

Chapter 23

Modern Monetary Policy and the Challenges Facing Central Bankers

Learning Objectives

After reading this chapter, you should be able to:

- LO1** Analyze the monetary policy transmission mechanism.
- LO2** Discuss key challenges facing monetary policymakers.

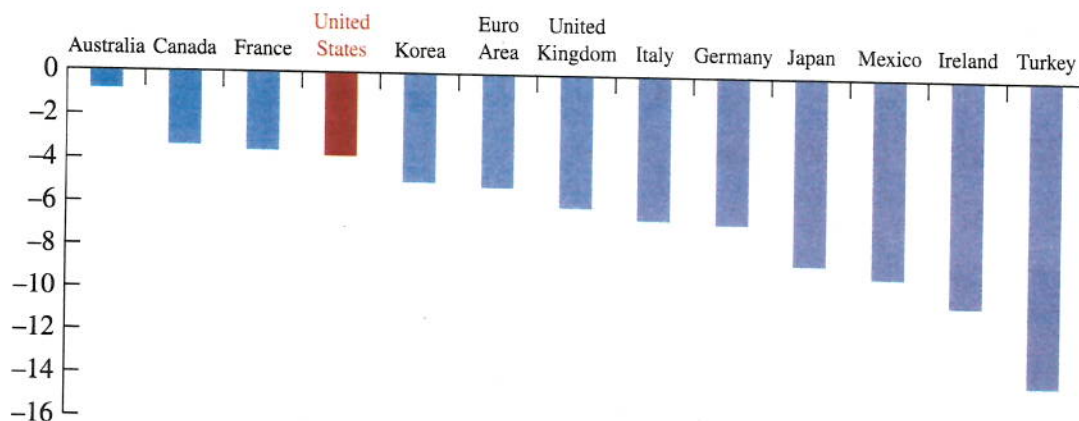
As we saw earlier, the financial crisis of 2007–2009 and the recession it triggered were by far the most widespread and costly since the Great Depression. And, although the financial disruptions began in the United States, they spread to almost all corners of the global economy. Indeed, the peak-to-trough decline of GDP was greater in many countries than in the United States (see Panel A of Figure 23.1). The subsequent crisis in the euro area triggered even larger economic losses in Greece, Ireland, Italy, Portugal, and Spain.

The response of monetary policymakers was likewise unprecedented. Interbank lending rates—the target of central bank policy—plunged in the United States, Japan, and much of Europe (see Panel B of Figure 23.1). And many central banks deployed unconventional monetary policy tools—including forward guidance, quantitative easing, and targeted asset purchases—to compensate for the collapse of intermediation and the fragility of financial markets. Although monetary policies failed to prevent the global crisis, they nevertheless helped to contain it. Around mid-2009, the worldwide plunge in GDP bottomed out, and most economies began growing again. Some, like China's, had regained strength even earlier, partly because of an extraordinary fiscal expansion. Similarly, the threat of an imminent breakup of the euro area receded in the latter half of 2012 following the ECB's extraordinary interventions (see Chapter 16).

Yet, many observers worried that the aftermath of these financial crises would dim the economic outlook for years to come. Some of the concerns stemmed from the deterioration of fiscal conditions—a number of countries racked up record fiscal deficits and surges in government debt in reaction to the crisis. But the damage to the global financial system posed at least as big and pervasive a problem.

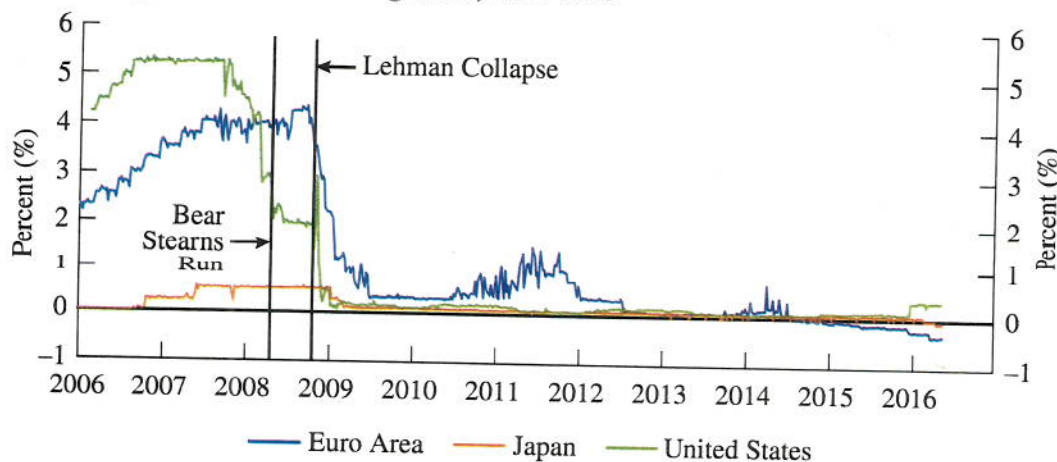
Figure 23.1

Economic Activity and Policy Rates during the Financial Crisis of 2007–2009 and Thereafter

A. Peak-to-Trough Percent Change of Real GDP during the Financial Crisis of 2007–2009

Note: The U.S. peak and trough occurred in fourth quarter 2007 and second quarter 2009, respectively. In the other countries, the dates differed somewhat, but the troughs occurred by third quarter 2009.

SOURCES: OECD and authors' calculations.

B. Overnight Interbank Lending Rates, 2006–2016

SOURCES: Bank of Japan, European Central Bank, and Federal Reserve Board.

Deep, long recessions are frequently followed by unusually sharp and long-lived economic rebounds. But the experience of previous financial crises—especially the Great Depression and the 1990s breakdown in Japan—led policymakers to worry that the rebound from the crisis of 2007–2009 would be weaker than the norm. They expected that anxious banks would make credit expensive and difficult to obtain, that investors would be cautious about buying securitized assets, and that U.S. households

would prefer to save more and borrow less. Policymakers also made clear that a period of increased regulation and prolonged fiscal repair lay ahead, which added to the hesitancy among intermediaries.

The aggregate demand and supply framework described in Chapter 21 helps us understand many sources of inflation and fluctuations in the business cycle as well as how stabilization policy works. But it does not explain why policymakers in many countries doubted that conventional monetary policy would be sufficient to counter the crisis of 2007–2009. And it does not explain the weakness of the recoveries following financial crises. To understand these concerns, we must return to the question of *how* monetary policy affects the economy.

Chapter 17 described how central banks influence the economy by controlling their balance sheet. Chapter 18 described how, in normal times, monetary policymakers use their balance sheet to control the interest rate banks charge each other for overnight loans. We learned that the real interest rate is the nominal interest rate minus the rate of expected inflation. Because the expected rate of inflation generally changes only slowly in low- and moderate-inflation economies, changing the target for the policy interest rate also changes the short-run real interest rate. In Chapter 21, we saw that the components of aggregate expenditure are sensitive to the real interest rate, so by changing the real interest rate, policymakers can influence real economic activity. Yet, the 2007–2009 experience (as well as that of Japan in the 1990s) suggests that conventional interest-rate policy does not always work. Even lowering their policy rates *below zero*—as the Bank of Japan, the ECB, and several smaller central banks did—has not prompted a strong expansion in these economies. To see why not, we need to look at all the ways that monetary policy actions affect real economic activity—that is, all the channels through which monetary policy is transmitted.

Examining the transmission mechanism of monetary policy is the first of this chapter's two main topics. The second topic is the question of why, in the aftermath of financial crises like the 2007–2009 episode, monetary policy and the challenges facing central bankers are especially difficult.

The Monetary Policy Transmission Mechanism

Any time the central bank alters the size of its balance sheet, the effects ripple through the economy, changing nearly everyone's behavior. Households adjust their spending on houses and cars. Companies rethink their decisions about how much and how fast to grow. Exchange rates change, bond and stock prices move, and banks adjust their balance sheets. In fact, we would be challenged to find a financial or economic decision that is unaffected. To fully appreciate how conventional monetary policy works, then, we need to examine the various ways in which changes in the policy-controlled interest influence the quantity of aggregate output demanded in the economy as a whole. These are referred to collectively as the channels of the **monetary policy transmission mechanism**. We will begin with the traditional **interest-rate** and **exchange-rate channels**. Next we will study the role of banks and finally the importance of stock price movements.

The Traditional Channels: Interest Rates and Exchange Rates

Central banks, such as the Federal Reserve, the European Central Bank, and the Bank of Japan, target a very short-term (usually overnight) interest rate. In the Fed's case, for example, a change of conventional policy is a change in the target range for the

federal funds rate. And as we saw in Chapter 21, a change in a central bank's policy interest rate represents a change in the real interest rate, which has a direct effect on total spending. The lower the real interest rate, the higher investment, consumption, and net exports will be.

Let's review this process. As the real interest rate falls, financing becomes less expensive, so firms become more likely to undertake investment projects and families more likely to purchase new cars. Changes in the real interest rate also affect the exchange rate. When the real interest rate falls, investor demand for U.S. assets falls with it, lowering the demand for and increasing the supply of dollars, reducing the dollar's value (see Chapter 19, Figure 19.2). That is, an easing of monetary policy—by which we mean a decrease in the target nominal interest rate, which lowers the real interest rate—leads to a depreciation of the dollar. A less valuable dollar, in turn, drives up the cost of imported goods and services, reducing imports from abroad. At the same time, however, the lower value of the dollar makes U.S. goods and services cheaper to foreigners, so they will buy more of them. Together, lower imports and higher exports mean higher net exports, or an increase in total spending.

