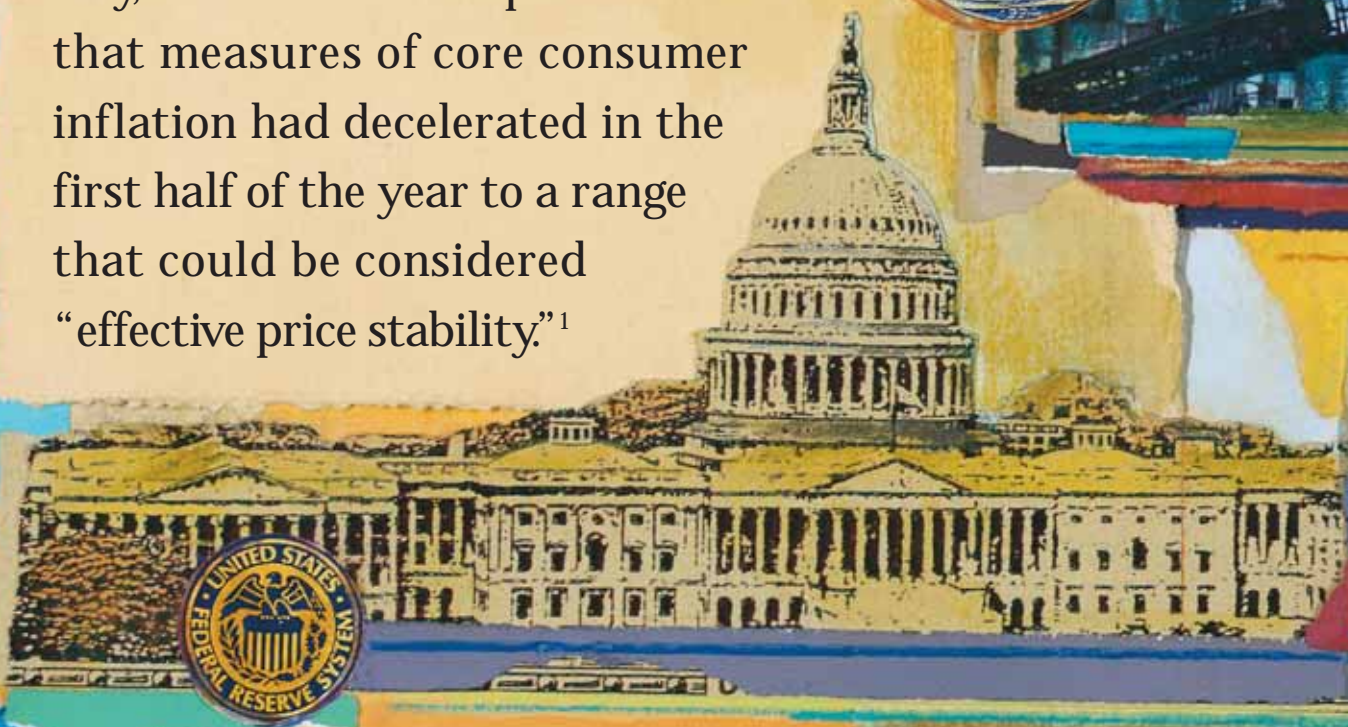
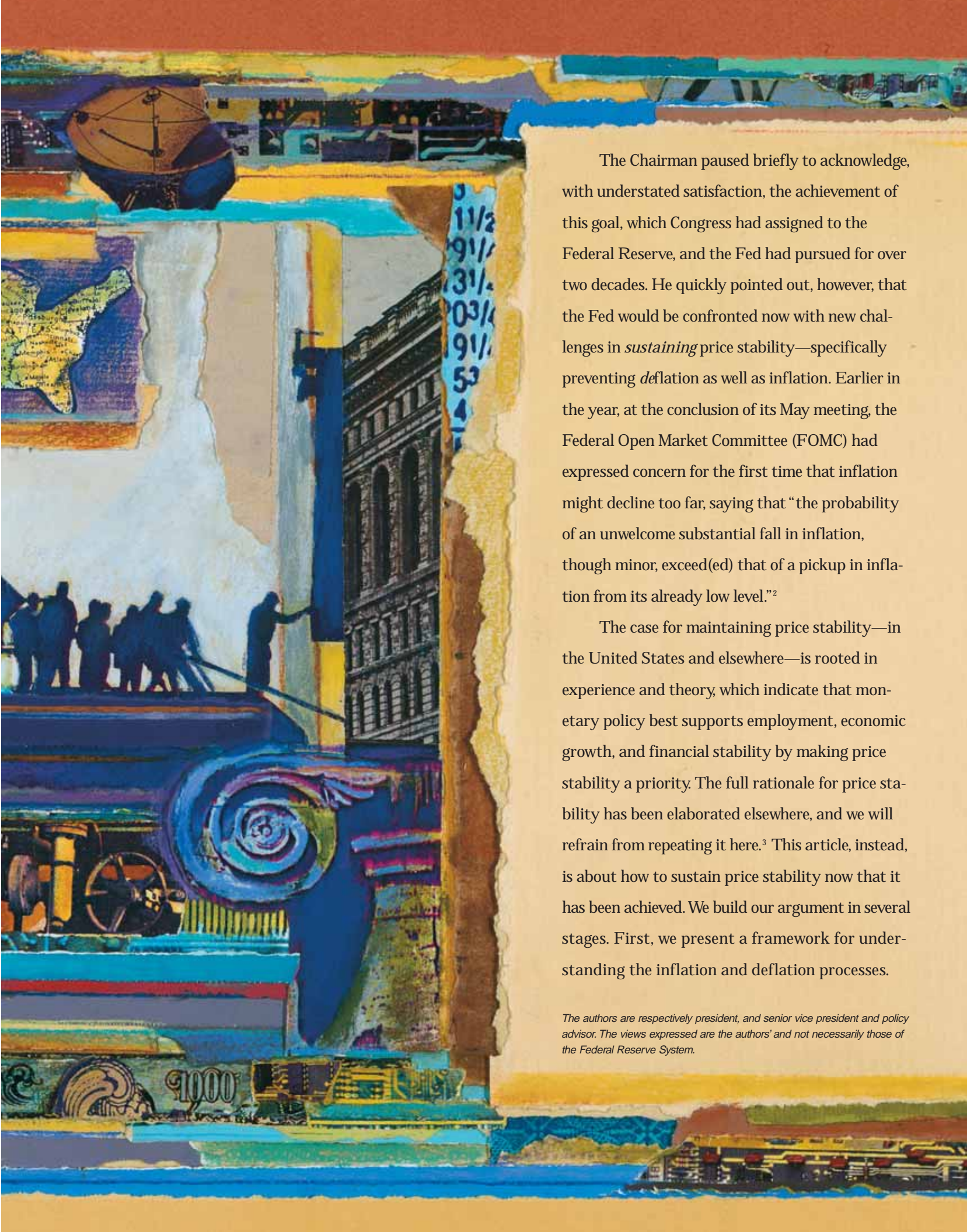


