

The background of the top section of the page features the seal of the Board of Governors of the Federal Reserve System. The seal is circular with a blue border containing the words "BOARD OF GOVERNORS" and "FEDERAL RESERVE SYSTEM" separated by stars. In the center of the seal is an eagle with its wings spread, perched on a shield. The number "17" is prominently displayed in a large, dark red font over the left side of the seal.

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The Conduct of Monetary Policy: Strategy and Tactics

Learning Objectives

- Define and recognize the importance of a nominal anchor.
- Identify the six potential goals that monetary policymakers may pursue.
- Summarize the distinctions between hierarchical and dual mandates.
- Compare and contrast the advantages and disadvantages of inflation targeting.
- Identify the key changes made over time to the Federal Reserve's monetary policy strategy.
- List the four lessons learned from the global financial crisis, and discuss what they mean for inflation targeting.
- Summarize the arguments for and against central bank policy responses to asset-price bubbles.
- Describe and assess the four criteria for choosing a policy instrument.
- Interpret and assess the performance of the Taylor rule as a hypothetical policy instrument for setting the federal funds rate.

Preview

Getting monetary policy right is crucial to the health of the economy. Overly expansionary monetary policy leads to high inflation, which decreases the efficiency of the economy and hampers economic growth. Monetary policy that is too tight can produce serious recessions in which output falls and unemployment rises. It can also lead to deflation, a fall in the price level such as occurred in the United States during the Great Depression and in Japan more recently. As we saw in Chapter 12, deflation can be especially damaging to an economy because it promotes financial instability and can worsen financial crises.

Now that we understand the tools that central banks such as the Federal Reserve use to conduct monetary policy, we can consider how central banks *should* conduct monetary policy. To explore this subject, we start by looking at the goals of monetary policy and then examine one of the most important strategies for the conduct of monetary policy, inflation targeting. We then discuss tactics—that is, the choice and setting of the monetary policy instrument.

THE PRICE STABILITY GOAL AND THE NOMINAL ANCHOR

Over the past few decades, policymakers throughout the world have become increasingly aware of the social and economic costs of inflation, and more concerned with maintaining a stable price level as a goal of economic policy. Indeed, **price stability**, which central bankers define as low and stable inflation, is increasingly viewed as the most important goal of monetary policy. Price stability is desirable because a rising price level (inflation) creates uncertainty in the economy, and that uncertainty might hamper economic growth. For example, when the overall level of prices is changing, the information conveyed by the prices of goods and services is harder to interpret, which complicates decision making for consumers, businesses, and governments, thereby leading to a less efficient financial system.

Not only do public opinion surveys indicate that the public is hostile to inflation, but a growing body of evidence also suggests that inflation leads to lower economic growth. The most extreme example of unstable prices is *hyperinflation*, such as occurred in Argentina, Brazil, Russia, and Zimbabwe in the recent past. Hyperinflation has proved to be very damaging to the workings of an economy.

Inflation also makes it difficult to plan for the future. For example, it is more difficult to decide how much to put aside to provide for a child's college education in an inflationary environment. Furthermore, inflation can strain a country's social fabric: Conflict might result, because each group in the society may compete with other groups to make sure that its income keeps up with the rising level of prices.

The Role of a Nominal Anchor

Because price stability is so crucial to the long-term health of an economy, a central element in successful monetary policy is the use of a **nominal anchor**—a nominal variable, such as the inflation rate or the money supply, that ties down the price level to achieve price stability. Adherence to a nominal anchor that keeps the nominal variable within a narrow range promotes price stability by directly promoting low and stable inflation expectations. A more subtle reason for a nominal anchor's importance is that it can limit the **time-inconsistency problem**, in which monetary policy conducted on a discretionary, day-by-day basis leads to poor long-term outcomes.

The Time-Inconsistency Problem

The time-inconsistency problem is something we deal with continually in everyday life. We often have a plan that we know will produce a good outcome in the long run, but when tomorrow comes, we just can't help ourselves and we renege on our plan because doing so has short-term gains. For example, we make a New Year's resolution to go on a diet, but soon thereafter we can't resist having one more bite of that rocky road ice cream—and then another bite, and then another bite—and the weight begins to pile back on. In other words, we find ourselves unable to *consistently* follow a good plan over *time*; the good plan is said to be *time-inconsistent* and will soon be abandoned.

Monetary policymakers also face the time-inconsistency problem. They are always tempted to pursue a discretionary monetary policy that is more expansionary than firms or people expect because such a policy would boost economic output (or lower unemployment) in the short run. The best policy, however, is *not* to pursue expansionary policy, because decisions about wages and prices reflect workers' and firms' expectations about policy; when they see a central bank pursuing expansionary policy, workers and firms will raise their expectations about inflation, driving wages and prices up. The rise in wages and prices will lead to higher inflation, but will not result in higher output on average. (We examine this issue more formally in Chapter 25.)

A central bank will have better inflation performance in the long run if it does not try to surprise people with an unexpectedly expansionary policy, but instead keeps inflation under control. However, even if a central bank recognizes that discretionary policy will lead to a poor outcome (high inflation with no gains in output), it still may not be able to pursue the better policy of inflation control because politicians are likely to apply pressure on the central bank to try to boost output with overly expansionary monetary policy.

A clue as to how we should deal with the time-inconsistency problem comes from how-to books on parenting. Parents know that giving in to a child to keep him from acting up will produce a very spoiled child. Nevertheless, when a child throws a tantrum, many parents give him what he wants just to shut him up. Because parents don't stick to their "do not give in" plan, the child expects that he will get what he wants if

he behaves badly, so he continues to throw tantrums, over and over again. Parenting books suggest a solution to the time-inconsistency problem (although they don't call it that): Parents should set behavior rules for their children and stick to them.

A nominal anchor is like a behavior rule. Just as rules can help prevent the time-inconsistency problem in parenting by helping adults resist pursuing the discretionary policy of giving in, a nominal anchor can help prevent the time-inconsistency problem in monetary policy by providing an expected constraint on discretionary policy.

OTHER GOALS OF MONETARY POLICY

Although price stability is the primary goal of most central banks, five other goals are continually mentioned by central bank officials when they discuss the objectives of monetary policy: (1) high employment and output stability, (2) economic growth, (3) stability of financial markets, (4) interest-rate stability, and (5) stability in foreign exchange markets.

High Employment and Output Stability

High employment is a worthy goal for two main reasons: (1) the alternative situation—high unemployment—causes much human misery; and (2) when unemployment is high, the economy has both idle workers and idle resources (closed factories and unused equipment), resulting in a loss of output (lower GDP).

Although it is clear that high employment is desirable, how high should it be? At what point can we say that the economy is at full employment? At first, it might seem that full employment is the point at which no worker is out of a job—that is, when unemployment is zero. But this definition ignores the fact that some unemployment, called *frictional unemployment*, which involves searches by workers and firms to find suitable matchups, is beneficial to the economy. For example, a worker who decides to look for a better job might be unemployed for a while during the job search. Workers often decide to leave work temporarily to pursue other activities (raising a family, travel, returning to school), and when they decide to reenter the job market, it may take some time for them to find the right job.

Another reason that unemployment is not zero when the economy is at full employment is *structural unemployment*, a mismatch between job requirements and the skills or availability of local workers. Clearly, this kind of unemployment is undesirable. Nonetheless, it is something that monetary policy can do little about.

This goal of high employment is not an unemployment level of zero but a level above zero that is consistent with full employment, the point at which the demand for labor equals the supply of labor. This level is called the **natural rate of unemployment**.

Although this definition sounds neat and authoritative, it leaves a troublesome question unanswered: What unemployment rate is consistent with full employment? In some cases, it is obvious that the unemployment rate is too high. The unemployment rate in excess of 20% during the Great Depression, for example, was clearly far too high. In the early 1960s, on the other hand, policymakers thought that a reasonable goal for the unemployment rate was 4%, a level that was probably too low, because it led to accelerating inflation. Current estimates of the natural rate of unemployment place it between $4\frac{1}{2}$ % and 6%, but even this estimate is subject to much uncertainty and disagreement. It is possible, for example, that appropriate government policy, such as

the provision of better information about job vacancies or job training programs, might decrease the natural rate of unemployment.

The high employment goal can be thought of in another way. Because the level of unemployment is tied to the level of economic activity in the economy, a particular level of output is produced at the natural rate of unemployment, which naturally enough is referred to as the **natural rate of output** but is more often referred to as **potential output**.

Trying to achieve the goal of high employment thus means that central banks should try to move the level of output toward the natural rate of output. In other words, they should try to stabilize the level of output around its natural rate.

Economic Growth

The goal of steady economic growth is closely related to the high-employment goal because businesses are more likely to invest in capital equipment to increase productivity and economic growth when unemployment is low. Conversely, if unemployment is high and factories are idle, it does not pay for a firm to invest in additional plants and equipment. Although the two goals are closely related, policies can be aimed specifically at promoting economic growth by directly encouraging firms to invest or by encouraging people to save, which provides more funds for firms to invest. In fact, this approach is the stated purpose of *supply-side economics* policies, which are intended to spur economic growth by providing tax incentives for businesses to invest in facilities and equipment and for taxpayers to save more. Active debate continues over the role that monetary policy should play in boosting growth.

Stability of Financial Markets

As our analysis in Chapter 12 showed, financial crises can interfere with the ability of financial markets to channel funds to people with productive investment opportunities, and can lead to a sharp contraction in economic activity. The promotion of a more stable financial system, in which financial crises are avoided, is thus an important goal for a central bank. Indeed, as we saw in Chapter 14, the Federal Reserve System was created to promote financial stability in the wake of the bank panic of 1907.

Interest-Rate Stability

Interest-rate stability is desirable because fluctuations in interest rates can create uncertainty in the economy and make it harder to plan for the future. Fluctuations in interest rates that affect consumers' willingness to buy houses, for example, make it more difficult for consumers to decide when to purchase a house and for construction firms to plan how many houses to build. A central bank may also want to reduce upward movements in interest rates for the reasons we discussed in Chapter 14: Upward movements in interest rates generate hostility toward central banks and lead to demands that their power be curtailed.

The stability of financial markets is also fostered by interest-rate stability, because fluctuations in interest rates create great uncertainty for financial institutions. An increase in interest rates produces large capital losses on long-term bonds and mortgages, losses that can cause the failures of the financial institutions holding them. In recent years, more pronounced interest-rate fluctuations have been a particularly severe problem for savings and loan associations and mutual savings banks, many of which got into serious financial trouble in the 1980s and early 1990s.

Stability in Foreign Exchange Markets

With the increasing importance of international trade to the U.S. economy, the value of the dollar relative to other currencies has become a major consideration for the Fed. A rise in the value of the dollar makes American industries less competitive with those abroad, and a drop in the value of the dollar stimulates inflation in the United States. In addition, preventing large changes in the value of the dollar makes it easier for firms and individuals purchasing or selling goods abroad to plan ahead. Stabilizing extreme movements in the value of the dollar in foreign exchange markets is thus an important goal of monetary policy. In other countries, which are even more dependent on foreign trade, stability in foreign exchange markets takes on even greater importance.

SHOULD PRICE STABILITY BE THE PRIMARY GOAL OF MONETARY POLICY?

In the long run, no inconsistency exists between the price stability goal and the other goals mentioned earlier. The natural rate of unemployment is not lowered by high inflation, so higher inflation cannot produce lower unemployment or more employment in the long run. In other words, there is no long-run trade-off between inflation and employment. In the long run, price stability promotes economic growth as well as financial and interest-rate stability. Although price stability is consistent with the other goals in the long run, in the short run price stability often conflicts with the goals of output stability and interest-rate stability. For example, when the economy is expanding and unemployment is falling, the economy may become overheated, leading to a rise in inflation. To pursue the price stability goal, a central bank would prevent this overheating by raising interest rates, an action that would initially cause output to fall and increase interest-rate instability. How should a central bank resolve this conflict among goals?

Hierarchical Versus Dual Mandates

Because price stability is crucial to the long-run health of the economy, many countries have decided that price stability should be the primary, long-run goal for central banks. For example, the Maastricht Treaty, which created the European Central Bank, states, “The primary objective of the European System of Central Banks [ESCB] shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Community,” which include objectives such as “a high level of employment” and “sustainable and non-inflationary growth.” Mandates of this type, which put the goal of price stability first and then state that other goals can be pursued as long as price stability is achieved, are known as **hierarchical mandates**. They are the directives governing the behavior of such central banks as the Bank of England, the Bank of Canada, and the Reserve Bank of New Zealand, as well as the European Central Bank.