While these traditional channels of monetary policy transmission make sense theoretically, they present a practical problem. Though changes in monetary policy do influence firms' decisions to purchase new equipment and build new buildings, the interest-rate channel is not very powerful. That is, data suggest that the investment component of total spending isn't very sensitive to interest rates, which should not be a surprise to us. At the end of our discussion of financial intermediation in Chapter 11, we saw that information problems often make external financing too difficult and costly for firms to obtain, either directly in the financial markets or indirectly through institutions. As a result, the vast majority of investments are financed by businesses themselves, through their own funds. While a small change in the interest rate does change the cost of external financing, it doesn't have much of an effect on investment decisions.

The impact of short-term interest rates on household decisions is also rather modest. The problem is that people's decisions to purchase cars or houses depend on longer-term interest rates rather than the policymakers' short-run target rate. So household consumption decisions will change only to the extent that changing the target interest rate affects long-term interest rates. And the overall effect isn't that large.

As for the effect of monetary policy on the exchange rate, once again, theory and practice differ. In the real world, the policy-controlled interest rate is just one of many factors that shift the demand and supply for the dollar on foreign exchange markets. The rather long list, described in Chapter 10, includes a change in the riskiness of domestic investment relative to foreign investment; a change in the preference of U.S. consumers for foreign-produced goods and services; and a change in foreigners' income and wealth. The influence of these other factors may overwhelm the impact of monetary policy on the exchange rate and net exports.

Thus, after careful analysis, we must conclude that the traditional channels of monetary policy transmission aren't very powerful. Yet evidence shows that monetary policy *is* effective. When policy-controlled interest rates go up, the quantity of aggregate output demanded does go down. The dynamic aggregate demand curve slopes down. Something else must be amplifying the impact of monetary policy changes on real economic activity. Otherwise, no one would care about the central bank's periodic policy statements. To figure out what that link might be, we turn now to a discussion of two alternative transmission channels: the stock and real estate markets, and the behavior of banks.





TOOLS OF THE TRADE

Correlation Does Not Imply Causality

Suppose we notice that the higher the crime rate in a neighborhood, the more often police are present. Should we infer that the police are causing crime? Surely not. Nor should we conclude from the fact that hospitals are filled with doctors that doctors make people ill. A fundamental principle of sound logical reasoning is that correlation does not imply causality. The fact that two events happened together does not indicate a causal link.

In the physical sciences, where researchers can conduct controlled experiments, establishing a causal link is not a serious challenge. We know from scientific trials that antibiotic drugs really do eliminate infections. It's not just chance that the people who take them feel better. But in economics, establishing a causal relationship is much more difficult. How can we be sure that monetary policy affects real economic activity? Our theories tell us that when policymakers raise the nominal interest rate, the real interest rate goes up, depressing aggregate expenditure and lowering real economic activity. But do we have any hard-and-fast evidence of this relationship?

The answer is that we do have some evidence that higher interest rates are associated with lower levels of real growth. Look back at Figure 21.17 (page 611), and you'll see the pattern: when interest rates rise, growth falls. But does that mean that increases in the interest rate cause recessions? What if, simultaneously, an increase in oil prices depresses real growth, causing policymakers to raise the interest rate

in order to head off rising inflation? That is, what if some third factor drives up the interest rate, forcing growth down at the same time? In that case, the interest rate becomes another implication of the fundamental cause of recession, an increase in oil prices.

How can we eliminate this problem and determine the extent to which monetary policy actually causes economic fluctuations? The answer is that we need to look for clear evidence that particular monetary policy actions are unrelated to this sort of third factor. Some years ago, Christina Romer and David Romer of the University of California at Berkeley read through the records of the Federal Reserve's interest-rate decisions since 1946. They identified a series of dates on which FOMC members stated unambiguously that they were raising interest rates to combat inflation. Each of these episodes was followed by a recession. Romer and Romer argued that, because the intention in each of these instances was to fight inflation, the FOMC's actions were not the result of the level of GDP at the time. Instead, it was monetary policy actions that were the fundamental cause.* With hard work and ingenuity, economists are ultimately able to distinguish causality from correlation.

*See Christina D. Romer and David H. Romer, "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," in O. J. Blanchard and S. Fischer, eds., *NBER Macroeconomic Annual* (Cambridge, MA: MIT Press, 1989), pp. 121–170.

Bank-Lending and Balance-Sheet Channels

Four times a year the Federal Reserve conducts an opinion survey on bank-lending practices. Addressed to the senior loan officers who oversee lending policies at the 60 or so largest banks in the country, the survey contains questions about both the demand for and the supply of loans. On the demand side, the questions have to do with the quantity and quality of loan applications. On the supply side, they have to do with the relative difficulty of getting a loan, as well as the rates borrowers must pay. This survey provides important information to monetary policymakers. Without it, they would not be able to tell whether a change in the quantity of new loans granted resulted from a shift in supply or a shift in demand. Was a drop in the quantity of new loans the result of fewer applications or a tightening of credit standards? Did interest-rate spreads climb because the quality of borrowers declined or because banks became more risk averse? Policymakers at the Fed care about the answers to these questions because if banks stop making loans, some businesses can't borrow to finance their investment projects, and economic growth slows.

The fact is that banks are essential to the operation of a modern economy. They direct resources from savers to investors and solve problems caused by information



asymmetries. Financial intermediaries specialize in screening borrowers to ensure they are creditworthy and in monitoring loan recipients to guarantee that they use borrowed funds as they said they would. But banks are not only the hub of the financial system; they are also the conduit through which monetary policy is transmitted to the economy. When policymakers change the size of the central bank's balance sheet, their action has an immediate impact on commercial bank balance sheets because it affects the level of reserves they hold. To understand monetary policy changes completely, then, we need to look carefully at how they affect the banking system. That means we need to examine the impact of policy changes on banks and bank lending.

Banks and Bank Lending For the vast majority of individuals and firms, the cost of issuing either stocks or bonds is prohibitive. These borrowers do not have access to capital market financing; instead, they must go to banks, which step in to reduce the information costs small borrowers face. A small business that is denied a bank loan has nowhere else to turn, so the project it wishes to undertake goes unfunded. When banks stop lending, then, a large class of borrowers simply can't obtain financing. Thus, bank lending is an important channel through which monetary policy affects the economy.¹ By altering the supply of funds to the banking system, policymakers can affect banks' ability and willingness to lend. This policy mechanism is referred to as the **bank-lending channel** of monetary policy transmission.

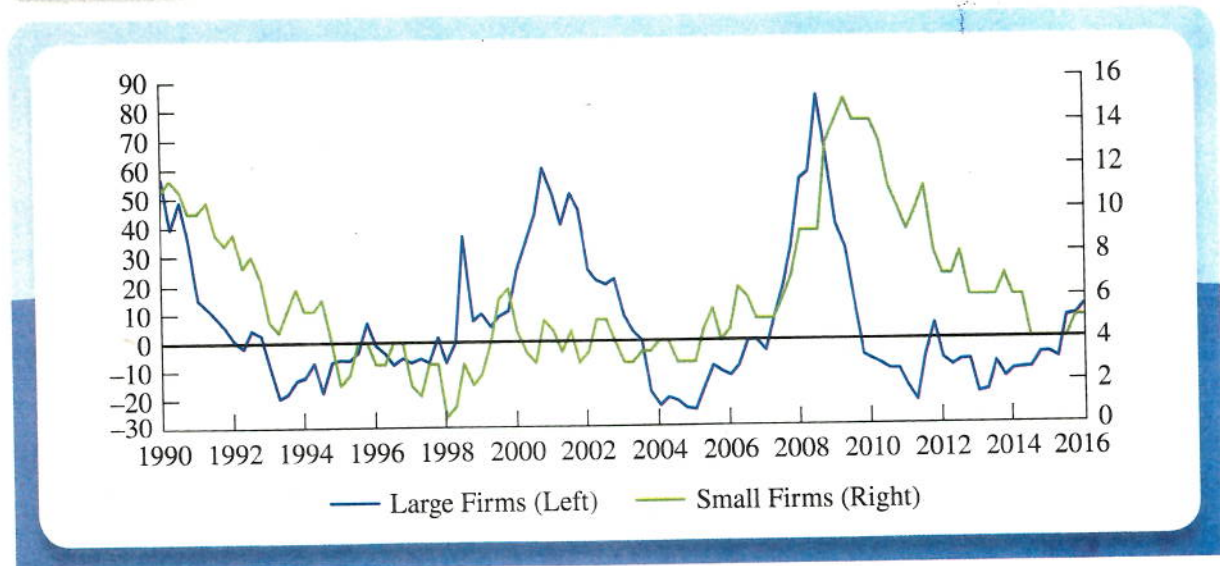
To see how the bank-lending channel works, think about the immediate consequences of an open market purchase (see Figure 17.2 on page 459). Recall that an open market operation involves an exchange of securities for reserves between the banking system and the central bank. When the central bank purchases securities from commercial banks, it pays for them with reserves. So after an open market purchase, banks have fewer securities and more reserves that usually bear lower interest. Unless bank managers do something, their revenues will fall. The natural reaction of the banks is to lend the new funds. These new loans work their way through the banking system through the process of multiple deposit creation, increasing the supply of loans throughout the economy. (Take a look back at the section on the deposit expansion multiplier in Chapter 17, pages 463 to 468.) In short, an open market purchase has a direct impact on the supply of loans, increasing their availability to those who depend on banks for financing.

