lock in” today the price at which you will buy or sell a commodity in the future. The contract can then itself be traded, and depending on how prices move a contract that allows you to buy a commodity — euros, say — at a low price can itself be very valuable. Businesses and investors can use such commodity futures contracts to avoid bearing various forms of risk. Other businesses and investors use such commodity futures to gamble.

comparative statics A method of analysis to determine the effect on the economy of some particular shift in the environment or policy. First look at the initial equilibrium position of the economy without the shift; then look at the equilibrium position of the economy with the shift; and finally see the difference in the two equilibrium positions as the response to the shift.

Congressional Budget Office Abbreviated CBO. The place to go to look for forecasts of the government's tax and spending programs, and what they mean for the economy.

consumer confidence How optimistic or pessimistic are consumers about the economy? The University of Michigan and the Conference Board conduct surveys of consumer confidence. The more confident consumers are, the higher consumption is likely to be for any given level of GDP. Consumer confidence is a powerful determinant of autonomous consumption.

consumer price index Abbreviated CPI. The most commonly used measure of the cost of living. It measures the cost of a slowly changing basket of consumer goods. The change in the CPI is the most frequently used measure of inflation. Because of difficulties in getting good measurements of components of the cost of living, the CPI probably contains a slight bias. A plurality of economists believe that the CPI overstates true changes in the cost of living by between 0.5 and 1.0 percentage point per year.

consumer prices The average prices paid by households for the goods they buy as consumers. Consumer prices are distinguished from investment-goods prices, the prices paid by the government, and export prices.

consumption function The dependence of aggregate consumption spending on baseline consumption C_0 , the marginal propensity to consume C_y , and disposable income Y^D : $C = C_0 + C_y Y^D$.

consumption per worker A measure of the consumption of the workforce — the consumption component of GDP divided by the labor force for the national economy.

consumption spending Spending on goods and services purchased and used by consumers. Consumption spending is the major component of national product, equal to about two-thirds of the total. Consumption spending does not include purchases of existing houses or the construction of new houses. The purchase of an existing house is an asset. Housing construction is counted in investment.

contractionary policy The opposite of expansionary policy: shifts in government spending, taxation, or monetary policy that reduce aggregate demand and tend to reduce national product, income, employment, and inflation. A contractionary fiscal policy increases net taxes or reduces government spending. A contractionary monetary policy is usually an open-market operation by which the Federal Reserve sells bonds for cash, thus reducing the money supply and raising short-term interest rates.

convergence Applied to a set of countries, the tendency for productivity and real wage levels to draw together. Applied to one country, the tendency for it to approach a balanced-growth path with a constant capital-output ratio determined by the country's investment, technology, population growth, and depreciation rates.

coordination failures Failures of firms to change prices to respond quickly to the marketplace or in concert with other firms. Such things as long-term price and labor contracts produce a kind of inertia.

cost-of-living escalators Provisions in contracts that automatically raise wages or prices as official price indexes rise.

countercyclical Something that moves in the opposite direction from the business cycle; something that is low when national product is above potential output, and vice versa. The unemployment rate is countercyclical, as is the government's budget balance.

coupon bond A bond that pays its holder not only its principal value at maturity but also a periodic interest payment called a “coupon.”

CPI See consumer price index.

CPS See Current Population Survey.

credibility The degree to which the public believes in the policy action taken by some institution of government (e.g., the Fed, Congress, or the president). As long as people in an economy believe that the central bank will act to keep inflation low, it is possible that the economy will be able to have both relatively full employment and relative price stability. But if the central bank does not have this credibility, either unemployment will be high or inflation will be high — or both.

crowding out Decreases in investment spending caused by a drop in government saving that leads to higher real interest rates.

currency The sum of paper money and coins. Currency is one of the major components of the money stock. It is the form of money that is easiest to use to buy goods and services.

currency arbitrage A situation, operating under the gold standard, whereby people buying or selling one currency at any price other than the ratio of the two gold parities would find themselves facing an unlimited demand, and would soon find themselves losing a nearly unlimited amount of money.

currency board An exchange rate system in which the central bank gives up its power to conduct domestic open-market operations and commits to buying and selling foreign currency at the official exchange rate only. Under a currency board, a country's stock of high-powered money is equal to its foreign exchange reserves. Establishing a currency board system is a way that a central bank can gain credibility: It not only fixes its exchange rate in terms of foreign currency, but it abandons the key lever — open-market operations — that it would use should it wish to begin a policy of inflation.

currency confidence The condition where people have faith in the continuing value of one country's currency relative to one or more other currencies.

currency crisis A situation where a country's currency is in serious trouble relative to the exchange rates of other countries. The most common problems facing that country are the prospect of hyperinflation or the need for significant devaluation.

currency-to-deposits ratio How much individuals and firms wish to hold in currency for every dollar that they hold in bank deposits. When people are nervous about the banking system, the currency-to-deposits ratio will rise, pushing the money multiplier and the money stock down and perhaps causing a recession.

current account In the balance of payments, the account that keeps track of a country's exports and imports. When exports exceed imports, economists say that there is a current account or trade surplus. When imports exceed exports, economists say that there is a current account or trade deficit. The current account and the capital account must match: Whenever there is a capital inflow, the current account must show a trade deficit — an excess of imports over exports — of equal magnitude; whenever there is a capital outflow, the current account must show a trade surplus — an excess of exports over imports — of equal magnitude.

Current Population Survey Abbreviated CPS. The survey undertaken by the Labor Department's Bureau of Labor Statistics to estimate the unemployment rate.

cyclical unemployment The difference between the current unemployment rate and the natural rate of unemployment. Cyclical unemployment is associated with deviations of national product from potential output.

cyclical volatility The amount of variation in the size of swings from peak to trough over time.

cyclically adjusted The value of an economic variable if unemployment were at its average rate and the business cycle were in neither a boom nor a depressed state.

cyclically adjusted budget deficit Also called the high-employment budget deficit. An estimate of what the budget deficit would be if national product were at potential output and unemployment were equal to the natural rate. This measure removes shifts in the budget deficit that are due to the operation of the economy's automatic stabilizers.

D

debt The national debt of a country is the sum total of all past deficits less all past surpluses the government has run. The government owes interest on the national debt — thus to avoid piling up even more debt, taxes must be higher when the debt is higher. And the fact that investors hold the bonds issued by the government that are the national debt means that they have less to finance private investment that boosts the country's capital stock.

deficit The amount by which government spending on goods, services, and transfer payments exceeds tax revenues in a given year. A national debt is created when the government borrows to cover the shortfall.

deflation When the price level falls for some substantial period of time. The opposite of inflation. Deflation is rarely seen today, but the deflation of 1929–1933 was a major factor contributing to the depth of the Great Depression: The falling price level bankrupted firms and banks that were in debt, and so reduced total aggregate demand.

demand deposits Checking account deposits. Called demand deposits because the bank pays them out whenever the depositor demands (usually by writing a check). Checking account deposits are part of what economists call the money stock because it is so easy to use checking account balances to pay for goods and services.

demographic transition A period in history which sees a rise in birth rates and a sharp fall in death rates as material standards of living increase above "subsistence" levels. (But after a while birth rates start to decline rapidly too. The end of the demographic transition sees both birth and death rates at a relatively low level, and the population nearly stable.)

dependent variable The variable alone on the left-hand side of an equation. The variable whose value is determined by the values of the variables on the right-hand side, and that changes when the variables on the right-hand side change.

deposit insurance A promise by the government or the central bank that bank failures will not freeze consumers' or firms' bank deposits and thus their ability to spend. Deposit insurance in the United States was instituted by Franklin Roosevelt's New Deal and has reduced the risk of a classic financial crisis. (But it also obligated U.S. taxpayers to bail out many bankrupt savings and loan associations in the late 1980s.)

depreciation (of capital) The difference between gross and net investment in capital; the amount by which the capital stock wears out, becomes obsolete, or is scrapped over a year.

depreciation (of currency) A decrease in the value of a currency. Depreciation of the dollar is a rise in the value of the exchange rate.

depreciation rate The rate at which capital wears out, rusts, or becomes obsolete and is scrapped. Because of depreciation, the economy's capital stock does not grow by the full value of gross investment. It grows by the amount of net investment — the difference between gross investment and depreciation.

depression The word used for an economic downturn, a fall in national product and a rise in unemployment, before "recession" was coined as a euphemism. Today the meaning of "depression" is a very severe downturn.

devaluation In a fixed exchange rate system, a reduction in the value of a country's currency so that it takes more units of the home country's currency to purchase one unit of foreign currency. An action taken by a central bank or treasury to decrease the official price of a country's currency relative to the price of other currencies — or in terms of gold. (Revaluation is the opposite action.)

diminishing returns Doubling the number of workers on a farm, or doubling the value of the capital each employee uses in a factory, does not generally increase production by the same amount each time. As more factors are added, smaller and smaller increases in production are generated. Such diminishing returns prompted nineteenth-century essayist Thomas Carlyle to call economics "the dismal science."

discounting Figuring out how much money you would have to put aside today and invest at the prevailing interest rate in order to obtain a specified sum at some particular point in the future. We calculate the profitability of investments by discounting future profits from investment and comparing the discounted present value to the cost of the investment.

discouraged workers Potential workers who have left the labor force because they do not believe they can find worthwhile jobs. Discouraged workers return to the labor force when the labor market tightens. Many think that official unemployment rates underestimate the unemployment problem because of the existence of discouraged workers.

discretion Leaving policies to be made and adjusted by appointed bodies of experts with discretion to respond to circumstances.

discretionary policy Policy that is not automatic in the sense that automatic stabilizers swing into action without anyone making an explicit decision. Discretionary monetary policy is made by the FOMC's decisions to change interest rates. Discretionary fiscal policy is made by Congress's and the president's decisions to change levels of spending and of taxes.

disinflation A reduction in inflation, a reduction in the rate at which prices are increasing — but not so great a reduction as to cause deflation. Usually seen in the context of the Volcker disinflation, the 1979–1984 fall in the U.S. inflation rate carried out by the Federal Reserve during the term of Chair Paul Volcker.

disposable income What is left of income after taxes have been paid and transfer payments received. The difference between national income and net taxes. Even when national income is unchanged, changes in the government's tax and transfer programs change disposable income and so are likely to change consumption spending. Disposable income $Y^D = Y - T$ where Y is total income and T is net taxes. If taxes are proportional to income, $T = tY$ where t is the tax rate, and then $Y^D = (1 - t)Y$.

divergence The tendency for a per capita measurement (e.g., incomes or standards of living) in various countries to become less equal over a period of time.

dividends Payments by a corporation to its shareholders on a regular, periodic basis. Dividends are the primary way that a firm rewards those who have invested in its common stock by returning a portion of the firm's profits to its investors.

domestic investment The same as "investment" in the national income and product accounts. Distinguished from foreign investment, which is investment by one country's citizens in the economy of another country.

durable manufacturing That part of the economy's manufacturing sector that makes durable goods — long-lived goods like refrigerators, large turbine generators, structural steel, and washing machines.

dynamic inconsistency A situation where a central bank succumbs to the temptation to make inflation higher than expected and thereby loses its credibility. That central bank will find that its words about future policy are ignored in the process of setting expectations, and expectations of inflation will be sky-high.