Sustaining Price Stability

J. Alfred Broaddus, Jr. and Marvin Goodfriend

The year 2003 was a watershed in Federal Reserve history. In his semiannual testimony to Congress on monetary policy in July, Chairman Greenspan declared that measures of core consumer inflation had decelerated in the first half of the year to a range that could be considered “effective price stability.”¹





The Chairman paused briefly to acknowledge, with understated satisfaction, the achievement of this goal, which Congress had assigned to the Federal Reserve, and the Fed had pursued for over two decades. He quickly pointed out, however, that the Fed would be confronted now with new challenges in *sustaining* price stability—specifically preventing *deflation* as well as inflation. Earlier in the year, at the conclusion of its May meeting, the Federal Open Market Committee (FOMC) had expressed concern for the first time that inflation might decline too far, saying that “the probability of an unwelcome substantial fall in inflation, though minor, exceed(ed) that of a pickup in inflation from its already low level.”²

The case for maintaining price stability—in the United States and elsewhere—is rooted in experience and theory, which indicate that monetary policy best supports employment, economic growth, and financial stability by making price stability a priority. The full rationale for price stability has been elaborated elsewhere, and we will refrain from repeating it here.³ This article, instead, is about how to sustain price stability now that it has been achieved. We build our argument in several stages. First, we present a framework for understanding the inflation and deflation processes.

The authors are respectively president, and senior vice president and policy advisor. The views expressed are the authors' and not necessarily those of the Federal Reserve System.