Monetary policymakers are not the only people who can influence bank-lending practices. Financial regulators can, too. Changes in financial regulations, such as an increase or decrease in the amount of capital banks are required to hold when they make certain types of loans, will have an impact on the amount of bank lending as well. In 1980, for example, President Jimmy Carter authorized the Federal Reserve to impose a series of credit controls in an attempt to reduce bank lending and, with it, the level of output and inflation. A mild recession followed. In the early 1990s, the economy failed to make a strong recovery from the recession after the first Gulf War. Careful examination of the historical record suggests that the disappointing economic performance was a direct consequence of a slowdown in bank lending. At the time, bank balance sheets were very weak, having been eroded by large loan losses during

¹Studies of how and why monetary policy is transmitted through bank lending and balance sheets include Ben Bernanke and Mark Gertler, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives* 9 (Fall 1995), pp. 27–45. The role of the bank-lending channel during the global financial crisis is the focus of Leonardo Gambacorta and David Marqués-Ibañez, "The Bank Lending Channel: Lessons from the Crisis," *Economic Policy* 26 (April 2011), pp. 135–182.

Figure 23.2

Survey Measures of Changing Credit Conditions by Firm Size



Note: For large firms, credit conditions are tightening when the figure is above zero and easing when it is below zero. For small firms, a higher figure indicates that the net share of firms concerned about credit availability is greater than before.

SOURCES: For large businesses, Federal Reserve Board's survey of senior loan officers at selected banks; for small businesses, survey of firms by the National Federation of Independent Business. Permission to use data from the National Federation of Independent Business. (FRED Code: DRTSCILM.)

the banking crises of the 1980s. When an increase in capital requirements was added to the banks' already heavy burden, the result was a reduction in lending.

Figure 23.2 plots two surveys of how credit conditions for large and small nonfarm businesses vary over time. One line shows the net share of banks tightening standards for loans to large firms (at least \$50 million in annual sales); the other shows the share of small firms that view credit as harder to obtain (than three months earlier) minus the share that view credit as easier to obtain. In both cases, credit conditions typically tighten in recessions and ease in booms. Note, however, that small firms—which depend more on bank loans than large firms—sometimes face tight credit conditions even in economic recoveries.² The figure shows that happening in 1992 and again in the aftermath of the financial crisis of 2007–2009. A cutback in lending to creditworthy small firms that want to expand or to qualified households that wish to buy a home creates “financial headwinds” that limit the pace of national economic growth during recovery. This is a key reason policymakers worry that the recovery from a recession caused by a financial crisis may be weaker than the recovery from a recession caused by other factors.

Firms' Balance Sheets and Household Net Worth Besides its influence on the willingness of banks to lend, monetary policy has an important effect on the creditworthiness of borrowers—or at least on their perceived creditworthiness. This **balance-sheet channel** of monetary policy transmission works because monetary

²Small firms are critical to private, nonfarm U.S. economic activity and employment: they account for about half of output and generate up to 80 percent of net new jobs each year (see Traci L. Mach and John D. Wolken, “Financial Services Used by Small Businesses: Evidence from the 2003 Survey of Small Business Finances,” *Federal Reserve Bulletin*, October 2006, pp. A167–A195).



YOUR FINANCIAL WORLD

Don't Count on Inflation to Bail You Out

When policymakers lower interest rates, their aim is to encourage people to borrow. Central bankers know that low-interest mortgages make it possible for people to buy homes they otherwise couldn't afford. And low-interest car loans allow them to buy a new car earlier than they would otherwise. In lowering interest rates, the FOMC is counting on a surge in borrowing to drive output higher. But while the increase in debt may help the economy as a whole, it can be dangerous for some individuals. They may borrow too much and end up with more debt than they can manage.

The problem with debt is that it must be repaid. Making sure you can repay your debts means carefully calculating what you can afford—not just now but over the entire term of the loan. To avoid overextending yourself, don't borrow on the assumption that your income is going to rise

rapidly. While you will typically receive annual increases in your real wage (adjusted for inflation), they are likely to be fairly modest. In fact, for the economy as a whole, pay raises tend to match the rate of productivity growth, which is usually around 2 percent. So don't be tempted into thinking that, though your budget may be tight when you take out a loan, future salary raises will remedy the problem.

The strategy of counting on salary increases to help eliminate debt amounts to counting on inflation to bail you out. It's true that inflation can be helpful to people who are in debt because it reduces the burden of repayment. But if policymakers at the Fed are doing their job, which is to keep inflation low, hoping inflation will help you pay off your loans is a strategy that is likely to backfire.

policy has a direct influence on the net worth of potential borrowers. Specifically, an easing of monetary policy improves firms' and households' balance sheets, increasing their net worth. In turn, these increases in net worth reduce the problems of moral hazard and adverse selection, lowering the information costs of lending and allowing borrowers to obtain financing more easily. Recall that the higher the net worth of a borrower, the more likely that the lender will be repaid. The result is a smaller credit risk premium.

There are two ways in which a monetary policy expansion can improve borrowers' net worth. First, as we have already discussed, an expansionary policy drives up asset prices, increasing the value of firms and the wealth of households. Higher equity and property prices mean higher net worth, which implies lower information costs and greater ease in obtaining financing. The increase in home equity loans that follows a real estate boom is an example of this process. With an increase in household wealth, banks are willing to step up their lending.

The second way that a monetary policy expansion can improve borrowers' net worth has to do with the drop in interest rates. Most borrowers already have loans that they are in the process of repaying; lower interest rates reduce the burden of repayment. For a firm, the drop in the cost of financing increases the difference between revenues and expenses, raising profits and increasing the firm's value. Something similar happens for individuals. When interest rates fall, people who hold variable-rate loans enjoy lower interest payments. This drop in the cost of their financing reduces the information problems that plague the lending relationship. Why? To evaluate a borrower's creditworthiness, banks look at the percentage of a person's income that is devoted to loan payments. At lower interest rates, that percentage will be lower, so individuals will qualify for larger loans. The conclusion is that *as interest rates fall, the supply of loans increases*.

It is worth pausing to emphasize that information is the driving force in the bank-lending and balance-sheet channels of monetary policy transmission. Information services are central to banks' role in the financial system because they help to address the

problems of adverse selection and moral hazard. The primacy of information in banking has some important implications for our understanding of the link between the financial system and the real economy. It means that financial instability, which is characterized by large and unpredictable moves in asset prices, accompanied by widespread bankruptcy, will reduce lenders' willingness to supply financing. It also means that accounting scandals, such as the ones that plagued U.S. companies in 2001 and 2002, will have an effect on the economy as a whole. When bankers are worried about the accuracy of accounting information, they will be less willing to make loans to anyone. Inferior information leads to an increase in adverse selection, reducing bank lending, lowering investment, and ultimately depressing the quantity of aggregate output demanded.

The channels of monetary policy transmission depend on the structure of the financial system. To the extent that banks are unimportant sources of funds for firms and individuals, the bank-lending channel is minor. As we will see at the end of this chapter, the rise of loan brokers and asset-backed securities diminished the importance of the bank-lending channel until the financial crisis of 2007–2009. But, following that crisis, information problems and the resulting balance-sheet effects persisted for some time. While technology has made the processing of increasing amounts of information easier and cheaper, it seems unlikely to solve the problems of adverse selection and moral hazard, which make net worth such an important determinant of a borrower's creditworthiness.

Asset-Price Channels: Wealth and Investment

When the interest rate moves, so do stock prices. Specifically, a fall in the interest rate tends to push stock prices up. This relationship between the interest rate and the stock market is referred to as the **asset-price channel** of monetary policy transmission. To understand it, we must first figure out why a change in the interest rate might cause a movement in stock prices. Then we must explain how a change in stock prices can influence the quantity of aggregate output demanded.

To see how the interest rate influences stock prices, recall that the fundamental value of a stock is the present value of the stream of its future dividends. The lower the interest rate is, the higher the present value is and, therefore, the higher the stock price will be. Added to this relationship is the fact that an easing of monetary policy might well improve consumer and business confidence in the prospects for future growth. More growth means more revenue and higher profits and that, too, will drive up stock prices. In fact, because current stock prices are based largely on expectations of future growth and future interest rates, they tend to move in anticipation of a cut in interest rates.

Monetary policy affects real estate markets in the same way that it influences stock markets. The mechanism is straightforward. When policymakers reduce their interest-rate target, it drives the mortgage rate down. Lower mortgage rates mean higher demand for residential housing, driving up the prices of existing homes.

In short, when the central bank reduces its target interest rate, the stock and real estate markets are likely to boom. Then what? Stock and property prices affect both individual consumption and business investment. For individuals, a rise in stock and real estate prices means an increase in wealth. The richer people become, the more they will consume. If stock values go high enough, shareholders can actually buy the luxury cars they have been wanting, or take the fancy vacations they've been dreaming of, or maybe both. The conclusion is that higher asset prices mean increased wealth and consumption.