E

East Asian crisis The remarkably deep and sudden financial crisis that hit East Asian economies in 1997 and 1998. The East Asian crisis came with the least warning

of any financial crisis in the 1990s. In other crises — Britain's, Brazil's, or Mexico's — some observers at least had pointed out fundamental problems that made that economy vulnerable to a crisis. The East Asian crisis appeared to come out of a blue sky.

East Asian miracle Since the mid-1960s the economies of East Asia have grown more rapidly than any other group of economies, anywhere, anytime.

economic expansion A sustained increase in GDP bracketed on either side by a period of recession.

economic growth The process by which productivity, living standards, and output increase.

Economic Report of the President A “book” prepared once a year (in February) by the president’s Council of Economic Advisers. It gives their view of the economy’s accomplishments, problems, and opportunities.

efficiency of labor The skills and education of the labor force, the ability of the labor force to handle modern technologies, and the efficiency with which the economy’s businesses and markets function. The efficiency of labor is very closely linked to an economy’s total factor productivity.

elasticity The proportional response of one quantity to a proportional change in another quantity. If a 1 percent change in one variable generates a 1 percent change in the other, the elasticity is one. If a 1 percent change in one generates a 2 percent change in the other, the elasticity is two.

equilibrium Short-run equilibrium is a state of balance between supply and demand in a particular market or in the economy as a whole. Long-run equilibrium requires that markets balance and also that expectations of inflation and other quantities be correct.

equilibrium capital-output ratio In the economic growth chapters, Chapters 4 and 5, the equilibrium capital-output ratio is the key to understanding where the economy is headed: what its long-run dynamic trajectory will be. Over time, the economy will converge to its balanced-growth path along which the capital-output ratio is constant at its equilibrium level. This equilibrium capital-output ratio is equal to the share of national product that is saved and invested, divided by the sum of the depreciation, labor-force growth, and labor-efficiency growth rates.

equilibrium condition A relationship between two economic quantities that holds not because any one actor or group in the economy makes it hold, but because the operation of the system as a whole pushes the economy to a state in which the relationship holds. The requirement that planned expenditure equal total output on the income-expenditure diagram is an equilibrium condition: If it does not hold, then inventories are either rising or falling and so businesses are either cutting back or raising production, and thus total output is either rising or falling toward planned expenditure.

equilibrium debt-to-GDP ratio The constant ratio of government debt to GDP when both real government debt and real GDP are growing at the same rate.

establishment survey A survey of businesses and how many employees they have that is carried out by the Bureau of Labor Statistics. The establishment survey is not used to calculate the unemployment rate.

excess bank reserves Bank reserves held over and above those mandated by law because banks are not confident that they would be paid back if they made additional loans, or because banks believe that some loans they have already made are about to go into default, or because they believe depositors are about to withdraw deposits.

exchange rate The nominal exchange rate is the rate at which one country’s money can be turned into another’s. The real exchange rate is the rate at which goods produced in one country can be bought or sold for another’s. The definition of the exchange rate is either the value of home currency or the price of foreign currency, depending on the textbook. In this book, the nominal exchange rate is the price of foreign currency.

expansion A period when real GDP is growing.

expansionary policy Increases in government spending, decreases in net taxes, or increases in the money stock that lower interest rates. Expansionary policies raise aggregate demand, national product, employment, and inflation.

expectations Everyone in the economy makes plans about what to do that depend on what they think the future will be like. Economists focus on this dependence of behavior on beliefs about the future: Investors’, consumers’, employers’, and workers’ expectations are a principal determinant of economic behavior. As a shorthand, economists usually collapse the range of different and conflicting expectations held by people into a single average number — for example, expectations of inflation.

expectations theory of the term structure The theory that the long-term interest rate is an average of today’s short-term interest rate and of the short-term interest rates that are expected to prevail in the future, plus a term premium.

expected inflation rate The rate at which prices were expected to increase. Today’s expected inflation rate is yesterday’s guess about today’s inflation rate.

expenditure side That part of the national income and product accounts made up of total expenditure — on consumption spending, investment, net exports, and government purchases.

exports Total goods and services produced at home and sold to purchasers in foreign countries. Exports are an addition to aggregate demand for home-produced products.

external balance When the trade surplus (or deficit) of a country is equal to the value of investors’ new long-term

investments abroad (or foreigners' new long-term investments here). A lack of external balance means that something — usually the exchange rate, but possibly interest rates or the level of GDP — is about to change.

F

Federal Open Market Committee Abbreviated FOMC.

The principal decision-making body of the Federal Reserve. The FOMC meets roughly every other month, decides on the level of short-term interest rates, and directs the open-market operations that the New York Federal Reserve Bank carries out on behalf of the Federal Reserve system.

Federal Reserve The United States' central bank. The institution conducts monetary policy and regulates banks. Its open-market operations change the money stock and peg short-term nominal interest rates. The Federal Reserve consists of a Board of Governors (seven, one of whom is chair) and 12 regional Federal Reserve banks.**Federal Reserve banks** The 12 regional banks — located in New York, Chicago, Cleveland, Boston, Philadelphia, Richmond, Atlanta, St. Louis, Kansas City, Dallas, Minneapolis, and San Francisco — that are the local branches of the Federal Reserve system.**Federal Reserve Board** The Washington, DC-based head office of the United States' central bank, the Federal Reserve system. The board consists of seven governors, one of whom is chair and one of whom is vice chair. The chair is appointed to a four-year term by the president with the advice and consent of the Senate.**final goods and services** Products that are not themselves used by businesses to make other products. Products that are (a) bought by consumers, (b) bought by firms or individuals as investments that increase their capital stock, (c) bought by the government, or (d) bought by foreigners (in excess of intermediate goods bought by domestic producers).**financial automatic stabilizers** Features of the financial system, such as deposit insurance, that help to prevent stress on the financial system from culminating in total collapse.**financial flexibility** A situation in which a large number of different financial instruments are traded on thick and liquid markets. This means that any one kind of asset has less and less potential to become a bottleneck.**financial markets** The stock market, the bond market, the short-term borrowing market, plus firms' borrowings from banks. The markets in which the flow of money from savers seeking a return to investors seeking money to finance purchases takes place.**financial panics** Sudden falls in stock and bond market prices, and rises in interest rates, driven at least in part by the fear that other people are about to panic and sell.

fine-tuning The hope that the Federal Reserve, Congress, and the president could together adjust fiscal and monetary policy to keep the economy always near full employment — as you tune a radio to get the strongest signal.

fiscal automatic stabilizers In a recession, tax revenues automatically decline as incomes fall, and social insurance spending automatically rises as more people qualify for food stamps, unemployment insurance, and other social welfare expenditures. The government budget automatically swings toward a deficit, providing a stimulus to aggregate demand, whenever private demand drops. Similarly, it automatically swings toward a surplus, reducing aggregate demand, whenever private demand rises. The structure of the government's tax and spending programs thus automatically provides a degree of stabilization to aggregate demand. These fiscal automatic stabilizers are the only form of fiscal policy in the United States that works rapidly and effectively to reduce the size of the business cycle.

fiscal policy Changes in government purchases or in net taxes that affect the level of aggregate demand. Increases in purchases or in transfer payments are expansionary policy; increases in taxes are contractionary policy.

Fisher effect An empirical regularity whereby nominal interest rates typically rise roughly point-for-point with the inflation rate.

fixed exchange rates A system of international monetary arrangements by which central banks buy and sell in foreign exchange markets to keep their relative exchange rates fixed. Before 1971 the industrial world was on a fixed exchange rate system called the Bretton Woods system.

fixed investment Investment to build houses and apartments, infrastructure, offices, stores, and other buildings, plus investment in machinery and equipment. The other important component of investment is inventory investment.

fixed-weight indexes Indexes formed by taking a weighted average of different quantities, where the weights are fixed and unchanging over the span of years for which the index is constructed.

flexible prices When wages and prices in an economy are not sticky, but move smoothly and rapidly to keep supply equal to demand in the labor market and in the goods market. Under flexible prices, real GDP is equal to potential output and unemployment is equal to its natural rate. Under flexible prices, changes in monetary and fiscal policy do not affect the level of real GDP, but they do affect its composition, and they affect the price level as well.

floating exchange rates A system of international monetary arrangements by which central banks let exchange rates be decided by supply and demand, so that they

“float” against one another as supplies and demands vary. Floating systems can be “clean”—if central banks truly leave the markets alone—or “dirty”—if central banks try at times to nudge exchange rates in one direction or another.

flow of funds The process by which saving—whether household, government, or foreign—is transformed into purchasing power useful for businesses undertaking investment spending. The flow of funds through financial markets is the center of macroeconomic analysis in the flexible-price full-employment model of Chapters 6 and 7.

flow variable An economic quantity measured as a flow per unit of time. GDP, investment spending, and inflation are examples of flow variables. The unemployment rate, the capital stock, and the price level are not flow variables—they are stock variables.

FOMC See Federal Open Market Committee.

foreign currency The money of any country save the one you happen to live in. When domestic exporters earn foreign currency by exporting, they have to figure out what to do with it—it’s no good in this country, after all. So they need to trade it either to someone who needs foreign currency to buy imports or to someone who wants foreign currency to make an investment abroad.

foreign exchange market The decentralized trading around the world of assets denominated in one currency for assets denominated in another: euros or dollars, pounds or yen. Exchange rates are set in the foreign exchange market.

foreign exchange reserves Foreign currency-denominated assets held by a country’s central bank or treasury to use in foreign exchange interventions. Under a fixed exchange rate system, a government must maintain sufficient foreign exchange reserves so that it can satisfy the people who wish to trade home currency for foreign currency.

foreign saving The net amount of money that foreigners are committing to buying up property and assets in the home country, equal to minus net exports.

foreign trade The purchase of commodities made in other countries. Imports and exports.

formulation lag The lapse of time between the moment that makers of economic policy recognize that a shock has affected the economy and the moment at which their policy response begins to be implemented. The time it takes to formulate policy.

fractional reserve banking A banking system—like the one we have—in which banks hold in their vaults only a portion of deposits they accept as reserves and lend the rest to customers who pay interest.

frictional unemployment The unemployment generated by firms taking time to fill vacancies and workers taking time to find the right job. Frictional unemployment is

the labor market counterpart of goods inventories in the goods market: It boosts output and workers’ incomes by giving them the opportunity to find jobs that match their skills.