In contrast, the legislation that defines the mission of the Federal Reserve states, “The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long-run growth of the monetary and credit aggregates commensurate with the economy’s long-run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate

long-term interest rates.” Because, as we learned in Chapter 5, long-term interest rates will be very high if inflation is high, this statement in practice is a **dual mandate** to achieve two coequal objectives: price stability and maximum employment (output stability).

Is it better for an economy to operate under a hierarchical mandate or a dual mandate?

Price Stability as the Primary, Long-Run Goal of Monetary Policy

Because no inconsistency exists between achieving price stability in the long run and the natural rate of unemployment, these two types of mandates are not very different if *maximum employment is defined as the natural rate of employment*. In practice, however, a substantial difference between these two mandates might exist because the public and politicians may believe that a hierarchical mandate puts too much emphasis on inflation control and not enough on stabilizing output.

Because low and stable inflation rates promote economic growth, central bankers have come to realize that price stability should be the primary, long-run goal of monetary policy. Nevertheless, because output fluctuations should also be a concern of monetary policy, the goal of price stability should be seen as primary only in the long run. Attempts to keep inflation at the same level in the short run, no matter what else is happening in the economy, are likely to lead to excessive output fluctuations.

As long as price stability is a long-run, but not short-run, goal, central banks can focus on reducing output fluctuations by allowing inflation to deviate from the long-run goal for short periods and, therefore, can operate under a dual mandate. However, if a dual mandate leads a central bank to pursue short-run expansionary policies that increase output and employment without worrying about the long-run consequences for inflation, the time-inconsistency problem may recur. Concerns that a dual mandate might lead to overly expansionary policy is a key reason why central bankers often favor hierarchical mandates in which the pursuit of price stability takes precedence. Hierarchical mandates can also be a problem if they lead to a central bank behaving as what the Governor of the Bank of England, Mervyn King, referred to as an “inflation nutter”—that is, a central bank that focuses solely on inflation control, even in the short run, and so undertakes policies that lead to large output fluctuations. Deciding which type of mandate is better for a central bank ultimately depends on the subtleties of how the mandate will work in practice. Either type of mandate is acceptable as long as it operates to make price stability the primary goal in the long run, but not in the short run.

INFLATION TARGETING

The recognition that price stability should be the primary long-run goal of monetary policy and that a nominal anchor is a valuable tool in helping to achieve this goal has led to a monetary policy strategy known as *inflation targeting*. **Inflation targeting** involves several elements: (1) public announcement of medium-term numerical objectives (targets) for inflation; (2) an institutional commitment to price stability as the primary, long-run goal of monetary policy and a commitment to achieving the inflation goal; (3) an information-inclusive approach in which many variables (not just monetary aggregates) are used in making decisions about monetary policy; (4) increased

transparency of the monetary policy strategy through communication with the public and the markets about the plans and objectives of monetary policymakers; and (5) increased accountability of the central bank for attaining its inflation objectives. New Zealand was the first country to formally adopt inflation targeting in 1990, followed by Canada in 1991, the United Kingdom in 1992, Sweden and Finland in 1993, and Australia and Spain in 1994. Israel, Chile, and Brazil, among other countries, have also adopted a form of inflation targeting.¹

Inflation Targeting in New Zealand, Canada, and the United Kingdom

We begin our look at inflation targeting with New Zealand, because it was the first country to adopt this strategy. We then go on to examine inflation targeting in Canada and the United Kingdom, which were the next countries to adopt it.

New Zealand As part of a general reform of the government's role in the economy, the New Zealand parliament passed a new Reserve Bank of New Zealand Act in 1989, which became effective on February 1, 1990. In addition to increasing the independence of the central bank, which transformed it from one of the least independent central banks among developed countries to one of the most independent, the act committed the Reserve Bank to a sole objective of price stability. The act stipulated that the minister of finance and the governor of the Reserve Bank should negotiate and make public a Policy Targets Agreement, a statement that sets out the targets by which monetary policy performance will be evaluated, specifying numerical target ranges for inflation and the dates by which they are to be reached. An unusual feature of the New Zealand legislation is that the governor of the Reserve Bank is held highly accountable for the success of monetary policy. If the goals set forth in the Policy Targets Agreement are not satisfied, the governor is subject to dismissal.

The first Policy Targets Agreement, signed by the minister of finance and the governor of the Reserve Bank on March 2, 1990, directed the Reserve Bank to achieve an annual inflation rate within a 3–5% range. Subsequent agreements lowered the range to 0–2% until the end of 1996, when the range was changed to 0–3%. In 2002, the range was changed again, to 1–3%. Tight monetary policy brought the inflation rate down from above 5% to below 2% by the end of 1992 (see Figure 1, panel (a)), but at the cost of a deep recession and a sharp rise in unemployment. Since then, inflation has typically remained within the targeted range, with the exception of brief periods in 1995, 2000, 2006, 2008, and 2011, when it exceeded the range by a small amount, and in 2013, when it temporarily dropped slightly below the target range. (Under the Reserve Bank Act, the governor could have been dismissed, but after parliamentary debates, the governor retained his job each time.) Since 1992, New Zealand's growth rate has generally been high, with some years exceeding 5%, and unemployment has decreased significantly.

Canada On February 26, 1991, a joint announcement by the minister of finance and the governor of the Bank of Canada established formal inflation targets. The target ranges were 2–4% by the end of 1992, 1.5–3.5% by June 1994, and 1–3% by December 1996.

¹A precursor to the inflation-targeting strategy is monetary targeting. This strategy is discussed in Appendix 1 to this chapter, "Monetary Targeting," which is available on the Companion Website at <http://www.pearsonglobaleditions.com/Mishkin>.

MyEconLab Mini-lecture

MyEconLab Real-time data

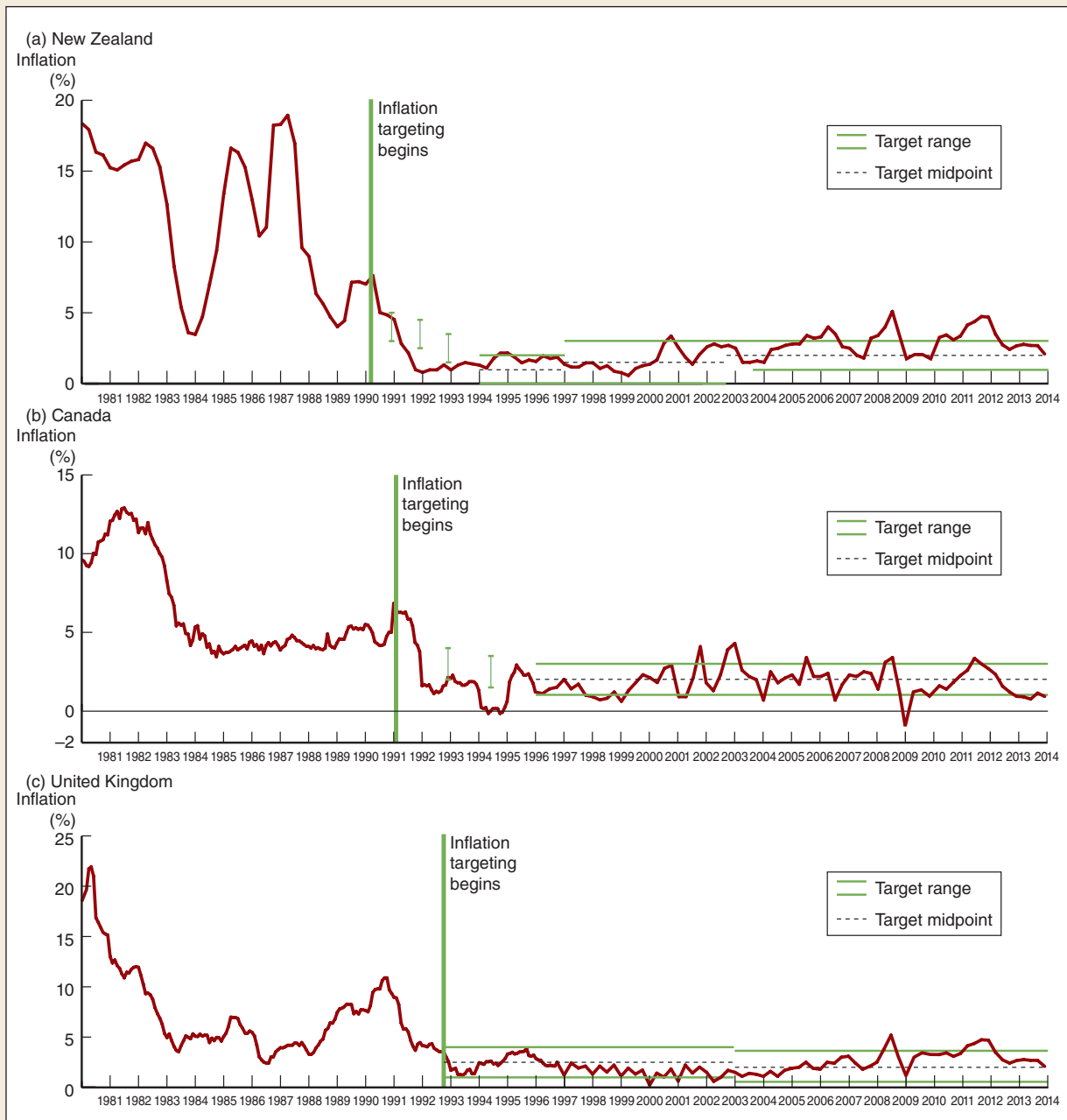


FIGURE 1 Inflation Rates and Inflation Targets for New Zealand, Canada, and the United Kingdom, 1980–2014

Inflation-targeting countries have significantly reduced the rate of inflation and over time have achieved their inflation targets.

Sources: Ben S. Bernanke, Thomas Laubach, Frederic S. Mishkin, and Adam S. Poson, *Inflation Targeting: Lessons from the International Experience* (Princeton: Princeton University Press, 1999); and Federal Reserve Bank of St. Louis, FRED database: <http://research.stlouisfed.org/fred2/>.

After the new government took office in late 1993, the target range was set at 1–3% from December 1995 until December 1998 and has been kept at this level. Canadian inflation has also fallen dramatically since the adoption of inflation targets, from above 5% in 1991, to a 0% rate in 1995, and to around 2% subsequently (see Figure 1, panel (b)). As was the case in New Zealand, however, this decline was not without cost: Unemployment soared to above 10% from 1991 until 1994, but then declined substantially.

United Kingdom In October 1992, the United Kingdom adopted an inflation target as its nominal anchor, and the Bank of England began to produce an *Inflation Report*, a quarterly report on the progress being made in achieving the target. The inflation target range was initially set at 1–4% until the next election (spring 1997 at the latest), with the intent that the inflation rate should settle down to the lower half of the range (below 2.5%). In May 1997, the inflation target was set at 2.5% and the Bank of England was given the power to set interest rates henceforth, granting it a more independent role in monetary policy.

Before the adoption of inflation targets, inflation had already been falling in the United Kingdom, with a peak of 9% at the beginning of 1991 and a rate of 4% at the time of adoption (see Figure 1, panel (c)). By the third quarter of 1994, it was at 2.2%, within the intended range. Subsequently, inflation rose, climbing slightly above the 2.5% level by the end of 1995, but then fell and has remained close to the target since then, except for the period from 2008 to 2012. In December 2003, the target was changed to 2.0% for a slightly different measure of inflation. Meanwhile, growth of the U.K. economy was strong until 2008, causing a substantial reduction in the unemployment rate.²

Advantages of Inflation Targeting

There are a number of benefits associated with inflation targeting: reduction of the time-inconsistency problem, increased transparency, increased accountability, consistency with democratic principles, and improved performance.

Reduction of the Time-Inconsistency Problem Because an explicit numerical inflation target increases the accountability of the central bank, inflation targeting can reduce the likelihood that the central bank will fall into the time-inconsistency trap of trying to expand output and employment in the short run by pursuing overly expansionary monetary policy. A key advantage of inflation targeting is that it can help focus the political debate on what a central bank can do in the long run—that is, control inflation—rather than what it cannot do, that is, permanently increase economic growth and the number of jobs through expansionary monetary policy. Thus inflation targeting can reduce political pressures on the central bank to pursue inflationary monetary policy and thereby reduce the likelihood of the time-inconsistency problem.