Just as consumption is affected by stock price movements, so is investment. As stock prices rise, firms find it easier to raise funds by issuing new shares. That is, they

Table 23.1 The Monetary Policy Transmission Mechanism

Channel	Mechanism
Interest rates (traditional channel)	Lower interest rates reduce the cost of investment, making more projects profitable.
Exchange rates (traditional channel)	Lower interest rates reduce the attractiveness of domestic investment, depressing the value of the currency and increasing net exports.
Bank lending	An easing of monetary policy raises the level of bank reserves and bank deposits, increasing the supply of funds.
Firms' balance sheets	Lower interest rates raise firms' profits, increasing their net worth and reducing the problems of adverse selection and moral hazard.
Household net worth	Lower interest rates raise individuals' net worth, improving their creditworthiness and allowing them to increase their borrowing.
Asset prices	Higher stock prices and real estate values fuel an increase in both business investment and household consumption.

gain access to financing in the primary capital market. To see why, think of a simple example in which the price of a company's stock suddenly increases. In the meantime, nothing has happened to the cost of a new investment and hence to its internal rate of return. But at the higher stock price, financing is now cheaper. This story should sound familiar. Recall the way in which the traditional *interest-rate channel* influences investment: a lower real interest rate means a lower cost of financing, which raises the profitability of investment projects. As a result, borderline investment projects suddenly become profitable when real interest rates fall. The same thing happens when stock prices rise. As financing becomes less expensive, more investments become profitable. In short, when asset markets boom, so does business investment in new equipment and buildings.³

Overall, changes in monetary policy influence aggregate expenditure in the economy through a variety of channels that are summarized in Table 23.1. Each of the transmission mechanisms works slightly differently, but they all lead us to the same conclusion: When interest rates rise, the quantity of aggregate output demanded falls so the dynamic aggregate demand curve slopes down.

Financial Crises and the Transmission of Monetary Policy

We have seen that monetary policy is transmitted to the economy through financial intermediaries and through asset prices. Yet, financial conditions deteriorated through much of the crisis of 2007–2009, even as central bankers were cutting interest rates aggressively. What prevented policy easing from being transmitted as usual to the real economy?

³This line of reasoning, known as *Tobin's q-theory*, was originally developed by the Nobel Prize-winning economist James Tobin. Tobin pointed out that the question of whether or not a firm invests should depend on the ratio of the market value of its shares to the replacement cost of its plant and equipment, which he called *q*. When *q* is greater than one—that is, when a firm's stock-market value exceeds its cost of rebuilding—investment in new plant and equipment is cheap relative to the value placed on it in the financial markets. When *q* is less than one, embarking on new investments isn't worthwhile.

The answer is that the crisis intensified the fundamental problems of asymmetric information—adverse selection and moral hazard—that affect the provision of credit in a modern economy. In general, a reduction in the quality of information about potential borrowers makes it more difficult for them to borrow. In the financial crisis, the widespread losses at intermediaries in general and the heightened uncertainty about the damage suffered by specific intermediaries reduced confidence in their ability to repay loans and thus virtually shut off the availability of credit to many of them. The hesitancy to lend in this episode was not unlike the common reluctance of buyers to acquire a used car when it might be a lemon (see pages 280–282). In short, funding liquidity dried up. As for households and nonfinancial firms, their net worth fell substantially, which greatly reduced their ability to borrow, so they responded by cutting spending. The result of this was a destabilizing feedback loop between worsening economic prospects and the deterioration of financial conditions that influence spending.

The process started in 2006 with the downturn in U.S. housing prices that led to widespread mortgage defaults. Major lenders—particularly in the United States and Europe—faced enormous and growing losses. Insufficient screening and monitoring had resulted in too many risky mortgages (see Chapter 11, *Lessons from the Crisis: Information Asymmetry and Securitization*, page 284). Losses from U.S. mortgage-backed securities and related financial instruments sharply depressed the capital in the financial system (see Chapter 12, *Lessons from the Crisis: Insufficient Bank Capital*, page 316). As a result, intermediaries were compelled to deleverage (see Chapter 3, *Lessons from the Crisis: Leverage*, page 50). They even stopped lending to each other—especially in the aftermath of the Lehman failure in September 2008—because they doubted the solvency of their counterparties or were simply uncertain about who would bear the losses (recall the Chapter 9 discussion of credit-default swaps).

The result was an intense scramble for funding that led to a near collapse of the financial system. Only the aggressive supply of reserves from central banks and of new capital from governments made it possible to restore the basic function of financial intermediaries and markets. With the usual policy transmission mechanism obstructed during the crisis, the Federal Reserve and other central banks also used unconventional policy mechanisms to directly influence key financial conditions that affect spending in the economy. The Fed's acquisitions of mortgage-backed securities and commercial paper stand out in this regard. Over time, expressions of central bank intent to keep interest rates low over an extended period (forward guidance) also influenced the willingness of investors to purchase other important assets, like equities and private-sector debt.

The bottom line: when the policy transmission mechanism is obstructed, central banks cannot assume that a cut in their target policy rate will ease the financial conditions that influence the economy. Indeed, through most of the crisis of 2007–2009, rate cuts did not even halt the deterioration of financial conditions, let alone improve them. Even after policy rates had fallen close to zero, financial conditions remained weak for some time.

The impairment of monetary policy transmission was at least as severe in the crisis of the euro area. In general, firms and households cannot borrow at a cost less than their governments, so rising default premiums on sovereign debt in 2011 and 2012 also worsened financial conditions for private borrowers in several of the countries on the geographic periphery of the euro area—Greece, Ireland, Italy, Portugal, and Spain. The ECB found it extremely difficult to offset this differential in funding access and cost. The central bank lowered its target interest rate and became the lender of last resort to these countries' banks. Yet, the supply of credit by the banks to firms and households diminished sharply. Only in the summer of 2012, when the ECB offered to become



APPLYING THE CONCEPT

DEBT, THE GREAT RECESSION, AND THE AWFUL RECOVERY

Was a high level of household debt a major cause of the Great Recession, which began in 2007, and the weak recovery, which started in 2009? If so, would reforming debt contracts make the economy less prone to severe disruptions?

Cycles make it difficult to distinguish cause and effect. Did rising debt boost house prices, or was it the other way around? And what was the relationship between the fall in house prices and the decline in household spending and employment?

House of Debt, an important recent book, shows that (1) a dramatic easing of credit standards for low-quality borrowers fed the U.S. mortgage boom in the years leading up to the Great Recession, (2) the mortgage boom was a major force driving up U.S. housing prices, and (3) the burden of high mortgage debt among those with lower incomes drove down consumption as house prices sank, contributing to the loss of jobs.*

The book shows that housing prices rose more sharply in zip codes where less-qualified borrowers (with lower incomes and wealth) were relatively numerous and gained access to mortgage credit. Beginning as early as 2005, residents in these same zip codes then cut their consumption on cars and other durable goods by the most as house price increases began to slow and then reverse. Having risen the most, house prices in those places also fell the furthest when the nationwide bubble burst. And workers who provided services nearby were the most likely to lose their jobs.

In other words, an extraordinary credit expansion stoked the housing boom, especially among families with lower incomes. And the cooling of the boom drove down consumption more sharply than in a normal recession, exacerbating the bust that was the Great Recession.

These facts do not diminish the critical role of intermediation in the 2007–2009 crisis, which turned vicious only after the September 2008 failure of Lehman Brothers.

But high levels of household debt, which led to foreclosure and bankruptcy, made things worse than they otherwise would have been. And securitization of many of the mortgages made it nearly impossible for lenders and borrowers to agree on what might have been mutually beneficial write-downs.

This has led some economists to propose new “mortgages” that shift part of the risk of house price declines to lenders and away from borrowers. Instead of merely being lenders, the suppliers of funds would become part owners of the collateral. In exchange, they would receive a portion of the increased value of the house when it is sold.

We now know that a boom in conventional mortgages can lead to a housing bust and debt burdens that generate and prolong a deep recession. But we still need to know much more about the relationship between debt and the business cycle; that would help us understand whether changing the form of debt contracts can help further stabilize the economy.

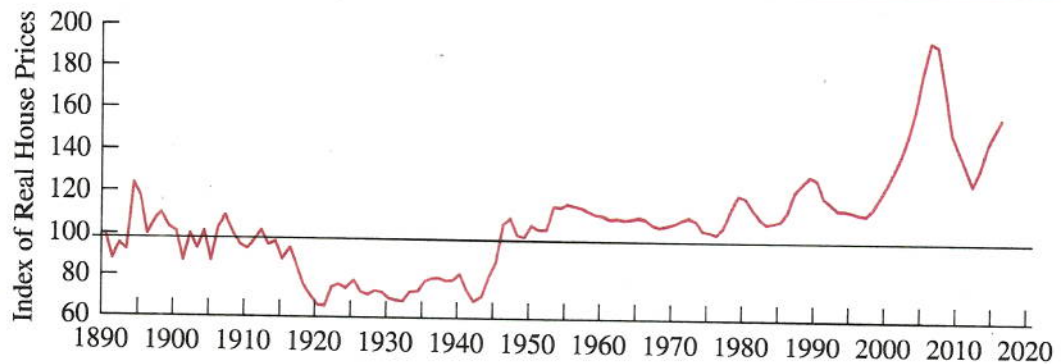
*See Atif Mian and Amir Sufi, *House of Debt* (Princeton, NJ: Princeton University Press, 2014).

a lender of last resort to the crisis-stricken periphery governments, did the resulting decline of sovereign risk premiums begin to relieve private-sector financial stress. Even in 2016, the ECB continued to introduce new policy tools designed to promote bank lending and to narrow the differential lending rates across member countries.

Financial conditions matter in economic upturns, too. When central banks hike rates to slow an economy, their success will depend on whether financial conditions respond. If an asset price bubble is under way, as it was in the United States in 2004–2006, the economic impact of central bank policy tightening probably will be smaller than usual. As a result, central banks must always take into account the workings of the monetary policy transmission mechanism in order to achieve their goals of economic and price stability.

The Challenges Modern Monetary Policymakers Face

The financial crisis of 2007–2009 was a “game changer” for the practitioners and theorists of monetary policy. Surely no one assumes now that monetary policy is a hard-and-fast science—that a few equations coupled with some statistical analysis and the

Figure 23.3 U.S. Real Housing Price Index, 1890–2016 (1890 = 100)

SOURCE: From *Irrational Exuberance*, 3rd ed. (Princeton, NJ: 2015). Reprinted with permission by Robert J. Shiller. Updates from www.econ.yale.edu/~shiller/data/Fig3-1.xls.