Friedman, Milton One of the four most influential macroeconomists of the twentieth century (the other three being John Maynard Keynes, Irving Fisher, and Robert Lucas). Leading exponent of monetarism, and one of the first to recognize the dominant role potentially played by the Federal Reserve in stabilization policy.

full-employment cyclically adjusted deficit An estimate of what the budget deficit would be if national product were at potential output. This measure removes shifts in the budget deficit that are due to the operation of the economy’s automatic stabilizers.

future value The inverse of present value—the value that a sum of money or a flow of cash would have at some date in the future, if it were invested and compounded at the prevailing rate of interest.

G

GDP See gross domestic product.

GDP deflator The ratio of nominal GDP to real GDP. The second most used estimate of the overall price level (the consumer price index is the most-used estimate).

generational accounting A way of looking at the government’s tax and spending plans not individual year by individual year, but all at once. Generational accounting attempts to set out the total lifetime impact of government policy on an individual’s resources and obligations.

globalization The ongoing process by which barriers to the free flow of commodities, capital, and information across countries are reduced.

GNP See gross national product.

gold standard The particular fixed exchange rate system dominant for more than a half century before the Great Depression. A system by which central banks preserve fixed exchange rates by always being willing to buy or sell their currencies at fixed rates in terms of the precious metal gold.

golden rule In growth theory, when an economy’s saving rate is equal to its capital share. In such a case the balanced-growth path has a higher level of consumption associated with it than any other balanced-growth path with the same path over time of the efficiency of labor.

goods market Economists sometimes divide the economy into four “markets”—the labor market where firms hire and pay workers; the money market where people buy and sell liquid assets; the bond market where people buy and sell bonds and stocks; and the goods market where people (and firms, and the government) buy and sell final goods and services.

goods market equilibrium In the flexible-price model, when prices have adjusted to make total aggregate demand for goods equal to potential output. In the sticky-price model, when firms have responded to their increasing or decreasing inventories by adjusting production to aggregate demand so that inventories are stable.

government deficit The difference between government spending and taxes when the first is larger than the second.

government purchases Government spending on goods or services (including the wages of government employees). Much government spending is not purchases but is instead transfer payments: payments like Social Security or food stamps that do not buy any good or service for the government.

government saving The government's budget surplus. Government saving is negative when the government runs a budget deficit.

government surplus The difference between the government's spending and taxes when the second is larger than the first.

Great Depression From 1929 to 1941, the deepest depression the United States has ever experienced. At its nadir in 1933, more than a quarter of the labor force was unemployed.

gross domestic product Abbreviated GDP. The most commonly used measure of product, output, and income. The total amount of final goods and services produced. By the circular flow principle, equal to the total income earned through domestically located production. Also equal to total expenditure on domestically produced goods and services.

gross exports Total goods and services produced at home and sold to purchasers in foreign countries.

gross investment Spending on investment goods that includes spending to simply replace worn-out or obsolete pieces of capital, or to keep existing capital in working condition. Subtract depreciation from gross investment to obtain net investment, the net increase in the economy's capital stock.

gross national product Abbreviated GNP. Equal to GDP minus the income earned by foreign-owned factors of production located in the United States, plus income of U.S. factors of production located abroad. GNP formerly was the most frequently used measure of national product, but the government lost confidence in its ability to estimate the difference between GNP and GDP.

growth rate Almost always the annual growth rate of GDP, or of GDP per worker. The amount by which real economic product is increasing from year to year.

H

high-employment budget deficit Also called the cyclically adjusted budget deficit. An estimate of what the govern-

ment's budget deficit would be if national product were equal to potential output and unemployment were equal to the natural rate. This measure removes shifts in the budget deficit that are due to the operation of the economy's automatic stabilizers.

high-powered money Usually called the monetary base.

The sum total of currency and of bank reserves on deposit at the Federal Reserve. The money stock is equal to the monetary base times the money multiplier.

high-pressure economy Another example of hydraulic metaphors: an economy in which the "pressure" of economic activity is high. Unemployment is low, production is often higher than potential output, workers are being pulled into the labor force, and inflation is often rising.

household saving Households' disposable income minus their consumption spending. Note that earnings not paid out but retained by corporations and then reinvested are counted in disposable income. Hence household saving includes both saving done directly by households and saving done on their behalf by firms whose stock they own.

hyperinflation Extremely high inflation, so high that the price mechanism breaks down. Under hyperinflation people are never sure what the true value of their money is, and they spend a great deal of time and energy trying to spend their cash incomes as fast as possible before they lose value. One rule of thumb is that inflation of more than 20 percent per month is hyperinflation.

I

imperfect information The information workers or managers have for decision making when they lack full information about the state of the economy.

implementation lag The time that passes between the completion of a monetary or fiscal policy action by the Federal Reserve or Congress and the onset of that action's effects on real GDP, unemployment, and inflation.

imports Goods and services produced in and purchased from other countries. Imports are a reduction in aggregate demand: Consumption and investment spending that are diverted to imports are not part of aggregate demand for domestically produced goods and services.

imputed rent Some people rent apartments from landlords. Other people own houses or condominiums. National income accountants were worried at the idea that if a tenant bought an apartment or a house from his or her landlord, real GDP would go down. So they invented "imputed rent" — the rent that those who live in owner-occupied housing pay as tenants to themselves as landlords — and include imputed rent in their calculations of GDP.

income-expenditure diagram The tool for figuring out what the equilibrium level of planned expenditure or

aggregate demand and national product is. If national product is too low, it is to the left of equilibrium on the income-expenditure diagram and inventories are rapidly being exhausted. If national product is too high, it is to the right of equilibrium and inventories are being involuntarily built up.

income side That part of the national income and product accounts made up of total income — earned by workers, received by investors, paid to landlords — and residual economic profits left for entrepreneurs and risk-bearers.

independent variable A variable often on the right-hand side of an equation. A variable whose value helps determine the value of the dependent variable, and that, when it changes, makes the dependent variable change.

index number A number that isn't a set sum, value, or quantity in well-defined units (like dollars, people, or miles) but that is a quantity relative to a base year given an arbitrary index value of 100. Index numbers are usually weighted averages of a large number of individual components, and the weights can be either fixed or chained.

industrial economies Those economies that have finished the process of industrialization — the United States, Britain, Germany, Japan, France, Canada, Italy, and the smaller economies at roughly the same stage of economic development.

Industrial Revolution The transformation of the British economy between 1750 and 1850 when largely handmade production was replaced by machine-made production, a change made possible by technological advance. Following the initial British industrial revolution, other countries have in turn undergone their own industrial revolutions.

inflation An increase in the overall level of prices in an economy, usually measured as the annual percentage change in its consumer price index.

inflation rate The annual rate of change of the overall level of prices in the economy.

inflation tax The tax implicitly levied on an economy's private sector by the government's exercise of its power to print more money. Also called "seigniorage."

inside lag The lapse of time between the moment that a shock begins to affect the economy and the moment that economic policy is altered in response to the shock. The inside lag has two parts: the recognition lag, during which makers of economic policy do not yet recognize the shock; and the formulation lag, during which makers of economic policy are designing the policy response.

insider-outsider theory A theory of how cyclical unemployment that persists for too long becomes transformed into structural unemployment. Workers who remain unemployed gradually lose their skills and their attachment to the labor force. And unions bargain to raise the wages of current members, not to find jobs for ex-members.

interest The periodic sums that you pay to "rent" the money that you have borrowed.

interest rate The price, measured in percent per year, paid for borrowing money. Conversely, the return earned by saving, and the relative price at which purchasing power can be transferred from the present to the future.

interest rate targeting A central bank that focuses its policies on controlling — targeting — interest rates.

intermediate goods Goods that are not final goods and services. Goods that are bought by businesses as inputs into some further process of production. Intermediate goods are excluded from product-side counts of GDP: To include them would lead to double counting (counting the same economic product twice), once in the intermediate good and once again in the final good that the intermediate good was used to produce.

internal balance When unemployment is equal to its natural rate, inflation is unchanging, and GDP is equal to potential output. Under a fixed exchange rate system, monetary policy cannot be used to pursue internal balance because the level of interest rates must be devoted to maintaining the fixed exchange rate.

international division of labor Resource-rich countries produce and export natural resources and resource-based products, industrialized economies export capital-intensive high-technology manufactures, and other countries export labor-intensive manufactures. All gain by concentrating their production in those sectors in which their economy is most efficient.

inventory investment A change in the stock of goods that make up firms' inventories: materials and supplies, work in progress, goods in storage, and finished goods that have not yet been sold. Fluctuations in inventory investment are primarily involuntary, the result of quarter-by-quarter differences between national product and aggregate demand.

investment The buildings and goods (both machines and inventories) purchased to add to the economy's stock of capital, plus (sometimes) government creation of infrastructure, plus residential construction.

investment accelerator The dependence of the level of business investment on the level of production. It arises from firms' preference to use internally generated rather than externally raised funds to finance investment, and from other causes. A strong accelerator increases the value of the Keynesian multiplier.

investment function How investment spending depends on the interest rate. Investment considered as a function of the interest rate. The relationship between the baseline level of investment I_0 , the real interest rate r , and the responsiveness of investment to a change in real interest rates I_r : $I = I_0 - I_r r$.

investment requirements The share of GDP that must be devoted to investment spending in order to keep an economy's capital-output ratio from falling.

investment spending That portion of total spending (approximately 20 percent) devoted to increasing business capacity and the economy's capital stock.

investor optimism The principal determinant of baseline investment I_0 . When investors are optimistic, I_0 is high. Fluctuations in investor optimism — what John Maynard Keynes called investors' "animal spirits" — are a principal cause of the business cycle.

IS curve The downward-sloping relationship between the (real, risky, long-term) interest rate and the equilibrium level of national product and aggregate demand. The IS curve summarizes the information about equilibrium national product in an entire family of income-expenditure diagrams, one for each possible value of the interest rate.

IS-LM diagram A diagram with the interest rate on the vertical axis and the level of national product on the horizontal axis, used to determine what values of the interest rate and of total income together produce equilibrium in the money market — supply of money equal to money demand — and equilibrium in the goods market — planned expenditure equal to real GDP. Whenever the central bank does not set the interest rate but instead sets the money stock, you need to look at the IS-LM diagram to determine the economy's equilibrium.

K

Keynes, John Maynard One of the four most influential macroeconomists of the twentieth century (the other three being Milton Friedman, Irving Fisher, and Robert Lucas). To Keynes we owe the income-expenditure aggregate-demand framework that still dominates intermediate macroeconomics courses and textbooks.

Keynesian cross diagram The income-expenditure diagram by another name. The tool for finding equilibrium planned expenditure and national product. Principally used in the derivation of the multiplier: the amplified response of changes in equilibrium planned expenditure and national product to fluctuations in autonomous spending.