Our framework, borrowed from the “new neoclassical synthesis” macroeconomic model, focuses on the management of the markup of price over marginal cost by monopolistically competitive firms.⁴ Next, we provide examples of shocks that are potentially inflationary or deflationary and explain how interest rate policy actions can counteract them effectively to maintain price stability.

The Fed’s current hard-won credibility for low inflation is a foundation of efficient monetary policy because it anchors *expected* inflation. We review briefly why inflation scares create problems for monetary policy. Addressing the challenge noted by Chairman Greenspan, we explain why deflation scares are equally problematic. Unfortunately, credibility

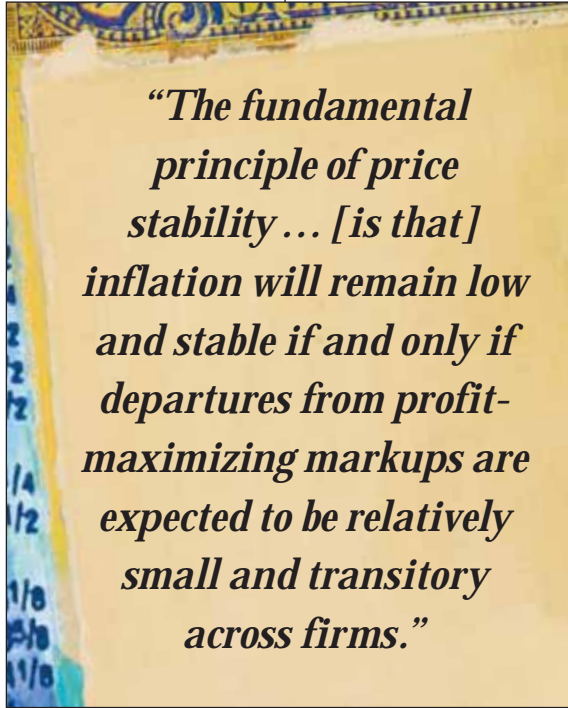
for containing inflation does not necessarily imply credibility against deflation because while there is no upper bound on nominal interest rates to resist inflation, there *is* a lower bound at zero. We explain how the Fed can use monetary policy—even at the zero bound—to preempt deflation and acquire credibility against deflation to complement its anti-inflation credentials.

Communication has come to play an increasingly important and substantive role in the Fed’s conduct of monetary policy because open and