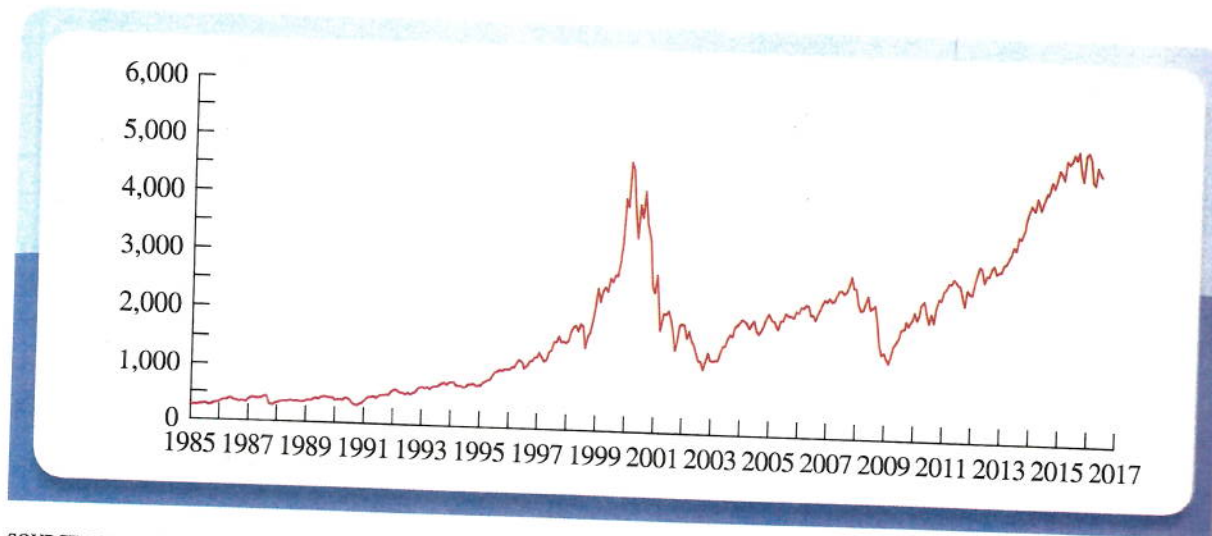
help of a big computer will suffice. To do their job well, central bankers need a detailed understanding of how both the financial system and the real economy will react to their policy changes.

That job would be tough enough in a world that is standing still, but the dynamism that is such a pervasive and desirable feature of today's economy makes the job all the more difficult. In fact, modern monetary policymakers face a series of daunting challenges. In this section, we will look at three that grew more prominent thanks to the financial crisis of 2007–2009. First, stock prices and property values have a tendency to go through boom and bust cycles. Second, policymakers' options are limited, as we have seen by the fact that the nominal interest rate cannot fall below the effective lower bound (somewhat below zero). Third, the structures of the economy and the financial system are constantly evolving, and the latter may be affected greatly by changing regulation in the years ahead.

Booms and Busts in Property and Equity Prices

Nearly everyone agrees that we would all be better off without skyrocketing increases in property and stock prices followed by sudden collapses. The unprecedented surge and collapse in U.S. housing prices was the ultimate source of the financial crisis of 2007–2009. Since the Great Depression of the 1930s, housing prices had declined nationwide in only three years, and then only slightly. Real house prices had been reasonably stable, because inflation offset the trend rise of nominal house prices. The spike in house prices in the years preceding the crisis was spectacularly unprecedented (see Figure 23.3). At the time, some argued that it was a bubble and therefore must burst and cause severe economic damage. Others said that housing fundamentals—growing household income, lower mortgage rates, and the like—had boosted affordability, which both justified the price surge and made it sustainable.⁴ The ensuing

⁴For an assessment of the role of monetary policy in the housing bubble, see Jane Dokko et al., "Monetary Policy and the Global Housing Bubble," *Economic Policy* 26, no. 66 (2011), pp. 233–283.

Figure 23.4 The Nasdaq Composite Index, 1984–2016

SOURCE: NASDAQ OMX Group (FRED code: NASDAQCOM).

collapse in home prices settled the debate, bringing on a financial and economic contraction more severe and widespread than even most pessimists expected.

Abrupt changes in asset prices, like the U.S. house price bubble, affect virtually every aspect of economic activity. Looking back at the first part of this chapter, we can see that changes in asset prices have a direct impact on both consumption and investment. Bubbles—which are identified after the fact by a sharp rise and then a sharp decline in prices—are damaging in part because the wealth effects they create cause consumption to surge and then contract just as rapidly. Equity bubbles—like the boom in the Internet sector in the late 1990s—allow firms to finance new projects more easily, causing investment to boom and then bust (see Figure 23.4). Bubbles are particularly damaging when their collapse impairs the balance sheets of leveraged intermediaries, risking a deleveraging spiral (see Chapter 3, Lessons from the Crisis: Leverage, page 50). The Great Depression, Japan's experience in the 1990s, the global crisis of 2007–2009, and the subsequent euro-area crisis all exemplify this pattern. For example, the loss of capital in the financial system in 2007–2009 could have led to catastrophe without extraordinary government actions. In contrast, the collapse of the Internet bubble of the late 1990s had a relatively minor impact because intermediaries faced limited credit exposure and remained well capitalized.

The devastating worldwide effects of the reversal in U.S. house prices beginning in 2006 has focused renewed attention on how monetary policymakers should react to asset price bubbles. Should the Federal Reserve have raised interest rates earlier or more aggressively in 2003–2006 when house prices were soaring? There are, and were, arguments on both sides.⁵ Proponents of a policy of “leaning against

⁵An early example of the case for intervention may be found in Stephen G. Cecchetti, Hans Genberg, and Sushil Wadhvani, “Asset Prices in a Flexible Inflation Targeting Framework,” in William C. Hunter, George G. Kaufman, and Michael Pomerleano, eds., *Asset Price Bubbles: Implications for Monetary, Regulatory and International Policies* (Cambridge, MA: MIT Press, 2002), pp. 427–444. For an early version of the case against, see Ben Bernanke and Mark Gertler, “Should Central Banks Respond to Movements in Asset Prices?” *American Economic Review*, May 2001, pp. 253–257.

bubbles” say that stabilizing inflation and real growth means raising interest rates to discourage bubbles from developing in the first place. If successful, this policy would reduce the credit booms that accompany bubbles, along with the busts that inevitably follow.

Opponents of this interventionist view argue that bubbles are too difficult to identify when they are developing. They point to the debate about U.S. housing prices in 2004 and 2005 as evidence that views were not unanimous. However, the fact that an economic phenomenon is difficult to measure is no excuse for ignoring it. Indeed, we have no choice: As we saw in the discussion of monetary policy transmission, macroeconomic forecasts rest on estimates of future wealth and stock prices. Without them, there is no way to forecast either consumption or investment.

Opponents of leaning against bubbles used to argue that central banks should simply wait until the bubble bursts and only then react aggressively to limit the fallout on the economy by cleaning up the mess. They pointed to the Great Depression and the 1990s in Japan as examples of what can happen if the central bank attempts to prick a bubble with interest-rate policy. Critics of an activist response also pointed to the mild U.S. recession in 2001—despite the collapse of the bubble for Internet stocks—as a successful instance of how policy can stabilize inflation and the economy in the face of a burst asset price bubble.

The crisis of 2007–2009 undermined the rosy view that policymakers can sit back and clean up after a bubble bursts. Having seen financial conditions collapse even with the policy rate set at zero, and having experienced the deepest global downturn since World War II, few central bankers remain sanguine about using conventional interest-rate policy to limit the fallout from asset price bubbles after they burst. However, central bankers still worry that interest rates are only a blunt tool and that pricking an asset price bubble could require rate hikes so severe that they would bludgeon the economy and reduce the likelihood of hitting a central bank’s objective for inflation. If the rate hikes were applied more cautiously to halt, say, a housing price bubble, it would be, as one economist put it, “like adding a grain of sand a day to a scale that is weighing a car.”

Today, there is a more nuanced case against using interest rates to prick asset price bubbles: namely, that the proper policy toolkit for addressing bubbles is not interest rates but the macroprudential regulatory tools that we discussed in Chapter 14. According to this view, bubbles are a major threat when they are associated with an expansion of credit that exposes the financial system to the eventual collapse of asset prices. As a result, the best response would be to adjust regulatory rules—such as procyclical capital requirements, systemic capital surcharges, and fees for insuring the capital of banks—to inhibit intermediaries from extending such risky credits in economic booms.

The macroprudential regulatory approach would help avoid the more destructive option of having to tighten interest rates across the whole economy to address a bubble in a specific asset. Yet, this approach still depends on the foresight and judgment of regulators to limit the buildup of a menacing asset price bubble. Moreover, policymakers acknowledge the difficulty of limiting systemic risks through the use of macroprudential policies alone. The ability of intermediaries to evade regulations and to conceal risk taking reduces the effectiveness of regulation and supervision, while raising interest rates allows policy “to get into all of the cracks” in the financial system, including shadow banks and systemically important financial markets.⁶

⁶Federal Reserve Board Governor Jeremy Stein articulated the potential benefits of using interest-rate policy to limit systemic risk in a speech at the Federal Reserve Bank of St. Louis: “Overheating in Credit Markets: Origins, Measurement, and Policy Responses,” February 7, 2013.