Keynesian multiplier The change in national income and planned expenditure that follows from a one-dollar change in any component of autonomous spending, such as government purchases. To find the value of the multiplier, subtract the economy's marginal propensity to expend from 1, and then take that number's inverse.

Keynesianism The school of thought, developed from the ideas of John Maynard Keynes, that emphasizes (a) the role of expectations of future profits in determining investment; (b) the volatility of expectations of future profits; (c) the power of the government to affect the economy through fiscal and monetary policy; and (d) the multiplier process, which amplifies the effects of both private-sector shocks and public-sector policies on aggregate demand.

L

labor force The sum of those who are employed and those who are actively looking for work. The unemployment rate is defined as the number of unemployed divided by the labor force.

labor market The market in which workers are hired by firms.

labor market equilibrium When the only kind of unemployment is "frictional" unemployment, and there is neither cyclical nor structural unemployment. When, save for those in the process of changing jobs, the economy is at full employment.

labor productivity National product divided by the number of workers (or, alternatively, by the total number of hours worked). Such a measure of output per worker is probably the best available measure of long-run economic growth.

labor supply The number of workers who want to work.

labor unions Organizations of workers that attempt to bargain with employers for higher wages and better working conditions by threatening to strike. Multiyear union contracts have been seen as important causes of price inertia.

lags The time between when a policy proposal is made and when it becomes effective in changing the economy in some way. Lags can arise during recognition of a condition, formulation of a policy, or implementation of that policy. The first two are inside lags, because they occur inside the government. The last is sometimes called the outside lag.

leading indicators A number of variables correlated with future movements in real GDP or inflation. Many economists believe these indicators can be relied on as a good guide to economic activity nine or so months ahead.

Some key indicators are stock prices, new manufacturing orders, the money supply, and the index of consumer expectations.

lender of last resort When the government steps in and lends money to organizations that are thought to be fundamentally sound, but that are critically short of cash in a financial crisis.

life-cycle consumption Consumption is depressed below income in peak earning years because people are saving for retirement. Before and after peak earning years, consumption is raised above income either as parents pay for upbringing or as retirees spend their savings.

liquid assets Forms of wealth that can be readily and cheaply converted into spendable form. Forms of wealth that can be easily used to finance purchases.

liquidity Applied to assets, whenever they can be easily, quickly, and without cost turned into money.

liquidity constraints An inability to borrow. When consumers suffer from liquidity constraints, their consumption spending is limited by their current income, and the marginal propensity to consume is likely to be high.

liquidity crisis When banks or other institutions cannot make the payments they owe because they lack cash, but when nobody (or few people) doubts that they will be solvent and profitable if the current financial crisis is successfully resolved.

LM curve The positive relationship between national income and the interest rate that emerges from considering a whole family of money demand–money supply diagrams, a different diagram for each possible level of national income. Plotted along with the IS curve on an IS-LM diagram, it determines the levels of national income and of the interest rate consistent with goods-market and money-market equilibriums.

loanable funds The total flow of resources available — household saving, government saving, and foreign saving — to finance investment spending and capital accumulation.

long-run growth The path of economic growth once the business-cycle fluctuations have been removed. The long-run pace of growth of potential output or of potential output per worker.

long-term interest rate The interest rate required if you are going to borrow money not for a short term of months but for a long term of decades.

long-term real interest rate The interest rate required if you are going to borrow money not for a short term of months but for a long term of decades, adjusted for inflation by subtracting the expected inflation rate from the nominal interest rate.

Lucas, Robert One of the four most influential macroeconomists of the twentieth century (the other three being John Maynard Keynes, Irving Fisher, and Milton Friedman). The leader of the rational-expectations school of macroeconomics for nearly two decades.

Lucas critique The assertion that much analysis of the effects of economic policy is badly flawed because it does not take proper account of how changing policies induce changes in people's expectations.

M

M1, M2, M3 Different measures of the money stock — of the total stock of assets in the economy that are liquid enough to be readily used to finance purchases.

macroeconomics The study of business cycles, the determinants of inflation and unemployment, and probably long-run growth and effects of government fiscal policy. Macroeconomics is contrasted with microeconomics — the study of what goes on in individual markets within the economy.

Malthusian age A period in which natural-resource scarcity limits any gains from increases in technology; a larger population becomes poor and malnourished, lowering their standard of living, and ultimately lowering population growth to zero.

marginal product of capital The increase in potential output from a unit increase in the economy's capital stock. Often calculated as equal to $\alpha Y/K$ (α , the share of national income received by owners of capital, divided by the capital-output ratio K/Y).

marginal product of labor (MPL) The increase in potential output from a one-unit increase in the supply of labor to the economy. Often calculated as $(1 - \alpha)Y/L$ (the share of national income received by workers, $1 - \alpha$, times average labor productivity Y/L).

marginal propensity to consume (MPC) The increase in consumption spending resulting from a one-dollar increase in disposable income. The parameter C_y in the consumption function $C = C_0 + C_y(1 - t)Y$, where C_0 is baseline consumption, t is the tax rate, and Y is total national income.

marginal propensity to expend (MPE) The increase in total spending — on consumption goods through the marginal propensity to consume and on net exports — from a one-dollar increase in national income. In the model of Chapters 9–12, $MPE = C_y(1 - t) - IM_y$, where C_y is the marginal propensity to consume, t is the tax rate, and IM_y is the share of income spent on imports. Note, however, that in more complicated models MPE may be different: Changes in national income may have other effects as higher firm profits lead to higher investment spending and as higher household incomes lead to lower social insurance spending.

maturity The date or the number of years in the future at which a bond's interest payments cease and its principal sum is returned to the lender.

median The middle one of something. The value such that half are as large or larger, and half are as small or smaller.

medium of exchange A commodity or an asset that almost everyone will accept as payment for a transaction. The most important function of money.

menu costs The costs to a firm of changing the price of a good or service. They lead firms to adjust their prices infrequently.

microeconomics That field of economics that deals with the behavior of the individual elements in an economy with respect to the price of a single commodity and the behavior of individual households and businesses.

mixed economy An economy in which markets control the allocation of resources and of labor to industries and firms, but in which the government plays a not overwhelming but significant role: providing social insurance and social welfare benefits on a large scale, trying to stabilize the macroeconomy, and enforcing contracts.

Post–World War II mixed economies have been extraordinarily successful at generating economic growth.

model A construct that aims to establish relationships — usually quantitative — between and among economic variables. Economists describe the process of reducing

the complexity and variation of the real-world economy into a handful of equations as “building a model.”

monetarism The theory, very popular in the 1970s and the early 1980s, that fluctuations in interest rates had little impact on money demand, so that stabilizing national product and employment could be carried out in a smooth and straightforward fashion by stabilizing the rate of growth of the money stock.

monetary automatic stabilizers Named by analogy with the fiscal automatic stabilizers produced by the structure of the government’s budget. Features of the financial system that tend to cushion and prevent declines in the money stock that would otherwise occur during a financial crisis. For example, deposit insurance is a monetary automatic stabilizer: It prevents bank deposits and the money stock from dropping when people begin to fear that a depression may bankrupt the bank they use.

monetary base Often called high-powered money. The sum total of currency and of bank reserves on deposit at the Federal Reserve. The money stock is equal to the monetary base times the money multiplier.

monetary policy How the supply of money or the interest rate varies with economic conditions like inflation, unemployment, and the exchange rate. The rules of thumb that the Federal Reserve uses to decide what instructions it is going to give the Federal Reserve Bank of New York.

monetary policy lags The time between when a monetary policy proposal is made and when it becomes effective in changing the economy in some way.

monetary policy reaction function An upward-sloping relationship between the inflation rate and the unemployment rate. When the inflation rate rises, a central bank wishing to fight inflation will raise interest rates to reduce output and thus increase the unemployment rate.

monetary transmission mechanism How changes in the money supply or in interest rates affect spending on consumption, investment, and other components of aggregate demand, thus leading to changes in national income and product.

money A word that economists use in a technical sense. To an economist, “money” means only “wealth in the form of readily spendable purchasing power.” Cash, plus balances in checking accounts, plus whatever other assets are held primarily as a way to keep purchasing power on hand to spend rather than as long-term investments.

money balances How much money — wealth in the form of readily spendable purchasing power — consumers and firms actually hold at a given moment.

money demand How much money — wealth in the form of readily spendable purchasing power — consumers and firms wish to hold at the given levels of national income and of interest rates.

money demand curve A curve drawn for a given and fixed level of national income showing how consumers’ and

firms’ demand for money varies with the interest rate: The higher the interest rate, the lower money demand is. On the money demand–money supply diagram, the point where the money demand curve is equal to the supply of money determines the market-clearing interest rate.

money illusion When managers, workers, and others fail to recognize that some of the change in their nominal income and revenue is a result of inflation and is not a change in their real income and revenue.

money market equilibrium When the money demand by consumers and firms equals the money supply which the Federal Reserve has allowed the banking system to make available.

money multiplier The change in the money stock that follows a one-dollar change in the monetary base; the ratio between the money stock and the monetary base. Increases in the reserves-to-deposits ratio or in the currency-to-deposits ratio reduce the money multiplier.

money stock The equilibrium of money supply and money demand. The amount of money the Federal Reserve has allowed the banking system to create.

money supply How much in the amount of liquid assets the Federal Reserve has allowed the banking system to create.

money supply curve The money supply considered as a function of the interest rate. In general the higher the interest rate, the lower are the excess reserves that the banking sector holds and the higher is the money stock.

money supply–money demand diagram The building block of the LM curve, the diagram with the interest rate on the vertical and the quantity of money supplied and demanded on the horizontal axis.

moral hazard The danger of imprudent, improper, or dishonest behavior in economic situations where actions are not easily or routinely monitored. A possible drawback of deposit insurance and of lender of last resort activities.

MPC See marginal propensity to consume.

MPE See marginal propensity to expend.

MPL See marginal product of labor.

multiplier The change in national income and aggregate demand that follows from a one-dollar change in any component of autonomous spending, such as government purchases. To find the value of the multiplier, subtract the economy’s marginal propensity to expend from 1, and then take that number’s inverse.

myopia Short-sightedness. A failure to look far enough ahead into the future. For example, “voter myopia” is the theory that voters react to the immediate economic situation, rather than to what has happened in the further past or what is likely to happen in the future.