Increased Transparency Inflation targeting has the advantage that it is readily understood by the public and is thus highly transparent. Indeed, inflation-targeting regimes place great importance on transparency in policymaking and on regular

²If you are interested in a more detailed discussion of inflation targeting in these and other countries, see Ben S. Bernanke, Thomas Laubach, Frederic S. Mishkin, and Adam S. Posen, *Inflation Targeting: Lessons from the International Experience* (Princeton: Princeton University Press, 1999).

communication with the public. Inflation-targeting central banks have frequent communications with the government, some mandated by law and some in response to informal inquiries, and their officials take every opportunity to make public speeches on their monetary policy strategy. Although these techniques are also commonly used in countries that have not adopted inflation targeting, inflation-targeting central banks have taken public outreach a step further: Not only do they engage in extended public information campaigns, including the distribution of glossy brochures, but they also publish documents like the Bank of England's *Inflation Report*. These documents are particularly noteworthy because, unlike the usual dull-looking, formal reports of central banks, they make use of fancy graphics, boxes, and other eye-catching design elements to engage the public's interest.

The channels of communication just discussed are used by central banks in inflation-targeting countries to explain the following concepts to the general public, financial market participants, and politicians: (1) the goals and limitations of monetary policy, including the rationale for inflation targets; (2) the numerical values of the inflation targets and how they were determined; (3) how the inflation targets are to be achieved, given current economic conditions; and (4) reasons for any deviations from the targets. These communications have improved private sector planning by reducing uncertainty about monetary policy, interest rates, and inflation; they have promoted public debate of monetary policy, in part by educating the public about what a central bank can and cannot achieve; and they have helped clarify the responsibilities of the central bank and of politicians in the conduct of monetary policy.

Increased Accountability Another key feature of inflation-targeting regimes is the tendency toward increased accountability of the central bank. Indeed, transparency and communication go hand in hand with increased accountability. The strongest case of accountability of a central bank in an inflation-targeting regime is in New Zealand, where the government has the right to dismiss the Reserve Bank's governor if the inflation targets are breached, even for one quarter. In other inflation-targeting countries, the central bank's accountability is less formalized. Nevertheless, the transparency of policy associated with inflation targeting has tended to make the central bank highly accountable to the public and the government. Sustained success in the conduct of monetary policy as measured against a preannounced and well-defined inflation target can be instrumental in building public support for a central bank's independence and for its policies. This building of public support and accountability occurs even in the absence of a rigidly defined and legalistic standard of performance evaluation and punishment.

Consistency with Democratic Principles Not only is accountability valuable in its own right, but it also makes the institutional framework for the conduct of monetary policy more consistent with democratic principles. The inflation-targeting framework promotes the accountability of the central bank to elected officials, who are given some responsibility for setting the goals of monetary policy and then monitoring the economic outcomes. However, under inflation targeting as it generally has been practiced, the central bank has complete control over operational decisions and so can be held accountable for achieving its assigned objectives.

Improved Performance The performance of inflation-targeting regimes has been quite good. Inflation-targeting countries seem to have significantly reduced both the rate of inflation and inflation expectations beyond what likely would have occurred in the absence of inflation targets. Furthermore, once lowered, inflation in these countries

has stayed low; following disinflations, the inflation rate in inflation-targeting countries has not bounced back up during subsequent cyclical expansions of the economy.

Disadvantages of Inflation Targeting

Critics of inflation targeting cite four disadvantages of this monetary policy strategy: delayed signaling, too much rigidity, the potential for increased output fluctuations, and low economic growth. We look at each in turn and examine the validity of these criticisms.

Delayed Signaling Inflation is not easily controlled by the monetary authorities. Furthermore, because of the long lags in the effects of monetary policy, inflation outcomes are revealed only after a substantial lag. Thus an inflation target does not send immediate signals to the public and the markets about the stance of monetary policy.

Too Much Rigidity Some economists criticize inflation targeting because they believe it imposes a rigid rule on monetary policymakers and limits their ability to respond to unforeseen circumstances. However, useful policy strategies exist that are “rule-like” in that they involve forward-looking behavior that limits policymakers from systematically engaging in policies with undesirable long-run consequences. Such policies avoid the time-inconsistency problem and would be best described as “constrained discretion,” a term coined by Ben Bernanke and the author of this book.

Indeed, inflation targeting can be described exactly in this way. Inflation targeting, as actually practiced, is far from rigid and is better described as “flexible inflation targeting.” First, inflation targeting does not prescribe simple and mechanical instructions on how the central bank should conduct monetary policy. Rather, it requires the central bank to use all available information to determine which policy actions are appropriate to achieve the inflation target. Unlike simple policy rules, inflation targeting never requires the central bank to focus solely on one key variable. Second, inflation targeting, as practiced, contains a substantial degree of policy discretion. Inflation targets have been modified depending on economic circumstances, as we have seen. Moreover, central banks under inflation-targeting regimes have left themselves considerable scope to respond to output growth and fluctuations through several devices.

Potential for Increased Output Fluctuations An important criticism of inflation targeting is that a sole focus on inflation may lead to monetary policy that is too tight when inflation is above target and thus may result in larger output fluctuations. Inflation targeting does not, however, require a sole focus on inflation—in fact, experience has shown that inflation targeters display substantial concern about output fluctuations. All the inflation targeters have set their inflation targets above zero.³ For example, New Zealand, Canada, the United Kingdom, and Sweden currently set the midpoints of their inflation targets at 2%, while Australia sets its midpoint at 2.5%.

The decision by inflation targeters to choose inflation targets above zero reflects the concern of monetary policymakers that particularly low inflation can have substantial negative effects on real economic activity. Deflation (negative inflation, in which the

³Consumer price indexes have been found to have an upward bias in the measurement of true inflation, so it is not surprising that inflation targets are chosen to exceed zero. However, the actual targets have been set to exceed the estimates of this measurement bias, indicating that inflation targeters have decided on targets for inflation that exceed zero even after measurement bias is accounted for.

price level actually falls) is especially to be feared because of the possibility that it may promote financial instability and precipitate a severe economic contraction (as discussed in Chapter 12). The deflation in Japan in recent years has been an important factor in the weakening of the Japanese financial system and economy. Inflation-targeting rates above zero make periods of deflation less likely. This is one reason why some economists, both within and outside of Japan, called on the Bank of Japan to adopt an inflation target at levels of 2%, which the Bank of Japan finally did in 2013.

Inflation targeting also does not ignore traditional stabilization goals. Central bankers in inflation-targeting countries continue to express their concern about fluctuations in output and employment, and the ability to accommodate short-run stabilization goals to some degree is built into all inflation-targeting regimes. All inflation-targeting countries have been willing to minimize output declines by gradually lowering medium-term inflation targets toward the long-run goal.

Low Economic Growth Another common concern about inflation targeting is that it will lead to low growth in output and employment. Although inflation reduction has been associated with below-normal output during disinflationary phases in inflation-targeting regimes, once low inflation levels were achieved, output and employment returned to levels at least as high as they were before. A conservative conclusion is that once low inflation is achieved, inflation targeting is not harmful to the real economy. Given the strong economic growth after disinflation in many countries (such as New Zealand) that have adopted inflation targets, a case can be made that inflation targeting promotes real economic growth, in addition to controlling inflation.

THE EVOLUTION OF THE FEDERAL RESERVE'S MONETARY POLICY STRATEGY

The Federal Reserve's monetary policy has evolved over time. We first discuss the Fed's monetary policy strategy prior to Ben Bernanke's term as chair of the Federal Reserve, and then see how the monetary policy evolved into a flexible inflation-targeting regime starting in January 2012.

The Fed's "Just Do It" Monetary Policy Strategy

From the 1980s up until the time Ben Bernanke became chair of the Federal Reserve in 2006, the Federal Reserve was able to achieve excellent macroeconomic performance (including low and stable inflation), and it did so without using an explicit nominal anchor such as an inflation target. Although the Federal Reserve did not articulate an explicit strategy, a coherent strategy for the conduct of monetary policy existed nonetheless. This strategy involved an implicit, but not an explicit, nominal anchor in the form of an overriding concern on the part of the Federal Reserve to control inflation in the long run. In addition, it involved forward-looking behavior that included careful monitoring for signs of future inflation, using a wide range of information coupled with periodic "preemptive strikes" by monetary policy against the threat of inflation.

As emphasized by Milton Friedman, monetary policy effects have long lags. In industrialized countries with a history of low inflation, the inflation process seems to have tremendous inertia: Estimates from large macroeconomic models of the U.S. economy, for example, suggest that monetary policy takes over a year to affect output

and over two years to have a significant impact on inflation. For countries that have experienced highly variable inflation, and therefore have more flexible prices, the lags may be shorter.

The presence of long lags means that monetary policy cannot wait for inflation to begin before it responds to it. If a central bank waits until overt signs of inflation appear, it will already be too late to maintain stable prices, at least not without a severe tightening of policy: Inflation expectations will already be embedded in the wage- and price-setting process, creating an inflation momentum that will be hard to halt. Inflation becomes much harder to control once it has been allowed to gather momentum, because higher inflation expectations become ingrained in various types of long-term contracts and pricing agreements.

To prevent inflation from getting started, therefore, monetary policy needs to be forward-looking and preemptive. That is, depending on the lags from monetary policy to inflation, monetary policy needs to act long before inflationary pressures are seen in the economy. For example, suppose it takes roughly two years for monetary policy to have a significant impact on inflation. In this case, even if inflation is currently low but policymakers believe inflation will rise over the next two years with an unchanged stance of monetary policy, they must tighten monetary policy *now* to prevent the inflationary surge.

Under Alan Greenspan and Ben Bernanke, the Federal Reserve was successful in pursuing a preemptive monetary policy. For example, the Fed raised interest rates from 1994 to 1995 before a rise in inflation got a toehold. As a result, inflation did not just remain steady; it fell slightly. The Fed also conducted preemptive strikes against economic downturns. For example, the Fed started easing monetary policy in September 2007 at the onset of the global financial crisis, even though the economy was growing strongly at the time and inflation was rising.⁴ (However, in this case, the Fed's preemptive policy was not sufficient to overcome the massive negative shock to the economy from the disruption to financial markets.) This preemptive, forward-looking monetary policy strategy is clearly also a feature of inflation-targeting regimes, because monetary policy instruments are adjusted to take into account the long lags in their effects on inflation.

However, the Fed's policy regime prior to the global financial crisis might best be described as a "just do it" policy, and it differed from inflation targeting in that it did not officially set a nominal anchor and was much less transparent. However, because the Fed's "just do it" approach had some of the key elements of inflation targeting, it also had many of its strengths. As with inflation targeting, the central bank used many sources of information to determine the best settings for monetary policy. The Fed's forward-looking behavior and stress on price stability helped discourage overly expansionary monetary policy, thereby ameliorating the time-inconsistency problem.

However, despite its success, the Fed's "just do it" approach had several weaknesses. First was its lack of transparency. The Fed's close-mouthed approach about its intentions gave rise to a constant guessing game about its future actions. This high level of uncertainty led to unnecessary volatility in financial markets and created doubt among producers and the general public about the future course of inflation and output. Furthermore, the opacity of the Fed's policymaking made it hard for Congress and the general public to hold the Federal Reserve accountable: The Fed could not be held accountable for its decisions if there were no predetermined criteria for judging its performance, and this lack of accountability was inconsistent with democratic principles. Low accountability might also make the Fed more susceptible to the time-inconsistency problem, whereby it might pursue short-term objectives at the expense of long-term ones.

⁴These episodes are discussed in the brief history of Fed policymaking given in Appendix 2 to this chapter, which is available on the Companion Website at <http://www.pearsonglobaleditions.com/Mishkin>.

The Long Road to Inflation Targeting

Alan Greenspan, chair of the Fed from 1987 until 2006, was not a strong advocate of increased Federal Reserve transparency. Hence, despite the weaknesses of the “just do it” approach and the successes of inflation-targeting regimes from 1991 on, Greenspan was opposed to the adoption of an inflation target and quashed movements in this direction at an FOMC meeting in 1996. When Ben Bernanke became chair of the Fed in 2006, increased Fed transparency and inflation targeting now had a strong advocate (see the Inside the Fed box).