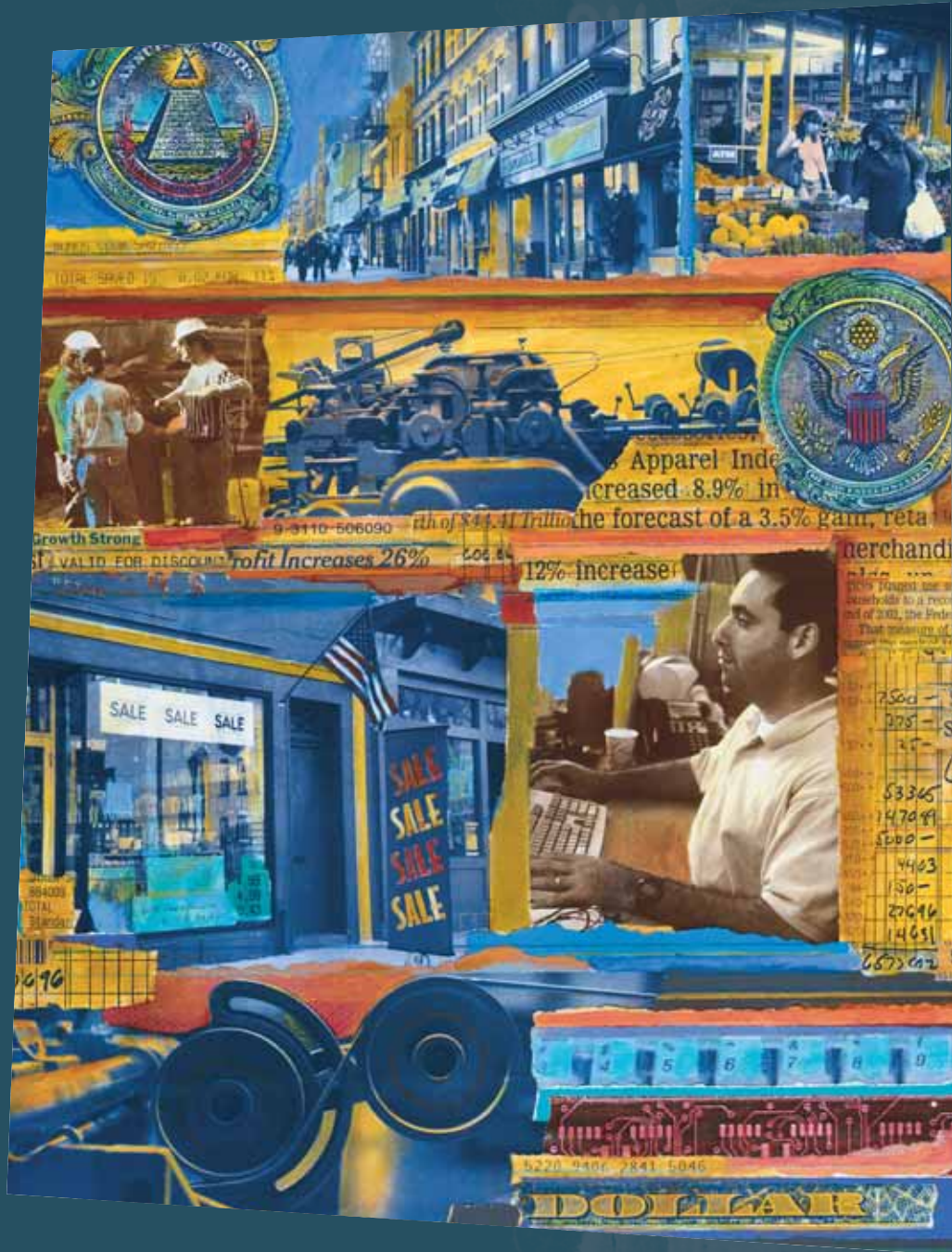
effective communication is a crucial ingredient in building and maintaining credibility for price stability. Good communication requires clear long-run policy objectives and clarity in conveying the reasoning behind short-run policy actions aimed at achieving those objectives. In line with our macroeconomic framework, we believe that both purposes would be well served if the Fed pub-

licly announced an explicit long-run inflation target, and made more prominent use of price-cost gap, employment gap, and output gap indicators in explaining the stance of monetary policy. In particular, we explain how, in our view, these changes would help minimize the kind of communication problems the Fed faced in 2003 in signaling its concern about deflation and its policy intentions for dealing with the rising risk of deflation at that time.

Having outlined what we want to accomplish in this article, let us emphasize that what follows is our understanding of the issues and our suggestions for dealing with them. Some of our views are shared by our Fed colleagues, others are not. This is no cause for embarrassment. Monetary policy and its effect on the economy is a complex and subtle subject; there is plenty of room for different approaches and divergent views.



“The fundamental principle of price stability... [is that] inflation will remain low and stable if and only if departures from profit-maximizing markups are expected to be relatively small and transitory across firms.”



The Fundamental Principle of Price Stability

Our approach to thinking about the maintenance of price stability focuses on how monopolistically competitive firms set their prices over time.⁵ This approach is useful because it highlights how monetary policymakers must create an environment within which firms *choose* to maintain stable prices on average.⁶

For our purposes, a key feature of price-setting in practice is its discontinuous character. It is costly for a firm producing a distinctive product to determine the exact price that maximizes its profits at every point in time. Forecasts of demand and cost conditions are expensive to obtain. Moreover, pricing must compete with other claims on management's time, such as production and marketing decisions. Consequently, pricing gets the attention of management only every so often.

For all these reasons, a firm is apt to consider changing its product price only when demand and cost conditions threaten to move its actual markup of price over cost *significantly* and *persistently* away from its profit-maximizing markup.⁷ Given a firm's current product price, higher production costs compress its markup, and lower production costs elevate its markup. Production costs, in turn, increase with the hourly wage a firm must pay its workers and decrease as labor productivity (output per hour) rises.⁸

Potential inflation arises when a significant compression of markups is widely expected by firms to persist. In this case, firms raise product prices over time to cover higher expected costs. Potential deflation develops if firms expect significantly elevated markups to persist. Competition for product market share in this latter case induces firms to pass along lower costs via lower prices.