While the crisis of 2007–2009 has not settled this debate, it has advanced the discussion substantially.⁷ Many policymakers remain reluctant to raise interest rates to address asset bubbles, but they no longer rule it out. Using interest rates to combat asset price bubbles now is more likely to be viewed as a backup approach for extreme circumstances, if the first-best methods of macroprudential regulation fail to limit a systemic threat.

Deflation and the Effective Lower Interest-Rate Bound

In Chapter 18, we noted that nominal interest rates cannot be deeply negative—that there is an *effective lower bound (ELB)*. In contrast to the concept of a *zero lower bound (ZLB)*, the ELB is below zero due to the transactions costs of storing, transporting, and insuring cash. The reason is that investors can always hold cash, so bonds must have yields above the ELB to attract bondholders. While this point may strike you as something only investors should worry about, it is not. The fact that nominal interest rates can't fall below the ELB restricts what monetary policymakers can do. Look back at Panel B of Figure 23.1 on page 654 and you will see that the policy target rate in 2009 was virtually zero in Japan and the United States, and only modestly higher in the euro area. Even though the global economy was sinking, policymakers believed that they had little scope to lower rates further. (As of 2016, policy rates in the euro area and Japan declined somewhat below zero, as central bankers experimented with getting closer to the ELB, the level of which is not precisely known.) The risk of becoming caught in precisely such a predicament has concerned central bankers around the world at least since Japan's experience with near-zero interest rates in the 1990s.

The problem posed by the ELB is a serious one. To understand why, we can do an exercise based on the macroeconomic model presented in Chapters 21 and 22. Think about the consequences of a shock that depresses aggregate expenditure. The shock could be caused by a decline in investment due to a fall in business prospects; by an appreciation of the dollar due to a deteriorating investment climate abroad, which has increased foreign demand for dollars; or by a decline in individuals' confidence in the future. Regardless of the source, the slowdown drives spending down at every level of inflation and the real interest rate, shifting the dynamic aggregate demand curve to the left. The immediate consequence of this drop in the quantity of aggregate output demanded is that real output falls below potential output, creating a recessionary output gap that puts downward pressure on inflation. Under normal circumstances, monetary policymakers would react to the decline in inflation by cutting the nominal interest rate enough to lower the real interest rate. Their action would increase spending, raise real output, and eliminate the output gap.

Now let's make a small adjustment to this story and assume that, when the shock occurs, inflation is zero and the policy interest rate that central bankers control is at the ELB. Under these conditions, the decline in aggregate demand still drives real output below potential output, placing downward pressure on inflation. But when inflation falls, it drops below zero so that, on average, prices are falling. The result is *deflation*.

Deflation isn't necessarily a problem, unless the shock that moves the economy away from its long-run equilibrium is big enough to drive output down to such a low level that

⁷For one view of how the financial crisis should alter monetary policy practices more generally, see Olivier Blanchard, Giovanni Dell'Ariccia, and Paulo Mauro, "Rethinking Macroeconomic Policy," IMF Staff Position Note, February 12, 2010, SPN/10/03.

policymakers can't bring it up, even by setting their nominal interest rate target at the ELB. At that point, we have arrived at one of the central banker's worst nightmares: a nominal interest rate that cannot be reduced, accompanied by deflation and real output that is below potential. Recall that when current output is below potential output, so that there is a recessionary output gap, current inflation is below expected inflation and expected inflation falls. In this case, that drives deflation down further. Because the nominal interest rate is at the ELB, policymakers cannot counter the worsening deflation by lowering it. Instead, the real interest rate *rises*, reducing spending, shifting the dynamic aggregate demand curve to the left, and expanding the recessionary output gap even more. The result is a *deflationary spiral* in which deflation grows worse and worse.

Deflation also aggravates information problems in ways that inflation does not. Deflation makes it more difficult for businesses to obtain financing for new projects. Without financing there is no investment; without investment there is no growth. The primary reason this happens is that debt is measured in fixed dollars, and deflation makes those dollars more valuable. Thus, deflation increases the real value of a firm's liabilities without affecting the real value of its assets. At a lower net worth, companies are suddenly less creditworthy.

In short, the combination of deflation and the effective lower bound can have a devastating impact on growth by short-circuiting the process that normally stabilizes the economy so that it is no longer self-correcting. Concern about the instabilities of a deflationary spiral helped to animate the central bank response to the crisis of 2007–2009, even though the crisis began with inflation above desirable levels. Policymakers were concerned that the deep recession itself could lower inflation expectations too far and raise real interest rates in a destabilizing manner.

Can policymakers do anything to avoid this pitfall? The answer is yes; there are ways to minimize the chances of this sort of catastrophe. Policymakers can choose from three strategies. First, they can set their inflation objective with the perils of deflation in mind; second, they can act boldly when there is even a hint of deflation; and third, they can utilize the unconventional policy tools that we discussed in Chapter 18.

The difficulties posed by the effective lower bound arise only when central bankers have achieved their objective of low, stable inflation. When inflation is high, so is the nominal interest rate; chances are therefore remote that the interest rate will hit the ELB. This observation suggests that central bankers should set their inflation objective high enough to minimize the possibility of a deflationary spiral. Indeed, some economists have proposed raising the inflation level that many central banks target (see Chapter 22, In the Blog: Is 2 Percent Still the Right Inflation Target?, pages 646–647).

Reducing the interest rate significantly and rapidly when faced with the possibility of hitting the ELB is another approach to avoiding deflation. Central bankers call this strategy “acting preemptively,” which means working hard to avoid ever reaching the point where interest rates hit their hard bottom. Acting preemptively was one reason why the FOMC reduced the target federal funds rate by 5.25 percentage points toward zero in a series of 10 cuts between September 2007 and December 2008. Dramatic actions of that sort are meant to ensure that the economy will recover before deflation can take hold.

Finally, as we saw in Chapter 18, central bankers have at their disposal a range of unconventional policy tools that they can employ when the traditional interest-rate target, an overnight rate, hits the lower bound.⁸ These include forward guidance, quantitative

⁸For an early discussion of unconventional monetary policy options, see the speech by then-Federal Reserve Board governor, later chairman, Ben S. Bernanke, “Deflation: Making Sure ‘It’ Doesn’t Happen Here,” remarks before the National Economists Club, Washington, D.C., November 21, 2001. The speech is available on the Federal Reserve Board’s website at www.federalreserve.gov.



IN THE BLOG

A Guide to "Secular Stagnation"

The financial crisis and resulting recession began in 2007. Over the following eight years, the U.S. economy grew in real terms at an anemic average annual rate of 1.2 percent, down sharply from the 3.0 percent pace that had prevailed from 1990 to 2007, a period that included two complete business cycles. By the end of 2015, the cumulative shortfall in GDP—relative to where it would have been had the higher growth rate persisted—approached \$2½ trillion, or more than \$8,500 per capita. Naturally, everyone wants to know why slow growth has persisted for so long and what, if anything, can be done about it.

The conventional explanation for the recent downshift is that the trend growth rate of potential output has slowed sharply. Potential output is a supply concept: in the long run, when all prices (including wages and interest rates) have adjusted, aggregate supply is determined by the available capital and labor and by the technology used to combine them to produce output. From this perspective, a long-term decline in the growth rate of real GDP means a slowing in the contribution to growth from one or more of those three sources.

An alternative hypothesis—proposed in 2013 by former Treasury Secretary Lawrence Summers—is that the feeble growth performance of the past decade reflects an unusually prolonged shortfall of aggregate demand rather than diminished supply.*

Summers's account of "secular stagnation" in demand turns standard analysis on its head. In conventional macroeconomics, business cycles are thought of as temporary, self-correcting deviations from the long-run path of potential output. Following a disturbance, prices and wages adjust to the new circumstances, equilibrium between demand

and supply is restored, and the economy returns to its long-run trend.

This conventional story has been useful in understanding post–World War II business cycles. Deviations of GDP from its long-run trend were moderate and brief. But the period since 2007 looks very different. By the end of 2015, real GDP was more than 13 percent below the level implied by the precrisis trend we noted at the outset—and the gap was continuing to widen. Not surprisingly, analysts have gradually lowered estimates of U.S. potential GDP (see Chapter 21, *In the Blog: Forecasting Trend Growth*, pages 604–605).

The secular stagnation story shifts the focus from supply to demand. Proponents argue that the *natural rate of interest*—the real interest rate (the nominal interest rate less expected inflation) that prevails in long-run equilibrium—has dropped well below zero. If the actual real interest rate in markets (and influenced by monetary policymakers) persistently exceeds the natural rate, then people will consume and invest less than would be consistent with the economy's potential. As a result, the argument goes, aggregate demand will remain short of supply, and inflation will tend to decline or stay low. Moreover, a persistent shortfall of aggregate demand can itself diminish supply through the atrophying effect of unemployment on worker skills, through the depreciation of the capital stock, and through damage to intermediaries that allocate savings to the most productive uses.

Why might the natural rate of interest be unusually low? Secular stagnationists offer several possibilities:

- High saving, which drives asset prices up and expected returns down.
- The declining cost of investment goods (think "software" versus "hardware"), which reduces investment outlays relative to savings.

*See Lawrence H. Summers, "U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound," *Business Economics* 49, no. 2 (April 2014), pp. 65–73.

easing, and targeted asset purchases—all of which were actively employed by central bankers in the financial crisis of 2007–2009 and by the ECB in the euro-area crisis. The mechanics are straightforward. Central bankers use forward guidance to influence long-term bond yields, which depend in part on expectations about future policy rates. They use quantitative easing and targeted asset purchases to control the size of their balance sheet and the mix of assets that they hold. During normal times, policymakers control the supply of their reserve liabilities in order to meet a target interest rate. But even if the short-run target rate drops to the lower bound, monetary policymakers

- Increased risk (or awareness of risk) following the financial crisis, which fosters greater caution among providers and users of funds.
- The rise of income inequality, which shifts income to high-savings households and thus lowers the average propensity to consume.