Shortly after becoming Fed chair, Bernanke made it clear that any movement toward inflation targeting must result from a consensus within the FOMC. He then set up an internal subcommittee to discuss Federal Reserve communications, which included discussions about announcing a specific numerical inflation objective. The FOMC made a partial step in the direction of inflation targeting in November 2007 when it announced a new communication strategy that lengthened the horizon for FOMC participants’ inflation projections to three years. In many cases, the three-year horizon would be sufficiently long that the projection for inflation under “appropriate policy” would reflect each participant’s inflation objective, because at the three-year horizon inflation should converge to the long-run objective.

In July 2008, in his last speech as a governor of the Federal Reserve, the author of this book argued that a few relatively minor modifications to the inflation objective could move the Fed even further toward inflation targeting.⁵ The Fed’s first goal should be to

Inside the Fed Ben Bernanke’s Advocacy of Inflation Targeting

Ben Bernanke is a world-renowned expert on monetary policy who wrote extensively on inflation targeting while working in academia. While a professor at Princeton, Bernanke, in several articles and in a book co-written with the author of this book, argued that inflation targeting would be a major step forward for the Federal Reserve and would produce better economic outcomes, for many of the reasons outlined earlier.*

When Bernanke took his position as a governor of the Federal Reserve from 2002 to 2005, he continued to advocate the adoption of an inflation target. In an important speech given at a conference at the Federal Reserve Bank of St. Louis in 2004, he described how the Federal Reserve might approach a movement toward inflation targeting: The Fed should announce a numerical value for its long-run inflation goal.[†] Bernanke emphasized that announcing such an objective for inflation would be completely consistent with the Fed’s

dual mandate of achieving price stability and maximum employment, and therefore might be called a *mandate-consistent inflation objective*, since the inflation objective would be set above zero to avoid deflations, which have harmful effects on employment. In addition, the inflation objective would not be intended as a short-run target that might lead to excessively tight control of inflation at the expense of overly high employment fluctuations.

*Ben S. Bernanke and Frederic S. Mishkin, “Inflation Targeting: A New Framework for Monetary Policy,” *Journal of Economic Perspectives*, vol. 11, no. 2 (1997); Ben S. Bernanke, Frederic S. Mishkin, and Adam S. Posen, “Inflation Targeting: Fed Policy After Greenspan,” *Milken Institute Review* (Fourth Quarter, 1999): 48–56; Ben S. Bernanke, Frederic S. Mishkin, and Adam S. Posen, “What Happens When Greenspan Is Gone,” *Wall Street Journal*, January 5, 2000, p. A22; and Ben S. Bernanke, Thomas Laubach, Frederic S. Mishkin, and Adam S. Posen, *Inflation Targeting: Lessons from the International Experience* (Princeton, NJ: Princeton University Press, 1999).

[†]Ben S. Bernanke, “Inflation Targeting,” Federal Reserve Bank of St. Louis, *Review*, vol. 86, no. 4 (July/August 2004): 165–168.

⁵See Frederic S. Mishkin, “Whither Federal Reserve Communications,” speech given at the Petersen Institute for International Economics, Washington, DC, July 28, 2008, <http://www.federalreserve.gov/newsevents/speech/mishkin20080>.

set a date for its inflation objective that was sufficiently far off that inflation would almost surely converge to its long-run value by that date. In January 2009, the FOMC adopted this modification by adding long-term inflation forecasts under “appropriate policy” to the published FOMC participants’ projections. Second, the FOMC participants should be willing to reach a consensus on a single value for the mandate-consistent inflation objective. Third, the FOMC should not modify this inflation objective unless there were valid scientific reasons for doing so. With these two additional modifications, the longer-run inflation projections would, in effect, be an announcement of a specific numerical objective for the inflation rate, and so would serve as a flexible version of inflation targeting. In October 2010, then-chair Bernanke gave a speech advocating exactly this approach.⁶ However, he was unable to convince his colleagues on the FOMC to adopt it.

When Janet Yellen left her position as president of the Federal Reserve Bank of San Francisco to become the vice-chair of the Board of Governors of the Federal Reserve System in 2010, Bernanke now had a strong ally for inflation targeting occupying the second-most-powerful position in the Federal Reserve System. In October 2010, Bernanke appointed Yellen as the chair of the internal subcommittee on communications, and the adoption of inflation targeting was not far off. The FOMC finally moved to inflation targeting on January 25, 2012, when it issued its “Statement on Long-Run Goals and Monetary Policy Strategy.”⁷ In this statement, which is renewed every January, the FOMC agreed to a single numerical value of the inflation objective, 2% on the PCE deflator. However, the statement also made it clear that the Federal Reserve would be pursuing a flexible form of inflation targeting, consistent with its dual mandate, because it would not only seek to achieve its inflation target but would also focus on promoting maximum sustainable employment.

The Federal Reserve is not the only central bank that has moved slowly toward inflation targeting. As the Global box, “The European Central Bank’s Monetary Policy Strategy,” suggests, the European Central Bank also follows a weak form of inflation targeting.

Global The European Central Bank’s Monetary Policy Strategy

The European Central Bank (ECB) has also been slow to move toward inflation targeting, adopting a hybrid monetary strategy that includes some elements of inflation targeting.* Shortly before the ECB became fully operational in 1999, its governing council defined price stability as an inflation rate below 2%. However, in May 2003, the ECB adopted a goal for inflation over the medium term of “below, but close to, 2%.” The ECB’s strategy has two key “pillars.” First, monetary and credit aggregates are assessed for “their implications for future inflation and economic growth.” Second, many other economic variables are used to assess the future economic outlook.

The ECB’s strategy is somewhat unclear and has been subject to criticism for this reason. Although the “below, but close to, 2%” goal for inflation sounds like an inflation target, the ECB has repeatedly stated that it does not have an inflation target. This central bank seems to have decided to try to “have its cake and eat it, too” by not committing too strongly to an inflation-targeting strategy. The resulting difficulty in assessing the ECB’s strategy has the potential to reduce the accountability of the institution.

*For a description of the ECB’s monetary policy strategy, go to the ECB’s website at <http://www.ecb.int>.

⁶Ben S. Bernanke, “Monetary Policy Objectives and Tools in a Low-Inflation Environment,” speech given at the Federal Reserve Bank of Boston’s conference, Revisiting Monetary Policy in a Low-Inflation Environment, October 15, 2010.

⁷These statements can be found at <http://www.federalreserve.gov/monetarypolicy/default.htm>.

LESSONS FOR MONETARY POLICY STRATEGY FROM THE GLOBAL FINANCIAL CRISIS

Our discussion in previous chapters of the course of events that characterized the global financial crisis suggests four basic lessons for economists and policymakers on how the economy works.⁸

1. *Developments in the financial sector have a far greater impact on economic activity than was earlier realized.* Although before the crisis economists and policymakers generally recognized that financial frictions could play an important role in business cycle fluctuations, as we saw in Chapter 12, the global financial crisis made it abundantly clear that the adverse effects of financial disruptions on economic activity could be far worse than originally anticipated.
2. *The zero lower bound on interest rates can be a serious problem.* As we saw in Chapter 16, the zero lower bound on interest rates has forced the Federal Reserve to use nonconventional monetary policy tools, not only since the crisis but also during the 2003–2006 period. Although these nonconventional tools can help stimulate the economy, they are more complicated to use than conventional tools and their impact on the economy is more uncertain, so they may be harder to use effectively.
3. *The cost of cleaning up after a financial crisis is very high.* As we saw in Chapter 12, financial crises are followed by deep recessions. In addition, recoveries from financial crises are very slow. Carmen Reinhart of the Petersen Institute for International Economics and Vincent Reinhart of the American Enterprise Institute have documented that economic growth is significantly lower during the decade following financial crises, and unemployment rates stay persistently higher for a decade after crisis episodes. In addition, in the aftermath of financial crises, government indebtedness almost always sharply increases and can lead to defaults on government debt, which have become a major concern in Europe in the aftermath of the most recent crisis.⁹
4. *Price and output stability do not ensure financial stability.* Before the recent financial crisis, the common view in both academia and central banks was that achieving price and output stability would promote financial stability. However, the success of central banks in stabilizing inflation and the decreased volatility of business cycle fluctuations before 2007, which became known as the “Great Moderation,” did not protect the economy from financial instability. Indeed, it may have promoted it. The low volatility of both inflation and output fluctuations may have lulled market participants into thinking less risk was present in the economic system than was really the case, leading them to take excessive risks, which in turn helped to fuel the global financial crisis.

What implications do these lessons have for monetary policy strategy? We first consider how these lessons might affect our thinking about inflation targeting and then look at how central banks should respond to asset-price bubbles.

⁸For a more detailed discussion of the lessons of the global financial crisis for monetary policy strategy, see Frederic S. Mishkin, “Monetary Policy Strategy: Lessons from the Crisis,” in Marek Jarocinski, Frank Smets, and Christian Thimann, eds., *Monetary Policy Revisited: Lessons from the Crisis*, Sixth ECB Central Banking Conference (Frankfurt, European Central Bank, 2011), pp. 67–118.

⁹See Carmen M. Reinhart and Vincent R. Reinhart, “After the Fall,” *Macroeconomic Challenges: The Decade Ahead*, Federal Reserve Bank of Kansas City Economic Symposium, 2010, manuscript available at <http://www.kansascityfed.org>; and Carmen M. Reinhart and Kenneth S. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton, NJ: Princeton University Press, 2009).

Implications for Inflation Targeting

Earlier in the chapter, we outlined the arguments for inflation targeting, and none of the lessons listed above contradicts these arguments. Although support for the inflation-targeting strategy is not weakened by the lessons learned from the financial crisis, these lessons do suggest that inflation targeting may need to be more flexible and also may need to be modified on several dimensions. First, we look at what these lessons might mean for the level of the inflation target.

Level of the Inflation Target As our discussion earlier in the chapter indicated, central banks typically have an inflation target around the 2% level. The seriousness of the zero-lower-bound problem raises the question of whether this target level is too low. A controversial paper written by researchers at the IMF, including its chief economist, suggests that the inflation target might be raised from the 2% level to the 4% level.¹⁰ The paper argues that with expectations of inflation anchored to this 4% target, by lowering the nominal interest rate to zero, the real interest rate, $i_r = i - \pi^e$, could be decreased to as low as -4% ($= 0 - 4\%$), rather than the rate of -2% ($= 0 - 2\%$) associated with the 2% inflation target. Conventional monetary policy, which involves manipulating the nominal policy rate, would then be able to become more expansionary when interest rates fell to a floor of zero than it could with the lower inflation target. In other words, the zero lower bound on the policy rate would be less binding with a higher inflation target.

Although this argument is theoretically sound, and raising the inflation target does have its benefits, we also have to look at its costs. The benefits of a higher inflation target accrue only when the zero-lower-bound problem occurs. Although this was a major problem during the global financial crisis, such episodes have not been very frequent. If the zero-lower-bound problem is rare, then the benefits of a higher inflation target are not so large because they are available only infrequently. However, the costs of higher inflation in terms of the distortions it produces in the economy, mentioned early in the chapter, are ongoing. Thus, although these costs may not be that large in any given year, they add up over time and may outweigh the intermittent benefits of a higher inflation target when the zero lower bound occurs.

Another problem with a higher inflation target is that the history of inflation suggests that it is more difficult to stabilize the inflation rate at a 4% level than at a 2% level. Once inflation starts to rise above this level, the public is likely to believe that price stability is no longer a credible goal of the central bank. The question then arises, if a 4% level of inflation is okay, then why not 6%, or 8%, and so on? Indeed, this is what seems to have happened in the 1960s, when economists such as Paul Samuelson and Robert Solow of MIT, both eventual recipients of the Nobel Prize, argued that policymakers should be willing to tolerate higher inflation rates in the 4–5% range. But when inflation rose to that level, the policy authorities could not contain it at that level, and it kept on rising to double-digit levels by the early 1980s. Getting inflation back down again during the Volcker era was very costly. No central banker wants to go through that cycle again, and this is why central bankers have been so hostile to the IMF researchers' suggestion.