Such reasoning implies the *fundamental principle of price stability*: inflation will remain low and stable if and only if departures from profit-maximizing markups are expected to be relatively small and transitory across firms, so firms are content to raise prices at the existing low inflation rate on average. Note that we consider low and stable inflation to be "effective price stability," in keeping with Chairman Greenspan's characterization.

The historical record shows that in the long run competition among firms for labor pushes real wages (nominal wages adjusted for inflation) up at about the same rate as labor productivity grows. Consequently, real production costs in the aggregate are stable in the long run. Nominal wages, in turn, tend to rise at the rate of productivity growth plus the rate of inflation; therefore, nominal production costs rise at about the rate of inflation in the long run. In the short run, however, shocks to aggregate demand and productivity can cause production costs to vary significantly and persistently relative to prices.



Counteracting Shocks to Price Stability

This section builds on the fundamental principle of price stability discussed in the previous section to explain how monetary policy, working through short-term interest rates, can counteract inflationary or deflationary shocks to the economy. The argument is straightforward: interest rate policy maintains price stability by managing aggregate demand so as to stabilize the actual markup at the profit-maximizing markup on average across firms.⁹ (What follows is tightly reasoned but well worth working through, since it describes the core relationships policymakers must focus on to succeed in maintaining price stability.)

An *inflationary* shock generates a sustained acceleration in production costs, and

therefore a compression of the average markup that inclines firms to raise prices above the previously expected low inflation rate *unless* the Fed uses interest rate policy actions to reverse the increase in costs and the markup compression. A *deflationary* shock, in contrast, generates a sustained deceleration or decline in production costs, and an increase in the markup that requires offsetting Fed interest rate actions. Exactly how interest rate policy works to stabilize the markup is explained below.

For expositional purposes, it is useful to divide shocks with inflationary or deflationary potential into two categories. We consider first shocks to expected future income prospects. Subsequently, we take up shocks to current productivity growth.



CORE PCE PRICE INDEX

Source: Bureau of Economic Analysis

Shocks to Expected Future Income Prospects

Whatever the source of optimism or pessimism about the future, shocks to expected *future* wages and profits are likely to be transmitted to *current* aggregate demand.¹⁰ Households will want to adjust current as well as future consumption to reflect any changes in expected lifetime resources.

And firms will want to invest more or less currently in response to any changes in expected future profits.

In these circumstances, *optimism* about future income prospects is potentially *inflationary* because it increases the current demand for labor, raises wages, and compresses markups. On the other hand, *pessimism*

about future prospects is potentially *deflationary* because it eases competition in the labor market, slows wage growth, and elevates markups.

The key point for monetary policy is this: one way or another, profit-maximizing markups will be restored. The shock may dissipate before inflationary or deflationary forces build up. If not, then either the Fed must restore profit-maximizing markups promptly with interest rate policy actions, or else firms will attempt to restore these markups by raising or cutting product prices,

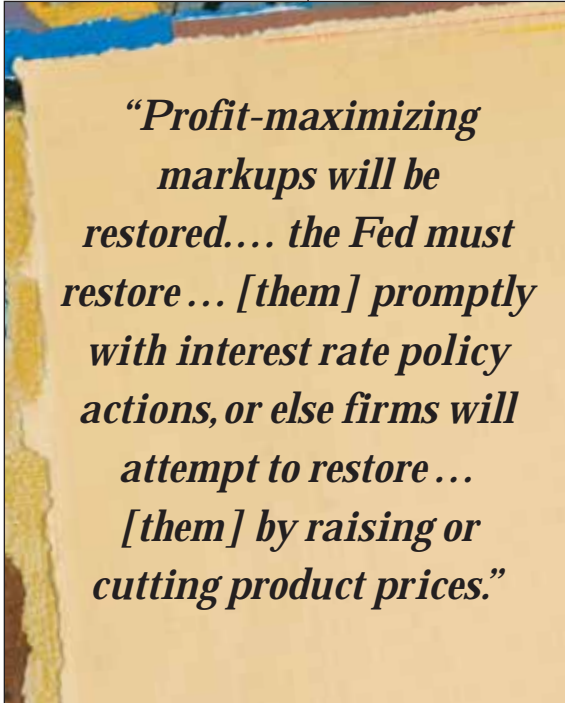
whichever the case may be. Clearly, it is better that profit-maximizing markups be restored by interest rate policy actions without inflation or deflation.