N

NAIRU Acronym for the nonaccelerating inflation rate of unemployment, which is the same as the natural rate of unemployment. The rate of unemployment when inflation is equal to expected inflation. The rate around which unemployment tends to fluctuate, and at which (because actual and expected inflation are equal) there is neither upward nor downward pressure on inflation.

national debt See debt.

national income The total income from all work and asset ownership in an economy. Leaving aside differences in accounting definitions, national income is equal to national product (for the only way income can be earned is by producing products) and is equal to total expenditure, or aggregate demand (for all income flowing to individuals must be expended one way or another).

national income and product accounts Abbreviated NIPA. The system that government statisticians use to measure, estimate, and check data on the flow of economic activity.

national income identity The requirement — built into the national income and product accounts — that total income add up to total expenditure, and that both be equal to the total value added produced by businesses: $C + I + G + NX = Y$, where C is consumption spending, I is investment spending, G is government purchases, NX is net exports, and Y is total national income.

national product The total value of all final goods and services produced in an economy. Leaving aside differences in accounting definitions, national product is equal to national income (for the only way products can be produced is by paying people to make them) and is equal to total expenditure, or aggregate demand (for every product is ultimately purchased).

national product per worker A synonym for labor productivity. It is probably the best measure of an economy's development. Other measures — national product per adult or per capita — fail to take account of the changing mix of market and household production, or imply that adults who spend their money on raising children are impoverished compared to adults who buy videos.

national saving The sum of household saving and government saving — or, since the government is usually not saving but running a deficit, household saving minus the government deficit. Domestic investment is equal to national saving plus net investment in this country by foreigners.

national saving identity A consequence of the national income identity: that household saving ($Y - T - C$) plus the government's budget surplus ($T - G$) plus the net inflow of capital — NX is equal to investment: $(Y - T - C) + (T - G) - NX = I$, where Y is total national income, T is net taxes, C is consumption

spending, G is government purchases, NX is net exports, and I is investment spending.

natural rate of unemployment A synonym for NAIRU: the rate of unemployment where actual and expected inflation are equal, and there is no downward or upward pressure on inflation. Milton Friedman coined the phrase "natural rate"; those who did not like the hint in the word "natural" that such unemployment was a good thing preferred the colorless acronym NAIRU.

net domestic product Another measure of total production, obtained by subtracting capital depreciation from GDP.

net exports The difference between exports and imports. Net exports have to be added to the sum of consumption, investment, and government purchases in order to arrive at aggregate demand, because exports are an addition to and imports a subtraction from aggregate demand for domestically produced goods and services.

net investment The difference between gross investment and depreciation. Net investment is the increase in the economy's capital stock — the stock of buildings, infrastructure, machines, and inventories that amplify worker productivity.

net national product Abbreviated NNP. Yet another measure of the economy's total output. Net national product subtracts depreciation from gross domestic product, and also subtracts payments that foreigners receive for the use of foreign-owned productive resources located in this country. Net national product is from a conceptual point of view the best estimate of national product.

net taxes The difference between taxes collected by the government and transfer payments received by households and businesses. Net taxes are the impact of the government's fiscal policy on the disposable income of the private sector. A fall in net taxes raises disposable income, and thus consumption spending. Net taxes are the variable T in the models of this book.

New Deal President Franklin D. Roosevelt's programs during 1933 to 1941 to attempt to pull the economy out of the Great Depression. Of mixed success.

New York Federal Reserve Bank The most important of the 12 banks that are the regional branches of the Federal Reserve. The bank that carries out the open-market operations that the Federal Reserve uses to change interest rates.

NIPA See national income and product accounts.

NNP See net national product.

nominal A quantity that is not adjusted for inflation, or for changes in the price level.

nominal exchange rate The exchange rate not adjusted for the changes in countries' relative price levels over time. The rate at which one country's money can be turned into another's; the cost of a unit of foreign currency in terms of the home currency.

nominal GDP Real GDP times the price level as measured by the GDP deflator. Nominal GDP is the total current-dollar value of final goods and services produced.

nominal interest rate The interest rate measured in terms of money: how many dollars you have to pay in the future in exchange for one dollar borrowed today. The nominal interest rate is equal to the real interest rate plus the expected inflation rate.

nominal wage The average level of money wages paid in an economy; the money cost to an employer of an average worker.

nondurable manufacturing Manufacturing that produces relatively short-lived products. Demand for nondurable manufactures is fairly steady — since they wear out, there is always a stable source of replacement demand.

“normal” baseline real rate of interest The real interest rate that the central bank would set if the inflation rate were equal to the central bank’s target inflation rate.

O

OECD See Organisation for Economic Co-operation and Development.

official settlements account International transactions that are neither current account transactions (payments for imports or exports) nor capital account transactions (payments for investments in other countries) but the purchase or sale of foreign currency assets by governments, or central banks.

Okun’s law A fall in the unemployment rate of 1 percentage point is associated with a 2.5 percent rise in national product relative to potential output. This association is called Okun’s law: Periods of high (or low) unemployment relative to the natural rate are the same as periods of low (or high) national product relative to potential output.

100 percent reserve banking A banking system — never seen in the real world, but sometimes used in economics textbooks as a baseline case — in which banks accept deposits but cannot make loans. When they accept deposits they must either (a) hold them in cash in their vaults or (b) redeposit the money in their own accounts at the central bank.

open economy An economy without substantial tariffs on imports or restrictions on international investments.

Alternatively, an economy where imports, exports, and international capital flows are relatively large shares of national product and are important determinants of fluctuations in employment and output.

open-market operation The principal way that central banks affect interest rates; the purchase (or sale) of short-term government bonds to increase (or decrease) the money supply, and push interest rates down (or up). Open-market operations are not the only tool that central banks have to affect money supplies and interest rates, but they are by far the most often used.

opportunity cost The next best opportunity forgone in order to do something else. One of the key concepts in all of economics.

Organisation for Economic Co-operation and Development (OECD) Originally a club of all countries that received Marshall Plan aid from the United States, plus the United States and Canada. Now a club of the industrialized countries that is used to collect data and try to coordinate economic policy.

output gap The difference between the actual and potential levels of output, $Y - Y^*$. Okun’s law reminds us that it is changes in the output gap — not just in output — that bring about changes in the unemployment rate.

output per worker The average amount of output produced in a year per worker, Y/L . Equal to the average labor productivity. Used as a proxy for the material standard of living.

P

participation rate The fraction of adults who are in the labor force. The participation rate is procyclical, because discouraged workers drop out of the labor force when unemployment is relatively high. The participation rate has grown steadily over time, as gender roles have changed and the boundary between market and household work has shifted.

patent laws and copyrights Laws designed to encourage invention and innovation by providing the right to exclude anyone else from using a discovery (patent) or intellectual property (copyright) for a period of years.

permanent income The level of income that households regard as likely to persist in the future. Their income minus any transitory windfalls that they do not expect to receive again in the future.

Phillips curve The downward-sloping relationship between unemployment and inflation. The old-fashioned (incorrect) flavor implied unemployment could be permanently reduced at the price of a small (permanent) rise in inflation. The location of the more satisfactory “accelerationist” Phillips curve depends on expectations of inflation: the higher expected inflation, the higher the unemployment rate needed to keep inflation at any particular level.

planned-expenditure function The relationship $PE = C + I + G + NX$ used to build aggregate demand for domestically produced products from the determinants of each of its components: consumption spending C , investment spending I , government purchases G , and net exports NX .

planned total expenditure line Found on the income-expenditure (or Keynesian cross) diagram that shows aggregate demand on the vertical and national income on the horizontal axis. An important part of the sticky-price short-run business-cycle model. The planned expenditure

line shows total spending — aggregate demand — as a function of the level of national income. The slope of the planned expenditure line is the MPE — the marginal propensity to expend income on domestic goods. The intercept of the planned expenditure line is the level of autonomous spending.

policy-induced recessions Recessions started not by swings in consumer or investor confidence, but by contractionary monetary policy.

policy mix The combination of monetary and fiscal policies being followed by a country's government and central bank.

political business cycle Movements in unemployment and inflation resulting from discretionary policy timed to enhance the political fortunes of an incumbent president.

potential growth rate The growth rate of potential output. The growth rate at which the economy's unemployment rate is neither rising nor falling.

potential output The level at which national product would be if expectations were correct, and if unemployment were equal to its natural rate. Potential output grows smoothly over time as technology advances, as net investment augments the capital stock, and as the labor force grows.

present value How much money you would have to put aside and invest today (at prevailing interest rates) in order to match a specified sum or pattern of cash flows in the future. Thus the value in today's dollars (calculated using prevailing interest rates) of a sum or sums of money to be received in the future.

price inertia Inflation can be slow to accelerate and also slow to decline because many decisions on changes in prices and wages are made with a long advance lead.

price level The average level of nominal prices in the economy. Changes in the price level are inflation (or deflation). The concept of the price level is meant to abstract from shifts in relative prices like a rise in the relative price of oil or a fall in the relative price of computers, and to capture changes in the value of the unit of account in which goods are priced, workers are paid, and contracts are written.

price stability The goal of central banks. An inflation rate so low that no one worries about it.

price stickiness A condition that exists when wages and prices do not move smoothly and immediately to keep supply equal to demand in the labor and goods markets.

procyclical Varying with the business cycle. A procyclical variable tends to be high when national product is high relative to potential output. Investment, especially investment in inventories, is procyclical; employment is procyclical; and inflation is procyclical. Unemployment is countercyclical.

producers' durable equipment One of the major components of business investment. The machines that

embody the technologies of the industrial revolution bought by businesses: computers, fax machines, large turbine generators, metal presses, and other capital goods that are not structures and not part of inventories.

production function The relation between the total amount of national product produced and the quantities of labor and capital (and the level of technology) used to produce it. The production function tells us how the productive resources of the economy — the labor force, the capital stock, and the level of technology that determines the efficiency of labor — can be used to produce and determine the level of output in the economy. In the Cobb-Douglas form of the production function, $Y^* = (K)^{\alpha}(L \cdot E)^{1-\alpha}$, potential output Y^* is determined by the size of the labor force L , the economy's capital stock K , the efficiency of labor E , and a parameter α that tells us how fast returns to investment diminish.

productivity Usually a synonym for labor productivity: total national product divided by the number of workers, or by the number of hours worked. Sometimes used for total factor productivity: the amount of national product divided by the number of weighted units of labor and capital used in production.

productivity growth The rate at which the economy's full-employment productivity expands from year to year as technology advances, as human capital increases, and as investment increases the economy's physical capital stock.

productivity growth slowdown Around 1973, the rate of productivity growth in the United States and other economies suddenly slowed. The causes of this slowdown still remain somewhat a mystery. The most likely explanation is bad luck: a number of small negative factors all affecting the economy at once, each with its own separate causes. The productivity slowdown era appears to have come to an end in the mid-1990s.

profits Income earned by entrepreneurs and equity investors. What is left over from the receipts of an enterprise after it has paid for (a) intermediate goods and materials, (b) wages, salaries, and fringe benefits, (c) rent, and (d) interest.

purchasing power parity Valuing production in different countries as if the relative exchange rate gave you equal purchasing power in each country; sometimes also used for the theory that exchange rates ought to fluctuate around the values that correspond to purchasing power parity.

Q

quantity theory of money The core belief of monetarism — strongly pushed by Milton Friedman in the 1960s and 1970s — that money demand is insensitive to changes in interest rates and that the velocity of money is nearly

constant. If true, then successful stabilization policy would require little more than stabilizing the rate of growth of the money stock.