Flexibility of Inflation Targeting We have seen that inflation targeting as actually practiced would be better described as “flexible inflation targeting.” However, before the global financial crisis, this flexibility involved allowing some short-run deviations

¹⁰Olivier Blanchard, Giovanni Dell’Ariccia, and Paolo Mauro, “Rethinking Monetary Policy,” *Journal of Money, Credit and Banking*, vol. 42, Issue Supplement S1 (September 2010): 199–217.

of inflation from the inflation target in order to promote output stability as well as price stability. Two lessons from the crisis—that financial instability can have devastating effects on the economy and that achieving price and output stability does not ensure financial stability—have led to a recognition that central banks need to pay more attention to financial stability, not only in designing inflation-targeting regimes but also in any monetary policy framework. Particularly important in this regard is the issue of how central banks should respond to asset-price bubbles, the topic we discuss next.

SHOULD CENTRAL BANKS TRY TO STOP ASSET-PRICE BUBBLES?

Over the centuries, economies have been subject to periodic **asset-price bubbles**, pronounced increases in asset prices, or “bubbles,” that depart from fundamental values and that eventually burst resoundingly. The story of the global financial crisis, discussed in Chapter 12, indicates just how costly these bubbles can be. The bursting of the asset-price bubble in the housing market brought down the financial system, leading to an economic downturn, a rise in unemployment, and direct hardship for families who were forced to leave their homes after foreclosures.

The high economic cost of asset-price bubbles raises the following questions: What should central banks do about them? Should they use monetary policy to try to pop the bubbles? Are there regulatory measures they can take to rein in asset-price bubbles? To answer these questions, we need to ask whether there are different kinds of bubbles that require different types of responses.

Two Types of Asset-Price Bubbles

To think about central banks’ response to asset-price bubbles, we first need to look at the different types of bubbles and how each might best be addressed. Asset-price bubbles are of two types: one type is driven by credit, and the second type is driven purely by overly optimistic expectations (dubbed “irrational exuberance” by Alan Greenspan).

Credit-Driven Bubbles When a credit boom begins, an asset-price bubble may begin to form. Easier-to-get credit can be used to purchase particular assets and thereby raise their prices. The rise in asset values, in turn, encourages further lending for these assets, either because it increases the value of collateral, making it easier to borrow, or because it raises the value of capital at financial institutions, which gives them more capacity to lend. The lending for these assets can then further increase demand for them and hence raise their prices even more. This feedback loop—in which a credit boom drives up asset prices, which in turn fuels the credit boom, which drives asset prices even higher, and so on—can generate a bubble in which asset prices rise well above their fundamental values.

Credit-driven bubbles are particularly dangerous, as the recent global financial crisis has demonstrated. When asset prices come back down to earth and the bubble bursts, the collapse in asset prices leads to a reversal of the feedback loop: loans go sour, lenders cut back on the credit supply, the demand for assets declines further, and prices drop even more. These were exactly the dynamics that characterized housing markets during the global financial crisis. Driven by a credit boom in subprime lending, housing

prices rose way above fundamental values; but when housing prices crashed, credit shriveled up and housing prices plummeted.

The resulting losses on subprime loans and securities eroded the balance sheets of financial institutions, causing a decline in credit (deleveraging) and a sharp fall in business and household spending, and therefore in economic activity. During the global financial crisis, the interaction between housing prices and the health of financial institutions following the collapse of the housing price bubble endangered the operation of the financial system as a whole and had dire consequences for the economy.

Bubbles Driven Solely by Irrational Exuberance Bubbles that are driven solely by overly optimistic expectations, but that are not associated with a credit boom, pose much less risk to the financial system. For example, the bubble in technology stocks in the late 1990s was not fueled by credit, and the bursting of the tech-stock bubble was not followed by a marked deterioration in financial institutions' balance sheets. The bursting of the tech-stock bubble thus did not have a very severe impact on the economy, and the recession that followed was quite mild. Bubbles driven solely by irrational exuberance are therefore far less dangerous than those driven by credit booms.

The Debate over Whether Central Banks Should Try to Pop Bubbles

Because asset prices are a central element of monetary policy and directly affect its outcomes (the transmission mechanisms of monetary policy are discussed in Chapter 26), monetary policy certainly needs to respond to asset prices in order to obtain good outcomes in terms of inflation and output. Hence, the issue is not whether monetary policy should respond to asset price movements at all, but whether it should respond at a level over and above the level called for in terms of the objectives of stabilizing inflation and employment. Should monetary policy try to pop, or slow, the growth of potential asset-price bubbles to minimize damage to the economy when these bubbles burst? Alternatively, rather than responding directly to possible asset-price bubbles, should the monetary authorities respond only to the asset-price declines that occur after a bubble bursts, to stabilize both output and inflation? These opposing positions have been characterized as *leaning against* asset-price bubbles versus *cleaning up* after the bubbles burst, and so the debate over what to do about asset-price bubbles has been labeled the “lean versus clean” debate.

Whether central banks should try to pop, or prick, bubbles was actively debated before the global financial crisis, with Alan Greenspan arguing against such actions. Greenspan's position held great sway in central banking circles before the crisis. However, the crisis has led economists to reevaluate this viewpoint, and we look at the pro and con arguments below.

Con: Why Central Banks Should Not Try to Prick Asset-Price Bubbles but Should Just Clean Up After They Burst Alan Greenspan's argument that central banks should not take actions to prick bubbles became known as the “Greenspan doctrine.” His position reflected five arguments:

1. Asset-price bubbles are nearly impossible to identify. If central banks or government officials knew that a bubble was in progress, wouldn't market participants know as well? If so, then a bubble would be unlikely to develop, because market participants would know that prices were getting out of line with fundamentals. Unless central

bank or government officials are smarter than market participants, an unlikely situation given the savvy of especially talented (and high-earning) market participants, they will be unlikely to identify when bubbles of this type are occurring. A strong argument, then, exists for not responding to suspected bubbles.

2. Although some economic analysis suggests that raising interest rates can diminish asset price increases, raising interest rates may be very ineffective in restraining bubbles, because market participants expect such high rates of return from buying bubble-driven assets. Furthermore, raising interest rates has often been found to cause a bubble to burst more severely, thereby increasing the damage to the economy. Another way of saying this is that bubbles are departures from normal behavior, and it is unrealistic to expect that the usual tools of monetary policy will be effective in abnormal conditions.
3. Many different asset prices exist, and at any one time a bubble may be present in only a fraction of asset markets. Monetary policy actions are a very blunt instrument in such a case, as such actions would be likely to affect asset prices in general, rather than the specific assets that are experiencing a bubble.
4. Monetary policy actions to prick bubbles can have harmful effects on the aggregate economy. If interest rates are raised significantly in an effort to curtail a bubble, the economy will slow, people will lose jobs, and inflation might fall below its desirable level. Indeed, as arguments 2 and 3 suggest, the rise in interest rates necessary to prick a bubble may be so high that it can be done only at great cost to workers and the economy. This is not to say that monetary policy should not respond to asset prices per se. The level of asset prices does affect aggregate demand (discussed in Chapter 26) and thus the evolution of the economy. Monetary policy should react to fluctuations in asset prices to the extent that they affect inflation and economic activity.
5. As long as policymakers respond in a timely fashion, by easing monetary policy aggressively after an asset bubble bursts, the harmful effects of a bursting bubble can be kept at a manageable level. Indeed, the Greenspan Fed acted in exactly this way after the stock market crash of 1987 and the bursting of the tech bubble in the stock market in 2000. Aggressive easing after the stock market bubbles burst in 1987 and 2000 was highly successful. The economy did not enter a recession after the stock market crash of 1987, and the recession that followed the tech bubble burst in 2000 was very mild.

Pro: Why Central Banks Should Try to Pop Bubbles The recent financial crisis clearly demonstrated that the bursting of credit-driven bubbles can be not only extremely costly but also very hard to clean up. Furthermore, credit-driven bubbles can occur even if price and output stability exist in the period leading up to them. Indeed, as we have seen, price and output stability might actually encourage credit-driven bubbles because they lead market participants to underestimate the amount of risk present in the economy. The global financial crisis has therefore provided a much stronger case for leaning against potential bubbles than for just cleaning up after they burst.

However, the distinction between the two types of bubbles, one of which (credit-driven) is much more costly to the economy than the other, suggests that the lean versus clean debate may have been miscast. Rather than leaning against potential asset-price bubbles, which would include both credit-driven and irrational exuberance-type bubbles, the case is much stronger for leaning against credit *booms*, which would involve leaning against credit-driven asset-price bubbles but not against asset-price

bubbles driven by irrational exuberance. It is much easier to identify credit booms than asset-price bubbles. When asset-price bubbles are rising rapidly at the same time that credit is booming, the likelihood is greater that asset prices are deviating from fundamentals because laxer credit standards are driving asset prices upward. In this case, central bank or government officials are more likely to identify that a boom is in progress; this was indeed the case during the housing market bubble in the United States, when central banks and government officials were aware that lenders had weakened lending standards and that credit extension in the mortgage markets was rising at abnormally high rates.

The case for leaning against credit-driven bubbles seems strong, but what policies would be most effective in restraining them?

Macroprudential Policies First, it is important to recognize that the key principle to consider in designing effective policies to lean against credit booms is that such policies must curb excessive risk taking. Only when risk taking is excessive are credit booms likely to develop, and so it is natural to look to prudential regulatory measures to constrain credit booms. Regulatory policy to affect what is happening in credit markets in the aggregate is referred to as **macroprudential regulation**, and it does seem to be the right tool for reining in credit-driven bubbles.

Financial regulation and supervision, either by central banks or by other government entities, with the usual elements of a well-functioning prudential regulatory and supervisory system, as described in Chapter 10, can prevent the excessive risk taking that can trigger a credit boom, which in turn will lead to an asset-price bubble. These elements include adequate disclosure and capital requirements, prompt corrective action, close monitoring of financial institutions' risk management procedures, and close supervision to enforce compliance with regulations. More generally, regulation should focus on preventing leverage cycles. As the global financial crisis demonstrated, the rise in asset prices that accompanied the credit boom resulted in higher capital buffers at financial institutions, supporting further lending in the context of unchanging capital requirements, which led to higher asset prices, and so on; in the bust, the value of the capital dropped precipitously, leading to a cut in lending. Capital requirements that are countercyclical, that is, adjusted upward during a boom and downward during a bust, might help eliminate the pernicious feedback loops that promote credit-driven bubbles.

A rapid rise in asset prices accompanied by a credit boom provides a signal that market failures or poor financial regulation and supervision might be causing a bubble to form. Central banks and other government regulators can then consider implementing policies to rein in credit growth directly or can implement measures to make sure credit standards are sufficiently high.

Monetary Policy The fact that the low interest rate policies of the Federal Reserve from 2002 to 2005 were followed by excessive risk taking suggests to many that overly easy monetary policy might promote financial instability. Although it is far from clear that the Federal Reserve is primarily to blame for the housing bubble, research does suggest that low interest rates can encourage excessive risk taking, in what has been called the "risk-taking channel of monetary policy." Low interest rates may increase the incentives for asset managers in financial institutions to search for higher yields and hence increase risk taking. Low interest rates may also increase the demand for assets, raising their prices and leading to increased valuation of collateral, which in turn encourages lenders to lend to riskier borrowers.

The risk-taking channel of monetary policy suggests that monetary policy should be used to lean against credit booms. However, many of the Greenspan doctrine's objections to using monetary policy to prick booms are still valid, so wouldn't it be better to use macroprudential supervision to constrain credit booms, leaving monetary policy to focus on price and output stability?

This argument would be quite strong if macroprudential policies were able to do the job. However, there are doubts on this score. Prudential supervision is subject to more political pressure than monetary policy because it affects the bottom line of financial institutions more directly. Thus these institutions have greater incentives to lobby politicians to discourage macroprudential policies that would rein in credit booms, particularly during a credit boom, when they are making the most money. In addition, financial institutions are often very good at finding loopholes to avoid regulation, as we discovered in Chapter 11, and so macroprudential supervision may not be effective. The possibility that macroprudential policies may not be implemented sufficiently well to constrain credit booms suggests that monetary policy may have to be used instead.

An important lesson from the global financial crisis is that central banks and other regulators should not have a *laissez-faire* attitude and let credit-driven bubbles proceed without any reaction. Figuring out how to do this well, however, is indeed a daunting task.