If the natural rate of interest is in fact well below zero, can monetary policymakers still restore the economy's equilibrium by stimulating aggregate demand? Yes, but only by altering the policy framework itself. For example, the central bank could raise its inflation target, lowering the real interest rate at the *effective lower bound* on nominal interest rates. Aside from monetary policy, fiscal policymakers could increase spending

to repair the country's deteriorating infrastructure, thereby increasing aggregate demand *and* aggregate supply.**

So, can we distinguish between the supply and demand accounts of the ongoing growth slowdown? Is it primarily a supply story of slowing productivity or a demand story of insufficiently low real interest rates? Table 23.2 highlights some of the differences in these two perspectives. But accurately measuring the contributions of these factors isn't easy. One test will be whether, as the labor market tightens, wages and prices rise more rapidly, signaling the erosion of economic slack. If not, the case for secular stagnation will gain increased force. And even if inflation does pick up, stagnationists are likely to insist that the damage to aggregate supply came from a failure to address the demand problem in a timely and vigorous way.

Table 23.2

Possible Contributors to the Growth Slowdown: Supply versus Demand

Supply	Demand
Demographics: slow labor force growth	High private debt: reduced propensity to consume
Limited innovation: slow productivity growth	High public debt: reduced public investment
Education: reduced gains in labor quality	Falling price of investment goods: lower outlays
Skill atrophy: reduced gains in labor quality	Preference for safe assets: reduced investment
Regulation: slower firm creation	Increased inequality: reduced propensity to consume
Regulation: trend decline in rate of job-finding	

** Structural reforms—such as improvements in competition, hiring and firing flexibility, and government transparency—can stimulate growth by expanding aggregate supply and raising the natural rate of interest in the process. See Coen Teulings and Richard Baldwin, eds., *Secular Stagnation: Facts, Causes and Cures* (London: CEPR Press and VoxEU.org, 2014).

retain their ability to expand their balance sheet. They can continue to purchase securities or make loans to banks to increase the size of the monetary base.

Everyone agrees that unconventional policy options are feasible. And we have seen their frequent use over the past decade in Europe, Japan, and the United States. Nevertheless, central bankers are reluctant to use such tools and, when used, are eager to exit as soon as improvements in the economy make it safe for them to do so. One reason for this aversion to unconventional tools is continued uncertainty about how and why they work and how to apply them effectively. Monetary policymaking rests on

quantitative estimates of the impact of a change in the target interest rate on the central bank's objectives. Policymakers have some idea of how a reduction of 25 or 50 basis points in the federal funds rate would affect output and inflation over the next year or two. But they have much less confidence about what the quantitative impact of an unconventional policy option will be. What is the effect on prices, consumption, and investment if the supply of reserves increases by a factor of 100 (as it did in the United States in September–October 2008) or if the central bank doubles its assets by purchasing \$1 trillion of mortgage-backed securities (as the Fed did in 2009)?

Beyond the uncertainty about their impact, another key reason for keeping unconventional policy tools unconventional is that policy exit—reducing the size of the balance sheet and restoring the mix of securities to a conventional portfolio of shorter-term government instruments—may be difficult. As we saw in Chapter 18, the ability to pay interest on reserves allows a central bank to tighten policy—by hiking the deposit rate that forms the floor for the overnight lending rate—even if policymakers choose temporarily not to sell the unconventional assets on the balance sheet. Nevertheless, central banks prefer assets that are liquid and that do not tilt the playing field in favor of specific private borrowers. And although they may wish to sell assets acquired in unconventional policy moves—including bonds with default risk and long-term bonds—in doing so they may suffer a loss. If a central bank faced sufficient losses, it might wish to ask the government to replenish its capital. Such reliance on government could add to inflation expectations if it were viewed as a threat to central bank independence.

The Evolving Structure of the Financial System

Monetary policy works through its effects on the financial system. Thus, differences in financial structure across countries may help explain differences in the effectiveness of monetary policy. By extension, changes in financial structure will change the impact of monetary policy. Recall from the first part of this chapter that one of the channels through which monetary policy influences real output and inflation is its impact on the supply of bank loans. By influencing bank lending, policymakers can affect the ease with which individuals and firms obtain financing.

Banks are crucial to this mechanism. As the nature of banking changes, we would expect the importance of this channel of monetary policy transmission to change along with it, and that has been the case. In the United States, for example, banks are no longer as important a source of financing as they once were. Thirty years ago, they accounted for virtually all the credit in the U.S. economy. At the time the crisis of 2007–2009 hit, direct bank loans had fallen to less than 60 percent of total credit extended.

The shift away from bank financing and toward securities financing in the capital markets means that the bank-lending channel of monetary policy became less important in the decades before the financial crisis that began in 2007. The decline of banks as a source of finance was accompanied by a corresponding rise in the importance of securities markets and of shadow banks—including securities brokers, money-market mutual funds, and government-sponsored enterprises (GSEs). Recall the asset-backed securities discussed in Chapter 3. Mortgage-backed and other asset-backed securities surged in volume over the past 30 years. In 1980, mortgage-backed securities accounted for only \$0.1 trillion of the \$1.5 trillion in U.S. mortgages outstanding. By 2009, they surpassed half of the nearly \$15 trillion in mortgages outstanding.

To create mortgage-backed securities, a broker bundles together a large number of home mortgages and then sells shares in the pool. Investors in mortgage-backed securities purchase shares in the revenue from the underlying financial instruments—in

this case, the mortgage payments made by homebuyers. Although their home purchase began with a bank loan, homebuyers in this way ultimately obtain a form of financing that is almost equivalent to capital market financing. Over the years, securitization—the process of pooling streams of revenue from loans and other receivables into marketable securities—has expanded in scope and size; it now includes car loans, credit card debt, student loans, equipment leases, and even movie box-office receipts.

Yet, the financial crisis that ended in 2009 is having a greater impact on the shape of the financial system than any event since the Great Depression. Importantly, it has interrupted the trend toward capital market finance: securitization has declined or slowed since 2006. For example, the volume of asset-backed commercial paper in the United States, which surpassed \$1.2 trillion in the summer of 2007, stood at less than 20 percent of that level at the end of 2015.

In the aftermath of the financial crisis, U.S. government agencies became the dominant source of new housing finance, either through direct loans or through guarantees. In 2010, 88 percent of new mortgage originations were agency-backed, up from 53 percent a decade earlier.⁹ Yet, the future of the housing-related GSEs remains highly uncertain, with many observers calling for them to be dismantled. After the GSEs were placed under the direct control of the federal government in 2008, the government injected more than \$150 billion to restore their positive net worth. In 2011, the U.S. Treasury proposed to wind them down gradually by raising their guarantee fees, reducing the size of loans eligible for a guarantee, and shrinking their portfolios of mortgages.¹⁰ In 2012, the GSEs doubled their guarantee fees. And, by 2015, their mortgage portfolios had halved from the peaks prior to 2010. Yet, as of 2016, they remained under federal control, and there seemed little momentum for reform (see Chapter 13, In the Blog: Still Riding the GSE Train, page 352).

And, at this writing, the impact of the most far-reaching U.S. regulatory reform since the 1930s—the Dodd-Frank Act of 2010—remains far from clear. First, implementation of the Act remains incomplete: as of mid-2016, regulators had yet to finalize about 30 percent of the new rules that the Act requires them to issue. Second, many key elements of the new financial regulatory measures were untried, including the Dodd-Frank apparatus for resolving a systemic intermediary. Third, turf conflicts among U.S. regulators sustained doubts about the Financial System Oversight Council's (FSOC) ability to obtain the cooperation needed for effective oversight. Fourth, court challenges raised doubts about FSOC's authority to designate nonbanks as *systemically important financial intermediaries* (SIFIs). Finally, policymakers were still learning how the tools of macroprudential regulation—including capital and liquidity requirements, stress tests, and living wills—could best be used to promote financial resilience.

Amid all this change, it is too soon to say how the post-crisis financial system will evolve. Will the trend toward securities finance resume? In part, that will depend on how regulators behave. A macroprudential regulator—of the kind that we discussed in Chapter 14—will try to limit intermediaries' incentives for taking systemic risk.

Will macroprudential regulation prevent the restoration of securitization? Probably not: regulators are aware that effective securitization can lead to a better diversification of risk. But unlike the incomplete securitization that prevailed earlier, effective securitization must avoid leaving concentrations of securitized assets on the balance sheets of intermediaries that make them vulnerable to collapsing asset price bubbles.

⁹See Bipartisan Policy Center, "Housing America's Future: New Directions for National Policy," February 2013, p. 43, <http://bipartisanpolicy.org/library/report/housing-future>.

¹⁰See U.S. Treasury, "Reforming America's Housing Finance Market: A Report to Congress," February 2011, www.treasury.gov/initiatives/documents/reforming%20america%27s%20housing%20finance%20market.pdf.

Consequently, macroprudential regulation will tend to restrain the future pace of securitization, especially compared to the boom years preceding the financial crisis.

However the financial system evolves, the pattern will be a critical one for central bankers, who need to know the quantitative impact their policies are likely to have. As the structure of the financial system changes, the effect of a 25- or 50-basis-point move in the federal funds rate will doubtless change with it. The changing effectiveness of conventional monetary policy likely will require central bankers to update their unconventional policy tools, too. Central bankers will always have to assess how the financial system is altering the monetary transmission mechanism.