R

- rational expectations** Expectations about the future formed by using all information about the structure of the economy and the likely course of government policy. When people in an economy have rational expectations, it is extremely difficult for shifts in economic policy to cause anything other than shifts in the rate of inflation or the price level. Contrasted with static expectations and adaptive expectations.
- real** Adjusted for inflation; either divided by the price level, or with the inflation rate subtracted from it.
- real appreciation** A fall in the value of the nominal exchange rate (the price of foreign currency) under a floating-rate system that is greater than the ongoing difference in inflation rates between the home country and other countries. An increase in the relative price of domestic-made goods in terms of foreign-made goods.
- real balances** The purchasing power of the money — wealth in the form of readily spendable purchasing power — that consumers and firms actually hold at a given moment. Equal to nominal money balances divided by the price level, and thus adjusted for inflation.
- real business cycle** A boom generated when rapid technological innovation opens up new industries and new possibilities for investment. At such moments the stock market will be high, the returns to investment large, and so investment spending will be high as well. An adverse supply shock — like the sudden and extreme rises in oil prices in the 1970s — can generate a real-business-cycle recession as well.
- real depreciation** A rise in the value of the nominal exchange rate (the price of foreign currency) under a floating-rate system that is greater than the ongoing difference in inflation rates between the home country and other countries. A reduction in the relative price of domestic-made goods in terms of foreign-made goods.
- real devaluation** An increase in the value of the nominal exchange rate (the price of foreign currency) under a fixed-rate system that is greater than the ongoing difference in inflation rates between the home country and other countries.
- real exchange rate** The nominal exchange rate adjusted for changes in relative price levels. The price of foreign-made goods measured relative to the price of domestic-made goods.
- real GDP** Inflation-adjusted gross domestic product; the most commonly used measure of national product, output, and income. The total income earned through domestically

located production. Equal as well to total expenditure on domestically produced goods and services. Real GDP can be calculated by dividing nominal (or money) GDP by the price level.

real interest rate The nominal interest rate minus the expected inflation rate. The real interest rate measures the cost in terms of goods to borrow purchasing power. It answers the question: “How much more power to purchase goods and services in the future must I offer in order to borrow a fixed amount of power to purchase goods and services today?”

real money balances The total stock of nominal money balances in the economy divided by the price level. Money demand is usually thought of as a demand for real money balances: If the price level doubles while interest rates and (real) national income remain the same, then nominal money demand should double as well in order to keep real money demand constant.

real wage The wage paid to the average worker divided by the price level.

real wage growth The change in the wage paid to the average worker divided by the price level. Found by taking the rate of increase of nominal wages, and subtracting the inflation rate.

recession A fall in the level of GDP for at least six months, or two quarters of the year. The National Bureau of Economic Research announces and dates recessions. They sometimes, but rarely, deviate from this simple definition.

recognition lag It takes time for the Bureau of Labor Statistics and the Bureau of Economic Analysis to compile and analyze data about the economy. The recognition lag is the lag between when a process begins and when those making economic policy recognize that it is going on. Recognition lags are on the order of three to six months.

representative agent A simplification often made in macroeconomics that assumes all participants in the economy are the same (i.e., that the differences between businesses and workers do not matter much for the issues under study). Macroeconomists will analyze a situation by examining the decision making of a single representative agent and then generalize to the economy as a whole from what would be his or her decisions.

reserve requirements The amount of money that the central bank requires other banks to maintain either as cash in their vaults or at the central bank for each dollar of deposits that they hold. Reserve requirements are one of the principal determinants of the money multiplier. Their adjustment is a rarely used tool of central banks.

reserves-to-deposits ratio The ratio of bank reserves to bank deposits; partly the result of mandated government regulations, and partly the result of banks' desire to avoid getting caught short and of fear that those they lend to will not pay the money back. One of the two

determinants (along with the currency-to-deposits ratio) of the money multiplier.

residential investment New construction of residences, both single-family homes and apartment buildings. An important component of total investment, and the principal nonbusiness component of investment. Fluctuations in residential investment are an important source of the business cycle.

resource scarcity Shortage in natural resources, such as land and water, relative to population.

revaluation When a central bank raises the value of its currency (lowers the nominal price of foreign currency) under a fixed exchange rate system.

Ricardian equivalence The hypothesis that households will cut consumption whenever they see a government deficit, anticipating higher future taxes that will be raised to pay off that deficit. Named for the nineteenth-century economist David Ricardo, but should be named after its principal advocate, the late-twentieth-century economist Robert Barro.

risk averse When individuals and institutions are unwilling to invest in ventures with a reasonable expected return, but also with a substantial probability of disaster.

risk premium The higher interest rate that lenders charge some of their borrowers because they fear that the borrower may not repay their money. Risk premiums are measured relative to the interest rates that the U.S. government can borrow using Treasury bills.

risky interest rate The interest rate on assets where there is some chance the debtor will default.

rules Monetarists believe that central banks should operate by setting fixed rules for how fast they will allow the money supply to grow. Only by setting policy according to fixed rules, they argue, can the central bank minimize uncertainty and let the private sector do its job.

rules versus authorities The debate, started by the early Chicago School economist Henry Simons, over whether macroeconomic policy should be conducted “automatically,” according to rules that would be followed no matter what, or determined by authorities with the discretion to respond to specific circumstances as they saw fit.

S

sacrifice ratio The number of percentage points of unemployment in excess of the natural rate times the number of years such excess unemployment must be endured to reduce annual inflation permanently by 1 percentage point.

safe interest rate The interest rate on assets where there is no significant probability of default.

Samuelson, Paul Nobel Prize-winning MIT economist. The person whose late-1940s economics textbook set the mold for the economics textbooks that you use.

saving rate The share of total GDP that an economy saves.

Usually calculated as the sum of household, government, and foreign saving divided by total output.

savings-and-loan crisis In the United States in the late

1980s, perhaps \$200 billion worth of deposits in savings and loan associations were lost in a run of bad and risky investments, mostly in real estate and in high-yield “junk” bonds.

seasonal adjustment Over a year, employment and production undergo seasonal fluctuations about as large as in a typical business cycle. They build up in the fall in preparation for the Christmas rush. They fall in the summer as vacations are taken. Seasonal adjustment removes these seasonal variations from economic data to give a better idea of the longer-term evolution of the economy.

seigniorage The tax implicitly levied on an economy's private sector by the government's exercise of its power to print more money.

services Commodities that are not (or are only incidentally) physical objects but are instead useful processes or pieces of information. Services are contrasted with goods — commodities that are principally useful physical objects.

shareholders Those who own the common stock issued by a company, and so are entitled to vote for its directors and other officers at the company's annual meeting, and to receive dividends (if any).

short-term interest rate The interest rate paid to borrow money for the short term, three to six months.

short-term nominal interest rate The interest rate paid to borrow money for the short term, three to six months. A nominal interest rate is not adjusted for inflation. The short-term nominal interest rate is important because it is the interest rate that has the greatest impact on money demand.

spending multiplier The changes in national income and total expenditure that follow from a one-dollar change in any component of autonomous spending.

stabilization policy Policy aimed at avoiding recessions and undue inflation by keeping total aggregate demand growing smoothly and unemployment near its NAIRU. Stabilization policy is countercyclical policy.

stagflation The coexistence of recession and rising inflation, or of recession and relatively high inflation. Politicians on whose watch economies suffer from stagflation usually lose their jobs at the next election.

static expectations Barely deserve the name of “expectations” at all — visions of the future that do not change at all in response to changes in the current economic situation. Contrasted with adaptive expectations and rational expectations.

statistical discrepancy A fudge factor added to reconcile two measurements of the same quantity that should be equal by definition, but that are not equal as measured.

The national income and product accounts are full of statistical discrepancies. The statistical discrepancy in the international trade sector is often the largest.

sticky prices When wages and prices do not move smoothly and immediately to keep supply equal to demand in the labor and goods markets. With sticky prices, inventory adjustment is the principal determinant of short-run equilibrium.

stock A tradable financial instrument that is a share of ownership of a corporation.

stock market The market on which the shares of common stock that carry ownership of companies are bought and sold. A company's bondholders have a right to be paid their interest and principal out of a company's operating profits. A company's stockholders have the right to elect the company's board of directors and to decide what to do with the rest of its profits. A relatively high stock market indicates optimism about future profits and is likely to be accompanied by a high level of investment.

stock variable An economic quantity or variable that is measured not as a flow over some period of time but as a stock that exists at a single moment in time. For example, the capital stock and the money supply are "stock variables." GDP, consumption, and the government deficit are "flow variables." The capital stock and the money supply can be measured in dollars. But when you speak of GDP, consumption, or the government deficit, you must always be measuring — implicitly or explicitly — in dollars per year.

structural deficit A synonym for cyclically adjusted or high-employment government budget deficit. The government runs a structural deficit when its budget deficit exists not because real GDP is less than potential output, but because taxes are too low or spending too high to balance the budget even when real GDP equals potential output and unemployment is at its natural rate.

structural unemployment Unemployment that is not "cyclical" and not "frictional." Cyclical unemployment goes away when output expands and real GDP reaches the level of potential output. Frictional unemployment serves as the economy's inventory of workers and is part of the normal process of workers changing jobs and finding good matches. Structural unemployment is the result of (a) a real wage level stuck too high for supply to balance demand in the labor market, (b) poor labor-market tax and regulatory policies that drive a large wedge between the earnings that workers receive and the costs firms must pay to employ them, (c) other policies that make it difficult for workers to move to where the jobs are and for jobs to move to where the workers are, or (d) a gross mismatch between the educational and skill levels of the labor force and the levels that employers require. Structural unemployment has been high

in western Europe for two decades, was high in the United States during the Great Depression, and is frequently high in the developing world.

structures Buildings, docks, bridges, and every other component of investment that is neither a piece of machinery and equipment nor a component of inventories. One way of looking at investment is to divide it into spending on machinery and equipment, changes in inventories, and spending on construction and remodeling of structures — residential, business, and government structures.

supply shocks Changes — usually large, sudden changes — in the productivity of the economy. Supply shocks can take the form of a large, sudden change in the price of a key raw material, as happened in the oil shocks of the 1970s. The sudden rise in the price of oil gave businesses a powerful incentive to use less oil and energy and more labor and capital in production; thus the economy's output per worker and its potential output dropped. The sudden rise in the price of oil also set in motion compensating price rises in other sectors, and led to higher inflation. The supply shocks of the 1970s were a major contributing factor to the stagflation of that decade. Rapid changes in technology can be seen as supply shocks as well.

surplus A shortened form of "government surplus." The amount by which the government's taxes exceed its spending.