TACTICS: CHOOSING THE POLICY INSTRUMENT

Now that we are familiar with the alternative strategies for implementing monetary policy, let's look at how monetary policy is conducted on a day-to-day basis. Central banks directly control the tools of monetary policy—open market operations, reserve requirements, the discount rate, the interest rate on reserves, large-scale asset purchases, and forward guidance—but knowing the tools and the strategies for implementing a monetary policy does not tell us whether that policy is easy or tight. To ascertain whether policy is easy or tight, we can observe the **policy instrument** (also called an **operating instrument**), a variable that responds to the central bank's tools and indicates the stance (easy or tight) of monetary policy. A central bank like the Fed has at its disposal two basic types of policy instruments: reserve aggregates (total reserves, nonborrowed reserves, the monetary base, and the nonborrowed base) and interest rates (the federal funds rate and other short-term interest rates). (Central banks in small countries can choose another policy instrument, the exchange rate, but we leave this topic to Chapter 19.) The policy instrument might be linked to an **intermediate target**, such as a monetary aggregate like M2 or a long-term interest rate. Intermediate targets stand between the policy instrument and the goals of monetary policy (e.g., price stability, output growth); they are not as directly affected by the tools of monetary policy but might be more closely linked to the goals of monetary policy. As a study aid, Figure 2 shows a schematic of the linkages among the tools of monetary policy, policy instruments, intermediate targets, and the goals of monetary policy.

As an example, suppose the central bank's employment and inflation goals are consistent with a nominal GDP growth rate of 5%. The central bank might believe that the 5% nominal GDP growth rate will be achieved by a 4% growth rate for M2 (an intermediate target), which will in turn be achieved by a growth rate of 3% for nonborrowed reserves (the policy instrument). Alternatively, the central bank might believe that the best way to achieve its objectives would be to set the federal funds rate (a policy instrument) at, say, 4%. Can the central bank choose to target both the nonborrowed reserves

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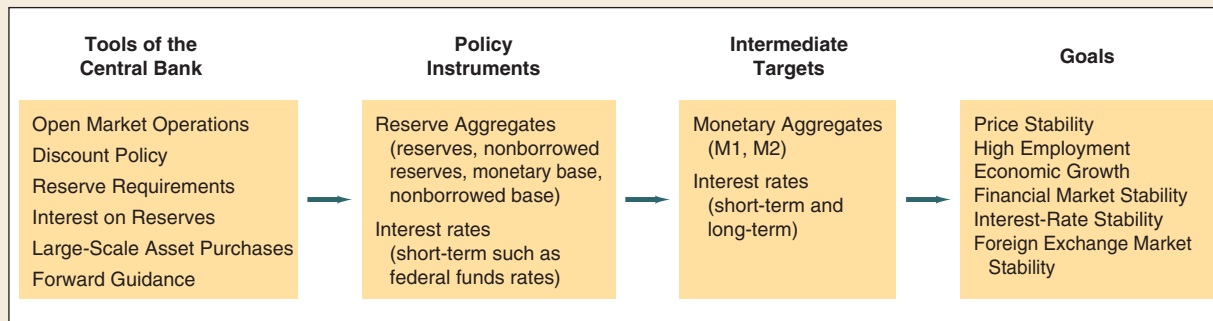


FIGURE 2 Linkages Among Central Bank Tools, Policy Instruments, Intermediate Targets, and Goals of Monetary Policy

The tools of the central bank are used to change the policy instruments to achieve the intermediate target and then the goals of monetary policy.

and the federal-funds-rate policy instruments at the same time? The answer is no. The application of supply and demand analysis to the market for reserves, developed in Chapter 16, explains why a central bank must choose one or the other.

Let's first see why choosing an aggregate target involves losing control of the interest rate. Figure 3 contains a supply and demand diagram of the market for reserves. Although the central bank expects the demand curve for reserves to be at R^{d*} , it fluctuates between $R^{d'}$ and $R^{d''}$ because of unexpected fluctuations in deposits (and hence required reserves) and changes in banks' desire to hold excess reserves. If the central bank has a nonborrowed reserves target of NBR^* (say, because it has a target growth rate

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FIGURE 3
Result of Targeting on Nonborrowed Reserves

Targeting on nonborrowed reserves of NBR^* will lead to fluctuations in the federal funds rate between i_{ff}' and i_{ff}'' because of fluctuations in the demand for reserves between $R^{d'}$ and $R^{d''}$.

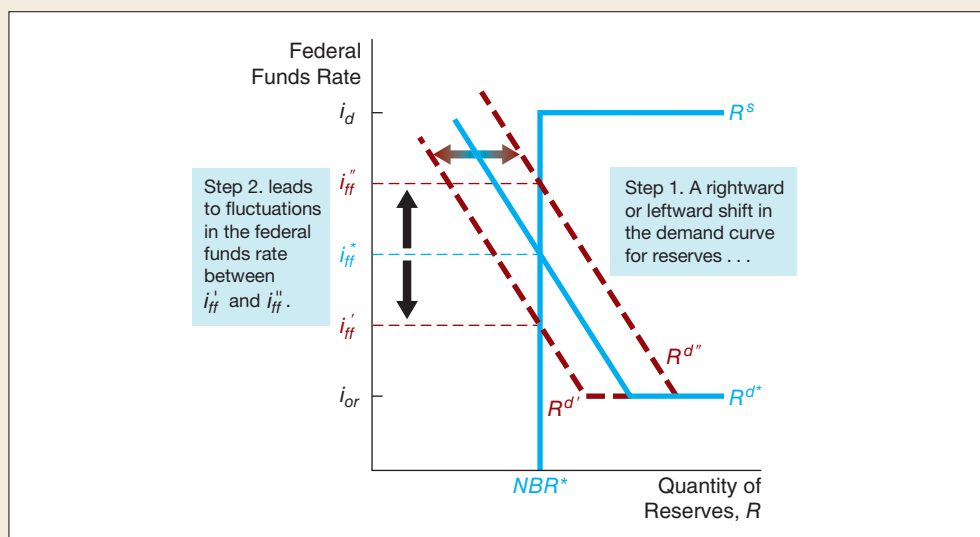
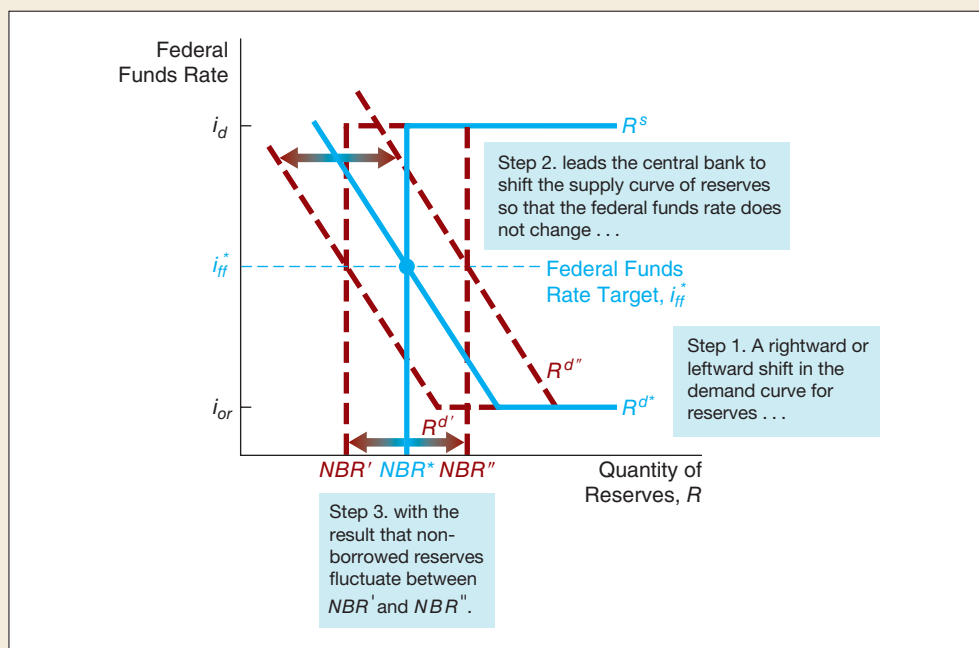


FIGURE 4
Result of Targeting on the Federal Funds Rate

Targeting on the interest rate i_{ff}^* will lead to fluctuations in nonborrowed reserves between NBR' and NBR'' because of fluctuations in the demand for reserves between $R^{d'}$ and $R^{d''}$.



of the money supply of 4%), it expects that the federal funds rate will be i_{ff}^* . However, as the figure indicates, the fluctuations in the reserves demand curve between $R^{d'}$ and $R^{d''}$ will result in a fluctuation in the federal funds rate between i_{ff}' and i_{ff}'' . Pursuing an aggregate target implies that interest rates will fluctuate.

The supply and demand diagram in Figure 4 shows the consequences of an interest-rate target set at i_{ff}^* . Again the central bank expects the reserves demand curve to be at R^{d*} , but it fluctuates between $R^{d'}$ and $R^{d''}$ due to unexpected changes in deposits or banks' desire to hold excess reserves. If the demand curve rises to $R^{d''}$, the federal funds rate will begin to rise above i_{ff}^* and the central bank will engage in open market purchases of bonds until it raises the supply of nonborrowed reserves to NBR'' , at which point the equilibrium federal funds rate will return to i_{ff}^* . Conversely, if the demand curve falls to $R^{d'}$ and the federal funds rate drops, the central bank will keep making open market sales until nonborrowed reserves fall to NBR' and the federal funds rate returns to i_{ff}^* . The central bank's adherence to the interest-rate target thus leads to a fluctuating quantity of nonborrowed reserves and the money supply.

The conclusion from our supply and demand analysis is that interest-rate and reserve (monetary) aggregate targets are incompatible. A central bank can hit one or the other, but not both. Because a choice between them has to be made, we need to examine what criteria should be used to select a policy instrument.

Criteria for Choosing the Policy Instrument

Three criteria apply when choosing a policy instrument: The instrument must be observable and measurable, it must be controllable by the central bank, and it must have a predictable effect on the goals.

Observability and Measurability Quick observability and accurate measurement of a policy instrument are necessary because such an instrument is useful only if it signals the policy stance rapidly. Reserve aggregates like nonborrowed reserves are easily measured, but some lag in the reporting of reserve aggregates (a delay of two weeks) exists. Short-term interest rates (like the federal funds rate), by contrast, are not only easy to measure but are also immediately observable. Thus, it seems that interest rates are more observable and measurable than reserves and are therefore a better policy instrument.

However, as we learned in Chapter 4, the interest rate that is easiest to measure and observe is the nominal interest rate. It is typically a poor measure of the real cost of borrowing, which indicates with more certainty what will happen to the real GDP. The real cost of borrowing is more accurately measured by the real interest rate—that is, the nominal interest rate adjusted for expected inflation ($i_r = i - \pi^e$). Unfortunately, real interest rates are extremely difficult to measure because we do not have a direct way of measuring expected inflation. Given that both interest rates and aggregates are associated with observability and measurability problems, it is not clear whether one should be preferred over the other as a policy instrument.

Controllability A central bank must be able to exercise effective control over a variable if the variable is to function as a useful policy instrument. If the central bank cannot control the policy instrument, knowing that it is off track does little good because the central bank has no way of getting it back on track.

Because of shifts into and out of currency, even reserve aggregates, such as nonborrowed reserves, are not completely controllable. Conversely, the Fed can control short-term interest rates, such as the federal funds rate, very tightly. It might appear, therefore, that short-term interest rates would dominate reserve aggregates on the controllability scale. However, a central bank cannot set short-term real interest rates because it does not have control over expectations of inflation. Once again, a clear-cut case cannot be made that short-term interest rates are preferable to reserve aggregates as a policy instrument, or vice versa.

Predictable Effect on Goals The most important characteristic of a policy instrument is that it must have a predictable effect on a goal such as high employment or price stability. If a central bank can accurately and quickly measure the price of tea in China and can completely control its price, what good does that do? The central bank cannot use the price of tea in China to affect unemployment or the price level in its own country. Because the ability of a policy instrument to affect goals is critical to its usefulness, the strength of the link between reserve or monetary aggregates and the goals (output, employment, and inflation) or, alternatively, between interest rates and these goals, has been the subject of much research and debate. In recent years, most central banks have concluded that the link between interest rates and goals such as stable inflation is stronger than the link between aggregates and inflation. For this reason, central banks throughout the world now generally use short-term interest rates as their policy instrument.