The changing nature of the financial system is important for individuals as well as policymakers. As the characteristics of money, banks, and loans evolve, we will all adjust how we pay for our purchases, how we hold our wealth, and how we obtain credit. Our use of currency will likely continue to decline. U.S. banks that now receive interest on their reserves may continue to hold far more of them than before the financial crisis. In Europe and Japan, investors may turn to cash if central banks try to lower the policy rate even closer to the effective lower bound. Perhaps some country will eliminate cash altogether, allowing for deeply negative interest rates.

No one can predict exactly when or to what extent these changes will occur, but now that you have reached the end of this book, you know how to think about them. And your skills in finding and analyzing economic and financial data will help you to stay up to date as the financial system evolves. You understand the economic role of financial institutions as well as what a central bank is and how it operates. Together with the aggregate demand–aggregate supply model, this knowledge gives you a framework with which to comprehend the evolution of the financial system, its effects on monetary policy, and its effects on you personally.

Key Terms

asset-price channel, 661	exchange-rate	monetary policy
balance-sheet channel, 659	channel, 655	transmission
bank-lending channel, 658	interest-rate channel, 655	mechanism, 655

Using FRED: Codes for Data in This Chapter

Data Series	FRED Data Code
Real GDP	GDPC1
U.S. 3-month Treasury bill rate	TB3MS
U.S. 10-year Treasury constant maturity rate	GS10
German government bond yield	INTGSBDEM193N
Italian government bond yield	INTGSBITM193N
Spanish government bond yield	INTGSBESM193N
1-year inflation expectations (Michigan survey)	MICH
Real trade-weighted U.S. dollar index: Broad	TWEXBPA
Trade-weighted U.S. dollar index: Broad	TWEXBMTH
Household net worth	TNWSHNO
Disposable personal income	DPI
Personal saving rate	PSAVER
S&P Case-Shiller 20-city home price index	SPCS20RSA
Consumer price index	CPIAUCSL
Net percentage of domestic banks tightening standards on credit cards	DRTSCLCC
Gross federal debt held by the public as percent of gross domestic product	FYPUGDA188S

Chapter Lessons

1. Monetary policy influences the economy through several channels.
 - a. The traditional channels of monetary policy transmission are interest rates and exchange rates.
 - i. Interest rates influence consumption and investment.
 - ii. Exchange rates affect net exports.
 - b. Monetary policy affects the supply of bank loans, changing the availability of bank financing to firms and individuals.
 - c. Monetary policy can change firms' and households' net worth, affecting their creditworthiness as borrowers.
 - d. The asset-price channel of monetary policy transmission works through stock and real estate prices.
 - i. Stock and property prices influence household wealth and consumption.
 - ii. Stock prices also affect businesses' ability and incentive to raise funds and make investments.

2. Monetary policymakers face significant challenges. To be successful, they require
 - a. Accurate estimates of potential GDP, even when its growth trend is shifting.
 - b. An understanding of how to cope with the problems created by the effective lower bound on nominal interest rates and the possibility of deflation.
 - c. A knowledge of how and when to react to the possibility of a stock or real estate boom (and bust).
 - d. An awareness of the changing structure of the financial system and a knowledge of how to react to it.

Conceptual and Analytical Problems

1. Explain in detail how monetary policy influences banks' lending behavior. Show how an open market purchase affects the banking system's balance sheet, and discuss the impact on the supply of bank loans. (You may wish to refer to Chapter 17 in answering this question.) (LO1)
2. Explain why you might expect the recovery from the 2007–2009 recession to be weaker than normal. (LO1)
- 3.* Explain why the traditional interest-rate channel of monetary policy transmission from monetary policy actions to changes in investment and consumption decisions may be relatively weak. (LO1)
4. Explain why monetary policymakers' actions in cutting the target range for the federal funds rate to 0 to $\frac{1}{4}$ percent were not sufficient to boost economic activity during the recession of 2007–2009. (LO2)
5. When monetary policymakers hit the effective lower bound with their policy rate, they have the option to turn to unconventional tools of monetary policy. How do these unconventional tools work, and why might policymakers be reluctant to use them except in very difficult circumstances? (LO2)
6. The government decides to place limits on the interest rates banks can pay their depositors. Seeing that alternative investments pay higher interest rates, depositors withdraw their funds from banks and place them in bonds. Will their action have an impact on the economy? If so, how? (LO1)
7. New developments in information technology have simplified the assessment of individual borrowers' creditworthiness. What are the likely consequences for the structure of the financial system? For monetary policy? (LO2)
- 8.* Describe the theory of the exchange-rate channel of the monetary transmission mechanism. How, through the exchange rate, does an interest-rate increase influence output? Why is this link difficult to find in practice? (LO1)
9. Why might the effective lower bound on nominal interest rates lead policymakers to raise their inflation objective? (LO2)
10. Considering the role of the U.S. house price bubble in the financial crisis of 2007–2009, how do you think monetary policymakers should respond to bubbles in asset markets? (LO2)

*Indicates more difficult problems

11. For each of the following, explain whether the response is theoretically consistent with a tightening of monetary policy and identify which of the traditional channels of monetary policy is at work: (LO1)
 - a. Firms become more likely to undertake investment projects.
 - b. Households become less likely to purchase refrigerators and washing machines.
 - c. Net exports fall.
12. In Country A suppose that changes in short-term interest rates translate quickly into changes in long-term interest rates, while in Country B long-term interest rates do not respond much to changes in short-term rates. In which country would you expect the interest-rate channel of monetary policy to be stronger? Explain your answer. (LO1)
13. Consider a situation where central bank officials repeatedly express concern that output exceeds potential output, implying that the economy is overheating. Although they haven't implemented any policy moves as yet, the data show that consumption of luxury goods has begun to slow. Explain how this behavior could reflect the asset-price channel of monetary policy at work. (LO1)
14. Do you think the balance-sheet channel of monetary policy would be stronger or weaker if (LO1)
 - a. Firms' balance sheets in general are very healthy?
 - b. Firms have a lot of existing variable-rate debt?
15. In the wake of the financial crisis of 2007–2009, would you anticipate the bank-lending channel becoming more or less important in the United States? Explain your answer. (LO2)
- 16.* Suppose there is an unexpected slowdown in the rate of productivity growth in the economy so that forecasters consistently overestimate the growth rate of GDP. If the central bank bases its policy decisions on the consensus forecast, what would be the likely consequences for inflation assuming it maintains its existing inflation target? (LO2)
17. Suppose the policy interest rate controlled by the central bank and the inflation rate were both zero. Explain in terms of the aggregate demand–aggregate supply framework how the economy could fall into a deflationary spiral if it were hit by a negative aggregate demand shock. (LO2)
- 18.* Use the aggregate demand–aggregate supply framework to show how a boom in equity prices might affect inflation and output in the short run. Describe the long-run impact on inflation and output (a) if the central bank implicitly allows its inflation target to rise and (b) if it retains its original inflation target. (LO2)
19. Compare the impact of a given change in monetary policy in two economies that are similar in every way except that in Economy A the financial system has a large shadow banking system providing many alternatives to bank financing, while in Economy B bank loans account for almost all of the financing in the economy. (LO1)
20. Suppose that the anemic growth in the U.S. economy following the financial crisis of 2007–2009 was a result of “secular stagnation.” Use the Fisher equation to explain why raising the central bank's inflation target could help boost economic

growth in circumstances where nominal interest rates are close to the effective lower bound. (LO2)

21. If the anemic growth experienced in the U.S. economy since the financial crisis primarily reflects slower growth of the labor force and slowing technological innovation, can monetary policy be used to address the problem? (LO2)
22. In which of the following economies do you think the bank lending channel would play a more important role, everything else being equal: an economy dominated by large, financially sophisticated firms, or an economy consisting of a large number of small firms. Explain your choice. (LO1)



Data Exploration

For general information on using Federal Reserve Economic Data (FRED) online, visit www.mhhe.com/moneyandbanking5e.com and refer to the FRED resources.

1. In conducting monetary policy, the European Central Bank (ECB) must balance the needs of euro-area countries with differing economic conditions. Plot since 1990 the yield spread between government bonds in Italy (FRED code: INTGSBITM193N) and Germany (FRED code: INTGSBDEM193N), along with the yield spread between government bonds in Spain (FRED code: INTGSBESM193N) and Germany. Discuss the yield spreads after 2008, and explain how they reflect policy challenges for the ECB. (LO2)
2. How important is the balance-sheet channel of monetary policy? Plot since 1996 the net tightening of credit standards for consumer and credit card loans (FRED code: DRTSCLCC) and (on the right scale) household net worth (FRED code: TNWBSHNO). Do banks adjust lending conditions when household balance sheets improve or deteriorate? (LO1)
3. Among the challenges facing central banks around the world is the elevated level of public debt. Plot U.S. federal debt held by the public as a percent of gross domestic product (FRED code: FYPUGDA188S), and discuss the problems that government debt could pose for the Federal Reserve in the future. (LO2)
- 4.* Some critics argue that the Federal Reserve stoked the housing price bubble after 2000 by keeping monetary policy too stimulative. To investigate, first plot from 2000 to 2007 on a quarterly basis the Taylor rule gap—the difference between the Taylor rule (as described in Chapter 18 Data Exploration Problem 1) and the federal funds rate. Add to this plot on the right scale an index of U.S. housing prices (FRED code: SPCS20RSA). Does the evidence support the critics' claim? What other evidence might be sought? (LO1)