T

taxes Payments by citizens and other residents to the government. Transfer payments are subtracted from gross taxes to calculate net taxes, or taxes less transfer payments. Net taxes are the measure of how much purchasing power is removed from the private sector by the government's fiscal policies.

taxes less transfers A synonym for "net taxes." The difference between total gross taxes collected by and transfer payments issued by the government. Taxes less transfers is a measure of how much purchasing power the government's fiscal policies remove from private households. Taxes less transfers is the variable \bar{T} in the models of this book and is here equal to tY , the tax rate t times national income Y .

Taylor rule A description of how the real interest rate that the central bank sets depends on the gap between the current inflation rate and the central bank's target inflation rate.

technological progress Invention and innovation in the broadest sense — including innovations in organization and control — that boost economic productivity over time.

technology transfer The rapid advance in total factor productivity possible in developing countries as they adopt

the more productive technologies already well known in the world economy's industrial core. Since most of the difference between productivity levels across countries is due to differences in total factor productivity and the efficiency of labor, successful technology transfer is at the heart of successful economic development.

term structure The relationship between the lifetime — the maturity — of bonds and the interest rates buyers receive from holding bonds until their maturity. "Term structure" is a synonym for "yield curve." The term structure of interest rates usually has an upward slope: The interest rate on long-term bonds is higher than the interest rate on short-term bonds. When the interest rate on short-term bonds is higher, economists say that the term structure is inverted, and an inverted term structure is one sign of a possible future recession.

time inconsistency In macroeconomics, the temptation for central banks to make total nominal spending a little higher than people had expected, for once expectations have been formed, contracts made, and wages and prices set, there appear to be only benefits and no costs to a little more total nominal spending. With total nominal spending a little higher than had been expected, output and employment boom. And since wages and prices have already been set, there is little corresponding increase in inflation. Of course, if a central bank establishes a pattern of always making total spending a little higher than anticipated, people will come to expect such action, and the result will be high and destructive inflation. In the long run the central bank wants to gain and keep a reputation for keeping inflation low. Thus what the central bank would like to do in the short run (boost the economy a bit) is inconsistent with what it needs to do in the long run (maintain its credibility as an inflation fighter).

total factor productivity Total factor productivity is not labor productivity — not real GDP Y divided by the labor force L . Total factor productivity is not capital productivity — not real GDP Y divided by the capital stock K . Instead, total factor productivity is real GDP Y divided by a geometric weighted average of the factors of production, where each factor's weight is the share of national income that is paid to it. Total factor productivity is very closely related to the efficiency of labor E : In the Solow growth model of Chapter 4, total factor productivity is equal to $E^{1-\alpha}$. Total factor productivity is the best measure of the technological level and the overall efficiency of an economy.

total saving Household saving (by businesses and households) plus government saving (the government's surplus, and government saving is negative when the government runs a deficit) plus the capital inflow (the net amount of money that foreigners are committing to buying up property and assets in the home country, equal to minus net exports). Total saving is equal to total

investment. Total saving is distinguished from national saving, which is equal to household saving plus the government surplus (leaving out the capital inflow); and total saving is distinguished from household saving, which is just the saving directly undertaken by households plus the business saving undertaken by firms on behalf of the households that are their owners.

trade balance A synonym for net exports, equal to gross exports minus imports.

trade deficit When gross exports are less than imports, and thus when net exports are negative. A country runs a trade deficit when international demand for goods and services it produces is less than home demand for goods and services produced abroad. A trade deficit is a subtraction from aggregate demand for domestically made products. A trade deficit is also necessarily associated with an equal capital inflow: net investment by foreigners in the home country.

trade surplus When gross exports are greater than imports, and thus when net exports are positive. A country runs a trade surplus when international demand for goods and services it produces is greater than home demand for goods and services produced abroad. A trade surplus is a boost to aggregate demand for domestically made products. A trade surplus is also necessarily associated with an equal capital outflow: net investment by home-country citizens in foreign countries.

transfer payments Spending by the government that is not a purchase of goods or services but instead simply a transfer of income from taxpayers to program recipients. Payments to contractors who have built highways or to bureaucrats who have sold their labor time to the government are not transfer payments. Payments to food stamp recipients, Social Security recipients, or unemployment insurance recipients are transfer payments. Transfer payments are included in the NIPA not as government purchases but under the "taxes" category. Transfer payments are subtracted from gross taxes to arrive at net taxes.

transitory income The difference between a household's current income and its permanent income. A household's transitory income is any portion of its current income that is seen as a windfall, and is not expected to continue in the future. Households tend to spend most of changes in their permanent income and to save most of changes in their transitory income. The marginal propensity to consume out of transitory income is much lower than the marginal propensity to consume out of permanent income.

Treasury bill A short-term bond issued by the United States Treasury. A U.S. government bond with a maturity — a period between the date at which the bond is issued and the date at which its principal comes due — of a year or less. A Treasury bill is a discount bond. It has no explicit payment of interest associated

with it, and it pays a positive interest rate to investors solely because it is initially sold at a discount to — for less than — its principal value. Federal Reserve monetary policy is carried out almost exclusively by open-market operations in Treasury bills.

treasury bond A long-term bond issued by the United States Treasury. A U.S. government bond with a maturity — a period between the date at which the bond is issued and the date at which its principal comes due — often years or more. A Treasury bond is a coupon bond: Not only does the government pay the holder the bond's principal at its maturity, but it pays the holder periodic "coupon" interest payments throughout the bond's lifetime.

treasury note A medium-term bond issued by the United States Treasury. A U.S. government bond with a maturity — a period between the date at which the bond is issued and the date at which its principal comes due — between one and ten years. A Treasury note is a coupon bond: Not only does the government pay the holder the note's principal at its maturity, but it pays the holder periodic "coupon" interest payments throughout the note's lifetime.

in deficits During the 1980s the U.S. government budget deficits and trade deficits mirrored each other: When one rose, the other rose; when one fell, the other fell; they were "twins." The argument was made that the first was driving the second — that high U.S. trade deficits were the result of large government budget deficits — and that the cure for the trade deficit was for the government to get its fiscal house in order and balance its budget, and not to impose tariffs and import restrictions on goods coming into the United States. In the 1990s the U.S. government budget and trade deficits were no longer twins: By the end of the decade the U.S. government was running a surplus, and the trade deficit was larger than it had ever been before. Why? Because the "twin deficits" doctrine was too simplistic: It would have been more accurate to say that a large trade deficit is the result of a large net capital inflow into the United States, and while a government budget deficit that raises domestic interest rates is one factor that can cause such a capital inflow, there are others as well. In the 1990s the inflow of capital into the United States was driven by investor optimism and high rates of investment in America.

U

employment rate The share of the labor force who are looking for but have not found an acceptable job. The labor force is calculated by adding (a) the number of people who told the Current Population Survey interviewers that they were at work and (b) the number of people who told the CPS interviewers they were looking for

work but had no job. The number of unemployed is calculated as the number of people who told the CPS interviewers they were looking for work but had no job. The unemployment rate is the number of unemployed divided by the labor force. The conventionally measured unemployment rate is usually seen as an underestimate of the amount of unemployment in the economy. The unemployment rate fails to take account of discouraged workers — those who want to work but are not looking for a job now because they don't think they can find one. It also makes no allowance for those who are working part-time for economic reasons — people who want a full-time job, but have found only a part-time one.

unionization rate The share of an economy's workforce that belongs to a labor union. In the United States the unionization rate has been falling slowly but steadily since World War II, so that private-sector unionization rates are now about one-third what they are in western Europe.

unit of account One of the three functions that economists traditionally ascribe to money: Money is a medium of exchange, a store of value, and a unit of account. To say that a form of money — the U.S. dollar, say — is a unit of account is to say that a great many contracts are written promising to exchange such-and-such a good or service for such-and-such a number of dollars. The fact that a form of money is a unit of account means that changes in that form of money's value — inflation or deflation — can have powerful effects on the distribution of income and the level of production. Falling prices — deflation — increase the real wealth of creditors: The amount of money they are owed buys more real goods and services when the price level is lower. Rising prices — inflation — increase the real wealth of debtors: The quantity of real goods they must sell to raise the money to pay off their debt is lower when the price level is higher. As John Maynard Keynes wrote in 1923, "The fact of falling prices injures entrepreneurs; consequently, the fear of falling prices causes [them to] . . . curtail . . . their operations" and leads to reduced production and high unemployment.

V

value added The difference between the material costs a business incurs in production by buying raw materials and intermediate goods and the revenue it earns when it sells its products. Value added is equal to the sum of (a) employee compensation (wages, salaries, and benefits), (b) capital costs (depreciation and interest), and (c) profits.

variable lags Part of a phrase from economist Milton Friedman: "Monetary policy works with long and variable lags." It reflects the idea that shifts in government policy will have powerful effects on aggregate demand, but that the time needed for such policy shifts to have their effects is not fixed but varies from time to time,

country to country, and case to case. Because changes in economic policy work with long and variable lags, caution in changing economic policies helps avoid doing more harm than good.

velocity of money The rate at which the economy's money stock "turns over" in an economy, equal to nominal expenditure or income divided by the money stock. If an economy has \$1 trillion of monetary assets and annual nominal national income of \$10 trillion, economists say that money has an income velocity of $(\$10 \text{ trillion}) / (\$1 \text{ trillion}) = 10$. The velocity of money is a measure of how often the average monetary asset is used as a means of payment, and thus changes hands, over the course of a year. The higher the interest rate, the greater the velocity of money. A higher interest rate gives businesses and households an incentive to economize on their use of money — that proportion of their wealth they hold in liquid and readily spendable but low interest-earning form.

Volcker, Paul Chair of the Federal Reserve Board from 1979 to 1987. His tenure saw the highest unemployment rates in post-World War II U.S. history and the reduction of inflation from near 10 percent per year to less than 4 percent per year.

voter myopia The theory that voters react to the immediate economic situation, rather than to what has happened in the further past or what is likely to happen in the future.

W

wage indexation When unions or workers negotiate with managers for wage levels that rise automatically when the price level rises. If (say) a steelworkers' contract provides them with an extra 1 percent increase in wages for each 1 percent rise in the CPI, economists say that their wages are indexed to the CPI. The more prevalent wage indexation is in an economy, the steeper its

Phillips curve and the larger the change in inflation produced by any shift in the unemployment rate. When wage indexation is prevalent, changes in prices will immediately and automatically trigger corresponding changes in wages.