TACTICS: THE TAYLOR RULE

As we have seen, the Federal Reserve and most other central banks currently conduct monetary policy by setting a target for short-term interest rates such as the federal funds rate. But how should this target be chosen?

John Taylor of Stanford University has come up with an answer, called the **Taylor rule**. The Taylor rule indicates that the federal (fed) funds rate should be set equal to the inflation rate plus an “equilibrium” real fed funds rate (the real fed funds rate that is consistent with full employment in the long run) plus a weighted average of two gaps: (1) an inflation gap, current inflation minus a target rate; and (2) an output gap, the percentage deviation of real GDP from an estimate of its potential (natural rate) level.¹¹

This rule can be written as follows:

$$\begin{aligned} \text{Federal funds rate target} = & \text{inflation rate} + \text{equilibrium real fed funds rate} \\ & + \frac{1}{2}(\text{inflation gap}) + \frac{1}{2}(\text{output gap}) \end{aligned}$$

Taylor assumed an equilibrium real fed funds rate of 2% and an appropriate target for inflation of 2%, with equal weights of $\frac{1}{2}$ on the inflation and output gaps. For a numerical example of the Taylor rule, suppose the inflation rate is at 3%, leading to a positive inflation gap of 1% ($= 3\% - 2$), and real GDP is 1% above its potential, resulting in a positive output gap of 1%. Then the Taylor rule suggests that the federal funds rate should be set at 6% [$= 3\%$ inflation $+ 2\%$ equilibrium real fed funds rate $+ \frac{1}{2}$ (1% inflation gap) $+ \frac{1}{2}$ (1% output gap)].

An important feature of the Taylor rule is that the coefficient on the inflation gap, $1/2$, is positive. If the inflation rate rises by 1 percentage point, then the federal funds target is raised by 1.5 percentage points, and so it is raised by more than a one-to-one ratio. In other words, a rise in inflation of 1 percentage point leads to an increase in the *real* federal funds rate of $\frac{1}{2}$ percentage point. The principle that the monetary authorities should raise nominal interest rates by more than the increase in the inflation rate has been named the **Taylor principle**, and it is critical to the success of monetary policy. Suppose that the Taylor principle is not followed and that the rise in nominal rates is *less* than the rise in the inflation rate, so that real interest rates *fall* when inflation rises. Serious instability then results, because a rise in inflation leads to an effective easing of monetary policy, which then leads to even higher inflation in the future. Indeed, this scenario characterizes the monetary policy of the 1970s, which led to a loss of the nominal anchor and the era of the so-called “Great Inflation,” when inflation rates climbed to double-digit levels. Fortunately, since 1979, the Taylor principle has become a feature of monetary policy, with much happier outcomes on both the inflation and aggregate output fronts.

Some economists take the view that the presence of an output gap in the Taylor rule indicates that the Fed should care not only about keeping inflation under control but also about minimizing business cycle fluctuations of output around its potential level. Caring about both inflation and output fluctuations is consistent with the Fed’s dual mandate and with many statements by Federal Reserve officials that controlling inflation and stabilizing real output are important concerns of the Fed.

An alternative interpretation of the presence of the output gap in the Taylor rule is that the output gap is an indicator of future inflation, as stipulated in **Phillips curve theory**. Phillips curve theory states that changes in inflation are influenced by the state of the economy relative to its productive capacity, as well as by other factors. This productive capacity can be measured by potential GDP, which is a function of the natural rate of unemployment, defined as the rate of unemployment consistent with full

¹¹The original formulation of the Taylor rule can be found in John B. Taylor, “Discretion Versus Policy Rules in Practice,” *Carnegie-Rochester Conference Series on Public Policy* 39 (1993): 195–214. However, a more intuitive discussion with a historical perspective can be found in John B. Taylor, “A Historical Analysis of Monetary Policy Rules,” in *Monetary Policy Rules*, ed., John B. Taylor (Chicago: University of Chicago Press, 1999), pp. 319–341.

employment. A related concept is the **NAIRU**, the **nonaccelerating inflation rate of unemployment**, defined as the rate of unemployment at which there is no tendency for inflation to change. Simply put, the theory states that when the unemployment rate is above NAIRU, with output below potential, inflation will fall, but when it is below NAIRU, with output above potential, inflation will rise. Prior to 1995, the NAIRU was thought to reside around 6%. However, with the drop in unemployment to around the 4% level in the late 1990s, with no increase (and even a slight decrease) in inflation, some critics have questioned the value of Phillips curve theory. They either claim that Phillips curve theory just doesn't work any more or, alternatively, they believe that great uncertainty exists about the value of NAIRU, which may have fallen to below 5% for reasons that are not absolutely clear. Phillips curve theory is now highly controversial, and critics question whether it should be used as a guide in the conduct of monetary policy.

As Figure 5 shows, the Taylor rule does a pretty good, but not perfect, job of describing the Fed's setting of the federal funds rate under former Fed chairs Greenspan and Bernanke. (Notice in Figure 5 that the Taylor rule does not accurately describe the movement of the federal funds rate during the 1970s, which reflects the fact that the Taylor principle was not being followed at that time, which in turn explains why monetary policy outcomes were so poor.) Does this mean that the Fed should fire all of its economists and put a computer in charge to simply compute the Taylor rule setting for the federal funds rate? This would certainly save the taxpayers a lot of money. Although the Fed does not use the Taylor rule to directly compute the federal funds rate, it does make use of the Taylor rule in thinking about how to conduct monetary policy (see the Inside the Fed box, "The Fed's Use of the Taylor Rule"). Given the above discussion, it is no surprise that the Taylor rule does not explain all of the movements in the federal funds rate outlined in Figure 5. For this reason, financial institutions hire Fed "watchers," as described in the second Inside the Fed box.

MyEconLab Mini-lecture

MyEconLab Real-time data

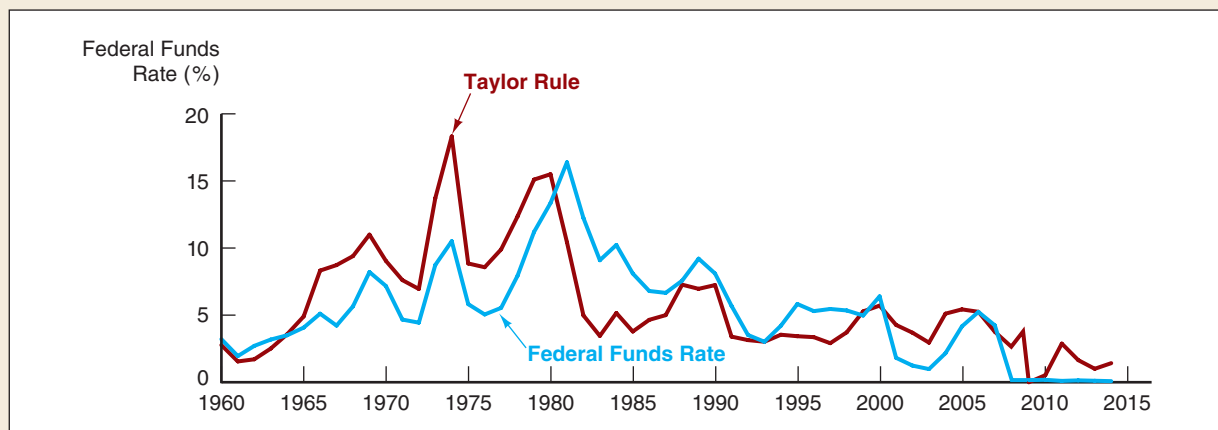


FIGURE 5 The Taylor Rule for the Federal Funds Rate, 1960–2014

The Taylor rule does a pretty good job of describing the Fed's setting of the federal funds rate under former chairs Greenspan and Bernanke, but it does not accurately describe the movement of the federal funds rate during the 1970s.

Source: Federal Reserve Bank of St. Louis, FRED database: <http://research.stlouisfed.org/fred2/>.

Inside the Fed The Fed's Use of the Taylor Rule

Why hasn't the Fed put the federal funds rate on Taylor rule autopilot, guided by a computer? There are several reasons why the Fed hasn't taken this drastic action. First and foremost, no perfect model of the economy exists, so even the best and brightest economists do not know the current output gap with certainty at any given moment. Since the economy is changing all the time, the Taylor rule coefficients are unlikely to stay constant in any event.

Even if we could determine the output gap with certainty, monetary policy is by necessity a forward-looking activity, since it takes a long time for monetary policy to affect the economy. Good monetary policy requires that the Fed forecast where inflation and economic activity are headed in the future, and then adjust the policy instrument accordingly. The Fed will therefore look at a much wider range of information than just the current inflation gap and output gap, the variables used in the Taylor rule, when setting its policy. In other words, the conduct of monetary policy is as much an art as it is a science, requiring both careful analytics and human judgment. The Taylor rule leaves out all of the art and so is unlikely to produce the best monetary policy outcomes. For example, financial crises, such

as the crisis that occurred from 2007 to 2009, require complex monetary policy actions because changes in credit spreads (the difference between interest rates on securities with credit risk and those without) may alter how the federal funds rate affects investment decisions, and therefore economic activity.

The bottom line is that putting monetary policy on autopilot by using a Taylor rule with fixed coefficients would be a bad idea. The Taylor rule is useful, however, as a *guide* to monetary policy. If the proposed setting of the policy instrument is very different from the setting suggested by the Taylor rule, policymakers should ask whether they have a good reason for deviating from this rule. If they don't, as during the era of the 1970s when Arthur Burns was the chair of the Federal Reserve, then they might be making a mistake. Indeed, the FOMC makes use of Taylor rule estimates in exactly this way—by referring to these estimates to inform their decisions about the federal funds rate target.*

*For an in-depth discussion of the FOMC's actual use of the Taylor rule in its policy deliberations, see Pier Francesco Asso, George A. Kahn, and Robert Leeson, "The Taylor Rule and the Practice of Central Banking," Federal Reserve Bank of Kansas City Working Paper RWP 10-05 (February 2010).

Inside the Fed Fed Watchers

As we have seen, the most important player in the determination of U.S. interest rates is the Federal Reserve. When the Fed wants to inject reserves into the system, it conducts open market purchases of bonds, an action that causes bond prices to increase and their interest rates to fall, at least in the short term. If the Fed withdraws reserves from the system, it sells bonds, thereby depressing their price and raising their interest rates. Knowing what actions the Fed might take can thus help investors and financial institutions predict the future course of interest rates with greater accuracy. Because, as we have seen, changes

in interest rates have a major impact on investors and financial institutions' profits, these parties are particularly interested in scrutinizing the Fed's behavior. To assist in this task, financial institutions hire *Fed watchers*, experts on Federal Reserve behavior who may have worked in the Federal Reserve System and so have an insider's view of Federal Reserve operations. A Fed watcher who can accurately predict the course of monetary policy is a very valuable commodity, and successful Fed watchers therefore often earn very high salaries, well into the six-figure range and sometimes even higher.

SUMMARY

1. The six basic goals of monetary policy are price stability (the primary goal), high employment (output stability), economic growth, stability of financial markets, interest-rate stability, and stability in foreign exchange markets.
2. A strong nominal anchor is a key element of a successful monetary policy. A strong nominal anchor helps promote price stability by tying down inflation expectations and limiting the time-inconsistency problem, in which monetary policymakers conduct monetary policy in a discretionary way that focuses on short-run objectives but produces poor long-run outcomes.
3. Inflation targeting has several advantages: (1) By focusing the political debate on long-run inflation, it can reduce the likelihood of the time-inconsistency problem; (2) it is readily understood by the public and is highly transparent; (3) it increases accountability of the central bank; and (4) it appears to ameliorate the effects of inflationary shocks. It does have some disadvantages, however: (1) Inflation is not easily controlled by the monetary authorities, and so an inflation target does not send immediate signals to the public and the markets; (2) it might impose a rigid rule on policymakers, although this has not been the case in practice; and (3) a sole focus on inflation may lead to larger output fluctuations, or lower economic growth although this also has not been the case in practice.
4. The Federal Reserve's monetary policy has evolved over time. From the 1980s through 2006, the Federal Reserve set an implicit, not an explicit, nominal anchor. Despite its demonstrated success, this monetary policy lacked transparency and was inconsistent with democratic principles. Under Ben Bernanke, the Federal Reserve moved to a flexible form of inflation targeting that was consistent with the Fed's dual mandate.
5. Four lessons can be learned from the global financial crisis: (1) Developments in the financial sector have a far greater impact on economic activity than was earlier realized; (2) the zero lower bound on interest rates can be a serious problem; (3) the cost of cleaning up after a financial crisis is very high; and (4) price and output stability do not ensure financial stability.
6. The lessons of the global financial crisis provide support for more flexible inflation targeting, possibly with a higher inflation target.
7. The lessons from the crisis also suggest that monetary policy should lean against credit booms but not asset-price bubbles.
8. Because interest-rate and aggregate policy instruments are incompatible, a central bank must choose between them on the basis of three criteria: measurability, controllability, and their ability to affect goal variables predictably. Central banks now typically use short-term interest rates as their policy instrument.
9. The Taylor rule indicates that the federal funds rate should be set equal to the inflation rate plus an "equilibrium" real fed funds rate plus a weighted average of two gaps: (1) an inflation gap, current inflation minus a target rate; and (2) an output gap, the percentage deviation of real GDP from an estimate of its potential (natural rate) level. The output gap in the Taylor rule can be interpreted as an indicator of future inflation, as stipulated in Phillips curve theory. However, this theory is controversial, because high output relative to potential as measured by low unemployment has not seemed to produce higher inflation in recent years.

KEY TERMS

asset-price bubble, p. 453
dual mandate, p. 441
hierarchical mandates, p. 440
inflation targeting, p. 441
intermediate target, p. 457
macroprudential regulation, p. 456
natural rate of output, p. 439

natural rate of unemployment, p. 438
nominal anchor, p. 437
nonaccelerating inflation rate of unemployment (NAIRU), p. 462
operating instrument, p. 457
Phillips curve theory, p. 461
policy instrument, p. 457

potential output, p. 439
price stability, p. 436
Taylor principle, p. 461
Taylor rule, p. 461
time-inconsistency problem, p. 437

QUESTIONS

Select questions are available in MyEconLab at <http://www.myeconlab.com>.

1. What are the benefits of using a nominal anchor for the conduct of monetary policy?
2. What incentives arise for a central bank to fall into the time-inconsistency trap of pursuing overly expansionary monetary policy?
3. Why would it be problematic for a central bank to have a primary goal of maximizing economic growth?
4. "Since financial crises can impart severe damage to the economy, a central bank's primary goal should be to ensure stability in financial markets." Is this statement true, false, or uncertain? Explain.
5. "A central bank with a dual mandate will achieve lower unemployment in the long run than a central bank with a hierarchical mandate in which price stability takes precedence." Is this statement true, false, or uncertain? Explain.
6. Why is a public announcement of numerical inflation rate objectives important to the success of an inflation-targeting central bank?
7. How does inflation targeting help reduce the time-inconsistency problem of discretionary policy?
8. What methods have inflation-targeting central banks used to increase communication with the public and to increase the transparency of monetary policymaking?
9. Why might inflation targeting increase support for the independence of the central bank in conducting monetary policy?
10. "Because inflation targeting focuses on achieving the inflation target, it will lead to excessive output fluctuations." Is this statement true, false, or uncertain? Explain.
11. What are the key advantages and disadvantages of the monetary strategy used by the Federal Reserve under Alan Greenspan, in which the nominal anchor was implicit rather than explicit?
12. "The zero lower bound on short-term interest rates is not a problem, since the central bank can just use quantitative easing to lower intermediate and longer-term interest rates instead." Is this statement true, false, or uncertain? Explain.
13. If higher inflation is bad, then why might it be advantageous to have a higher inflation target rather than a lower target that is closer to zero?
14. Why aren't most central banks more proactive in trying to use monetary policy to eliminate asset-price bubbles?
15. Why might it be better to *lean* against credit-driven bubbles rather than just *clean* up after other types of asset bubbles burst?
16. According to the Greenspan doctrine, under what conditions might a central bank respond to a perceived stock market bubble?
17. Classify each of the following as either a policy instrument or an intermediate target, and explain your choice.
 - a. The ten-year Treasury bond rate
 - b. The monetary base
 - c. M1
 - d. The fed funds rate
18. "If the demand for reserves did not fluctuate, the Fed could pursue both a reserves target and an interest-rate target at the same time." Is this statement true, false, or uncertain? Explain.
19. What procedures can the Fed use to control the federal funds rate? Why does control of this interest rate imply that the Fed will lose control of nonborrowed reserves?
20. Compare the monetary base to M1 on the grounds of controllability and measurability. Which do you prefer as an intermediate target? Why?
21. "Interest rates can be measured more accurately and quickly than reserve aggregates; hence an interest rate is preferred to the reserve aggregates as a policy instrument." Do you agree or disagree? Explain your answer.
22. How can bank behavior and the Fed's behavior cause money supply growth to be procyclical (rising during booms and falling during recessions)?
23. What does the Taylor rule imply that policymakers should do to the fed funds rate under the following scenarios?
 - a. Unemployment rises due to a recession.
 - b. An oil price shock causes the inflation rate to rise by 1% and output to fall by 1%.
 - c. The economy experiences prolonged increases in productivity growth while actual output growth is unchanged.
 - d. Potential output declines while actual output remains unchanged.
 - e. The Fed revises its (implicit) inflation target downward.

APPLIED PROBLEMS

Select applied problems are available in MyEconLab at <http://www.myeconlab.com>.

24. If the Fed has an interest-rate target, why will an increase in the demand for reserves lead to a rise in the money supply? Use a graph of the market for reserves to explain.
25. Since monetary policy changes made through the fed funds rate occur with a lag, policymakers are usually more concerned with adjusting policy according to changes in the forecasted or expected inflation rate, rather than the current inflation rate. In light of this, suppose that monetary policymakers employ the Taylor rule to set the fed funds rate, where the inflation gap is defined as the difference between expected inflation and the target inflation rate. Assume that the weights on both the inflation and output gaps are $\frac{1}{2}$, the equilibrium real fed funds rate is 4%, the inflation rate target is 3%, and the output gap is 2%.
 - a. If the expected inflation rate is 7%, then at what target should the fed funds rate be set according to the Taylor rule?
 - b. Suppose half of Fed economists forecast inflation to be 6%, and half of Fed economists forecast inflation to be 8%. If the Fed uses the average of these two forecasts as its measure of expected inflation, then at what target should the fed funds rate be set according to the Taylor rule?
 - c. Now suppose half of Fed economists forecast inflation to be 0%, and half forecast inflation to be 14%. If the Fed uses the average of these two forecasts as its measure of expected inflation, then at what target should the fed funds rate be set according to the Taylor rule?
 - d. Given your answers to parts (a)–(c) above, do you think it is a good idea for monetary policymakers to use a strict interpretation of the Taylor rule as a basis for setting policy? Why or why not?

DATA ANALYSIS PROBLEMS

The Problems update with real-time data in MyEconLab and are available for practice or instructor assignment.

-  1. The Fed's maximum employment mandate is generally interpreted as an attempt to achieve an unemployment rate that is as close as possible to the natural rate and inflation that is close to its 2% goal for personal consumption expenditure price inflation. Go to the St. Louis Federal Reserve FRED database, and find data on the personal consumption expenditure price index (PCECTPI), the unemployment rate (UNRATE), and a measure of the natural rate of unemployment (NROU). For the price index, adjust the units setting to "Percent Change From Year Ago" to convert the data to the inflation rate; for the unemployment rate, change the frequency setting to "Quarterly." Download the data into a spreadsheet. Calculate the unemployment gap and inflation gap for each quarter. Then, using the inflation gap, create an average inflation gap measure by taking the average of the current inflation gap and the gaps for the previous three quarters. Now apply the
 - following (admittedly arbitrary and ad hoc) test to the data from 2000:Q1 through the most recent data available: If the unemployment gap is larger than 1.0 for two or more consecutive quarters, and/or the average inflation gap is larger in absolute value than 0.5 for two or more consecutive quarters, consider the mandate "violated."
 - a. Based on this ad hoc test, in which quarters has the Fed "violated" the price stability portion of its mandate? In which quarters has the Fed "violated" the maximum employment mandate?
 - b. Is the Fed currently "in violation" of its mandate?
 - c. Interpret your results. What do your response to part (a) and the data imply about the challenge that monetary policymakers face in achieving the Fed's mandate perfectly at all times?
-  2. Go to the St. Louis Federal Reserve FRED database, and find data on the personal consumption expenditure price index (PCECTPI), real GDP

(GDPC1), an estimate of potential GDP (GDPOT), and the federal funds rate (DFF). For the price index, adjust the *units* setting to “Percent Change From Year Ago” to convert the data to the inflation rate; for the federal funds rate, change the *frequency* setting to “Quarterly.” Download the data into a spreadsheet. Assuming the inflation target is 2%, calculate the inflation gap and the output gap for each quarter, from 2000 until the most recent quarter of data available. Calculate the output gap as the percentage deviation of output from the potential level of output.

- a. Use the output and inflation gaps to calculate, for each quarter, the fed funds rate predicted by the Taylor rule. Assume that the weights on inflation stabilization and output stabilization are both $\frac{1}{2}$ (see the formula in the chapter). Compare the current (quarterly average) federal funds rate to the federal funds rate prescribed by the Taylor rule. Does the Taylor rule accurately predict the current rate? Briefly comment.
- b. Create a graph that compares the predicted Taylor rule values with the actual quarterly federal funds rate averages. How well, in general, does the Taylor rule prediction fit the average federal funds rate? Briefly explain.
- c. Based on the results from the 2008–2009 period, explain the limitations of the Taylor rule as a formal policy tool. How do these limitations help explain the use of nonconventional monetary policy during this period?
- d. Suppose Congress changes the Fed’s mandate to a hierarchical one in which inflation stabilization takes priority over output stabilization. In this context, recalculate the predicted Taylor rule value for each quarter since 2000, assuming that the weight on inflation stabilization is $\frac{3}{4}$ and the weight on output stabilization is $\frac{1}{4}$. Create a graph showing the Taylor rule prediction calculated in part (a), the prediction using new “hierarchical” Taylor rule, and the fed funds rate. How, if at all, does changing the mandate change the predicted policy paths? How would the fed funds rate be affected by a hierarchical mandate? Briefly explain.

WEB EXERCISES

1. The Federal Open Market Committee (FOMC) meets about every six weeks to assess the state of the economy and to decide what actions the central bank should take. The minutes of this meeting are released three weeks after the meeting; however, a brief press release is made available immediately after the meeting. Find the schedule of minutes and press releases at <http://www.federalreserve.gov/fomc/>.
 - a. When was the last scheduled meeting of the FOMC? When is the next meeting?
 - b. Review the press release from the last meeting. What did the committee decide to do about short-term interest rates?
 - c. Review the most recently published meeting minutes. What areas of the economy seemed to be of most concern to the committee members?
2. It is possible to access other central bank websites to learn about these banks’ structures. One example is the European Central Bank. Go to <http://www.ecb.int/index.html>. On the ECB home page, find information about the ECB’s strategy for monetary policy.
3. Many countries have central banks that are responsible for their nation’s monetary policy. Go to <http://www.bis.org/cbanks.htm> and select one of the central banks (for example, the central bank of Norway). Review that bank’s website to determine its policies regarding the application of monetary policy. How does this bank’s policies compare to those of the U.S. central bank?

WEB REFERENCES

<http://www.federalreserve.gov/pf/pf.htm>

The Federal Reserve reports on its primary purposes and functions.

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

A comprehensive listing of sites that offer a wide variety of economic summary data and graphs.

<http://www.federalreserve.gov/releases/H3>

Historic and current data on the aggregate reserves of depository institutions and the monetary base.

<http://www.federalreserve.gov/aboutthefed/relatedWebSites.htm>

The Federal Reserve provides links to other central bank Web pages.

WEB APPENDICES

Please visit the Companion Website at <http://www.pearsonglobaleditions.com/Mishkin> to read the Web appendices to Chapter 17.

Appendix 1: **Monetary Targeting**

Appendix 2: **A Brief History of Federal Reserve Policymaking**