Y

yield curve The relationship between the interest rate you earn for lending or are charged for borrowing money and the length of time of the loan contract. "Yield curve" is a synonym for "term structure." A yield curve diagram is drawn with the interest rate for a given risk category of bonds on the vertical axis, and the bonds' maturity — the time until the borrower repays the principal — on the horizontal axis. The yield curve usually slopes upward: You pay a higher interest rate to borrow and earn a higher interest rate to lend for a longer term because longer-term investments bear higher risk. Whenever the yield curve slopes downward — whenever short-term interest rates are higher than long-term rates — economists say that the yield curve is inverted. An inverted yield curve is a sign of a possible future recession.

yield to maturity The interest rate you will earn over the life span of a bond if you buy it today and hold it until it reaches its maturity and the issuer pays you back the bond's principal. Note that if the bond's current price is different from its face (or principal) value, the yield to maturity will be different from the coupon interest rate. Consider a five-year bond with a principal value of \$100 that pays annual coupon interest of 5 percent, or \$5 a year. If you paid \$100 for this bond, its yield to maturity would be the coupon interest rate of 5 percent per year. But if you buy the bond for \$85, its yield to maturity is 8.84 percent. Remember: The lower the price of a bond, the higher the interest rate it pays.

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U.S. Macroeconomic Data

Year	Real GDP (billions of chained 2000 dollars)	Real GDP per Worker (chained 2000 dollars)	Inflation (based on GDP deflator, percent per year)	Unemploy- ment (percent)	Long-Term Real Interest Rate (BAA bonds - actual inflation rate)	Real Exchange Rate (dollar value of foreign currency; 1982 = 100)	Real Stock Market Value (S&P composite; 2000 index value)	Consumption (billions of chained 2000 dollars)
1959	2,441.3	35,708	1.2	5.5	3.85		276.48	1,554.6
1960	2,501.8	35,931	1.4	5.5	3.79		265.40	1,597.4
1961	2,560.0	36,333	1.1	6.7	3.98		311.40	1,630.3
1962	2,715.2	38,451	1.4	5.5	3.62		289.17	1,711.1
1963	2,834.0	39,453	1.1	5.7	3.76		320.49	1,781.6
1964	2,998.6	41,026	1.5	5.2	3.33		367.62	1,888.4
1965	3,191.1	42,859	1.8	4.5	3.07		391.21	2,007.7
1966	3,399.1	44,861	2.8	3.8	2.87		367.82	2,121.8
1967	3,484.6	45,052	3.1	3.8	3.13		384.69	2,185.0
1968	3,652.7	46,391	4.3	3.6	2.64		396.13	2,310.5
1969	3,765.4	46,640	5.0	3.5	2.81		374.11	2,396.4
1970	3,771.9	45,570	5.3	4.9	3.81		302.20	2,451.9
1971	3,898.6	46,202	5.0	5.9	3.56		339.92	2,545.5
1972	4,105.0	47,165	4.3	5.6	3.86	102	361.94	2,701.3
1973	4,341.5	48,547	5.6	4.9	2.64	113	337.26	2,833.8
1974	4,319.6	46,978	9.0	5.6	0.50	116	238.62	2,812.3
1975	4,311.2	45,974	9.5	8.5	1.11	122	226.70	2,876.9
1976	4,540.9	47,223	5.8	7.7	3.95	124	253.74	3,035.5
1977	4,750.5	47,980	6.4	7.1	2.57	120	229.66	3,164.1
1978	5,015.0	49,046	7.0	6.1	2.49	133	209.82	3,303.1
1979	5,173.4	49,288	8.3	5.8	2.39	134	207.88	3,383.4
1980	5,161.7	48,267	9.1	7.1	4.57	131	219.71	3,374.1
1981	5,291.7	48,695	9.4	7.6	6.64	111	216.56	3,422.2
1982	5,189.3	47,088	6.1	9.7	10.01	100	190.81	3,470.3
1983	5,423.8	48,622	3.9	9.6	9.65	95	245.97	3,668.6
1984	5,813.6	51,201	3.8	7.5	10.39	89	237.14	3,863.3
1985	6,053.7	52,431	3.0	7.2	9.72	86	267.97	4,064.0
1986	6,263.6	53,156	2.2	7.0	8.19	98	331.62	4,228.9
1987	6,475.1	54,020	2.7	6.2	7.88	107	391.82	4,369.8
1988	6,742.7	55,418	3.4	5.5	7.43	115	351.08	4,546.9
1989	6,981.4	56,361	3.8	5.3	6.38	113	410.90	4,675.0
1990	7,112.5	56,520	3.9	5.6	6.46	115	409.97	4,770.3
1991	7,100.5	56,199	3.5	6.8	6.30	116	445.41	4,778.4
1992	7,336.6	57,270	2.3	7.5	6.68	119	481.17	4,934.8
1993	7,532.7	58,303	2.3	6.9	5.63	117	510.70	5,099.8
1994	7,835.5	59,787	2.1	6.1	6.52	117	510.08	5,290.7
1995	8,031.7	60,706	2.0	5.6	6.20	121	588.09	5,433.5
1996	8,328.9	62,182	1.9	5.4	6.15	118	714.37	5,619.4
1997	8,703.5	63,857	1.7	4.9	6.16	112	915.40	5,831.8
1998	9,066.9	65,858	1.1	4.5	6.12	103	1125.16	6,125.8
1999	9,470.3	67,952	1.4	4.2	6.47	104	1356.25	6,438.6
2000	9,817.0	68,851	2.2	4.0	6.16	100	1427.22	6,739.4
2001	9,890.7	68,813	2.4	4.7	5.55	94	1166.17	6,910.4
2002	10,074.8	69,547	1.7	5.8	6.10	94	954.82	7,123.4
2003	10,381.3	70,857	1.8	6.0	4.97	100	910.57	7,355.6
2004	10,837.2	73,522	2.1	5.5	4.29	105	1044.18	7,634.7
2005*	11,216.5	74,977	2.5	5.3	4.39	110	1036.53	7,863.7

Notation	Introduced in chapter	Definition
α (alpha)	4	parameter of Cobb-Douglas production function
β (beta)	12	$-\beta$ is the slope of the Phillips curve
δ (delta)	4	depreciation rate of physical capital K
ε (epsilon)	2	real exchange rate
ε^* (epsilon)	15	the government's target real exchange rate
ε_0 (epsilon)	6	baseline level of the real exchange rate
ε_r (epsilon)	6	responsiveness of the real exchange rate to changes in the real interest rate
ε_R (epsilon)	15	responsiveness of the real exchange rate to changes in foreign exchange reserves
μ (mu)	13	money multiplier
π (pi)	7	inflation rate; rate of change of price level P
π^e (pi)	7	expected future inflation rate
π^t (pi)	12	the central bank's target inflation rate
σ^s (sigma)	2	risk premium
ϕ (phi)	12	slope of the monetary policy reaction function
A	9	total autonomous spending; spending not affected by income; $A = C_0 + I + G + GX$
A_0	10	baseline autonomous spending; spending not affected by income nor interest rates
AD	7	aggregate demand: $AD = C + I + G + GX - IM$
B	13	monetary base
C	4	consumption spending by households
C_0	6	baseline level of consumption
C_y	6	marginal propensity to consume, mpc; $C_y = \Delta C / \Delta Y^D$
d	14	government deficit; if $d < 0$, there is a government surplus
D	14	government debt
e	2	nominal exchange rate; domestic price of 1 unit of foreign currency
E	4	efficiency of labor force
FG	15	flow of gold into the domestic economy
g	4	growth rate of labor efficiency E
G	4	government purchases of goods and services
GX	4	gross exports; goods and services sold to foreigners
i	7	nominal interest rate; $i = r + \pi^e$
I	4	investment spending by businesses
I_0	6	baseline level of investment spending
I_r	6	responsiveness of investment spending to changes in the real interest rate
IM	4	imports; goods and services purchased from foreigners
IM_y	6	responsiveness of import spending to a change in real GDP Y
K	3	real physical capital
K/L	4	capital per worker
K/Y	4	capital-output ratio
L	3	size of labor force

Notation	Introduced in chapter	Definition
m	8	rate of growth of money stock M
M	8	money stock
M^d	8a, 11	nominal money demand
M_i	8a, 11	responsiveness of money demand to a change in the nominal interest rate i
MPE	9	marginal propensity to spend; $MPE = \Delta PE / \Delta Y$
M_y	8a, 11	responsiveness of money demand to a change in real GDP Y
n	3	growth rate of the labor force L
NIA	15	net investment from abroad
NX	4	net exports
P	2	price level in domestic country (United States)
P^f	2	price level in foreign country
PE	9	planned expenditure; $PE = C + I + G + GX - IM$
r	2	real interest rate
r_0	12	the central bank's estimate of the normal real interest rate
r^f	6	foreign real interest rate
r_π	12	slope of the Taylor rule; how aggressively the central bank reacts to inflation
R	15	foreign exchange reserves
s	4	saving rate, S/Y
S	7	total saving; $S = S^H + S^G + S^F$
S^F	4	foreign saving; $S^F = IM - GX$
S^G	4	government saving; $S^G = T - G$
S^H	4	household saving; $S^H = Y^D - C$
ss	12	supply shocks that can directly affect the inflation rate
t	6	average tax rate; $T = tY$
T	4	net taxes; tax revenues less transfer payments
u	12	unemployment rate
u_0	12	unemployment rate when $r = r_0$
u^*	12	natural rate of unemployment
v	7	growth rate of velocity V
V	7	velocity of money
W	6	nominal wage
X_f	6	responsiveness of gross exports to changes in foreign income
X_e	6	responsiveness of gross exports to changes in the real exchange rate
y	7	growth rate of real GDP Y
Y	4	real GDP; real national income
Y/L	3	output per worker; average labor productivity
Y^*	6	potential real GDP
Y^D	6	disposable income; $Y^D = Y - T$
Y^f	6	foreign GDP

Ideal Author Team

Brad DeLong brings both scholarship and policymaking experience to the author team. He is a research associate of the National Bureau of Economic Research and a visiting scholar at the Federal Reserve Bank of San Francisco. He has also been the deputy assistant secretary for economic policy at the Treasury Department. *Martha Olney* brings superb teaching credentials to the project. She is a Distinguished Teaching Award recipient at both the University of California, Berkeley and the University of Massachusetts, Amherst; and she won the Jonathan Hughes Prize for Excellence in Teaching Economic History.

More Accessible Core Material

Five key chapters were extensively revised to make the content and presentation more accessible.

- 4 The Theory of Economic Growth
- 5 The Reality of Economic Growth: History and Prospect
- 7 Equilibrium in the Flexible-Price Model
- 11 The Money Market and the LM Curve **NOW OPTIONAL**
- 12 The Phillips Curve, Expectations, and Monetary Policy

The Amount of Mathematics Toned Down

There are fewer equations in the narrative of this edition; the authors include only the amount of math necessary for explanations and examples. More is done with graphs and intuition.

Modern and Brief

DeLong and Olney have streamlined the presentation of older topics, such as the relative slopes of the IS and LM curves, in order to dedicate more space to topics being researched and discussed today. The book's brevity allows for a better focus on these important concepts.

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Cover image: Piet Mondrian. Composition in Red, Blue and Yellow, 1930.
Oil on canvas, 18 1/8" x 18 1/8" (46 x 46 cm)
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