Bottom line: the Fed can offset a potentially inflationary increase in current demand arising from an increase in expected future income prospects by raising real interest rates to increase the return to saving, raise the cost of borrowing, and induce

households and firms to defer spending. Higher real rates preempt inflation by reversing the increased current demand for labor, which reduces the pressure on wages and production costs, and restores profit-maximizing markups. Conversely, by lowering real interest rates, the Fed can lower the return to saving and the cost of borrowing, stimulate spending, and offset a potentially

deflationary reduction in aggregate demand. Lower real rates, in turn, preempt deflation by strengthening current labor demand, reversing the downward pressure on wages, and recompressing markups.

The argument above proceeded as if firms were not fully confident that the Fed would act promptly to stabilize production costs that would otherwise be affected by shocks to future income prospects. If firms are confident, then they will meet a temporary increase in demand by working current employees more intensively or by hiring



“Profit-maximizing markups will be restored.... the Fed must restore ... [them] promptly with interest rate policy actions, or else firms will attempt to restore ... [them] by raising or cutting product prices.”

temporary workers, rather than by raising product prices. And firms will lay off labor rather than cut prices if they expect the Fed to stabilize production costs in the face of a shortfall in current demand. Note that the average markup will tend to be compressed temporarily in the first case and elevated temporarily in the second case. We will say more below about why the Fed's "credibility" for price stability is the foundation of efficient monetary policy.

Shocks to Current Productivity Growth

Consider next a sequence of *current* shocks to productivity growth that persist unexpectedly at first, but subsequently come to be expected to persist. Initially, unanticipated increases in productivity growth are

potentially deflationary, and decreases are potentially inflationary. We take the deflationary case; the inflationary case is exactly the reverse.

For a *given* growth rate of wages, accelerated productivity growth lowers production costs *directly*. If, at first, the acceleration is not expected to persist, there is little effect on expected future income and little effect on current aggregate demand. In such circumstances, faster productivity growth also slows production costs *indirectly* by reducing current labor demand and slowing the growth of wages. Two historical examples of these

effects are particularly noteworthy. Surprisingly persistent *strong* productivity growth in conjunction with a weak labor market helped lower production costs and produce disinflation in 2003. Conversely, surprisingly persistent *weak* productivity growth helped produce inflation in the 1970s.¹¹

The longer a surprising acceleration or deceleration of productivity growth persists, the more

likely it will come to be *expected* to persist. If these changes in expectations are sufficiently pronounced, they have the potential to offset and reverse the initial risk to price stability arising from the change in productivity growth. This appears to be what happened in the late 1990s when surprisingly persistent increases in productivity growth apparently came to

be expected and were extrapolated far into the future. The brightening future income prospects caused aggregate demand to grow even *faster* than productivity for a time near the end of the decade. Labor markets tightened, real wages grew about as fast as productivity, and inflation remained low and stable. Indeed, there was concern at the time that inflation might rise if the increase in demand stimulated by the higher expected future income growth outstripped the restraining effect of the higher productivity growth on prices.



Whether current shocks to productivity are potentially inflationary or deflationary, the Fed can act to offset that potential with interest rate policy. Again, the guiding policy principle is to manage aggregate demand to stabilize production costs so as to sustain profit-maximizing markups on average. The Fed must *reduce* real interest rates to defuse the potential for deflation when a period of faster productivity growth is not expected to persist. In this situation, lower real interest rates must stimulate aggregate demand sufficiently to offset the weakness in labor markets and thereby allow wage increases to reflect the higher productivity. Alternatively, if the public comes to regard a period of faster productivity growth as an increase in

trend growth, then the Fed might have to *increase* real interest rates to relieve the potential for *inflation*. Specifically, interest rates would have to rise enough to limit the increase in current aggregate demand to what can be satisfied by the *current* increase in productivity at the profit-maximizing markup.

Having outlined these policy prescriptions, we want to be quick to acknowledge—as practical policymakers—that implementing them with consistent success is far from rote. Measuring and predicting the relevant aggregate variables is difficult

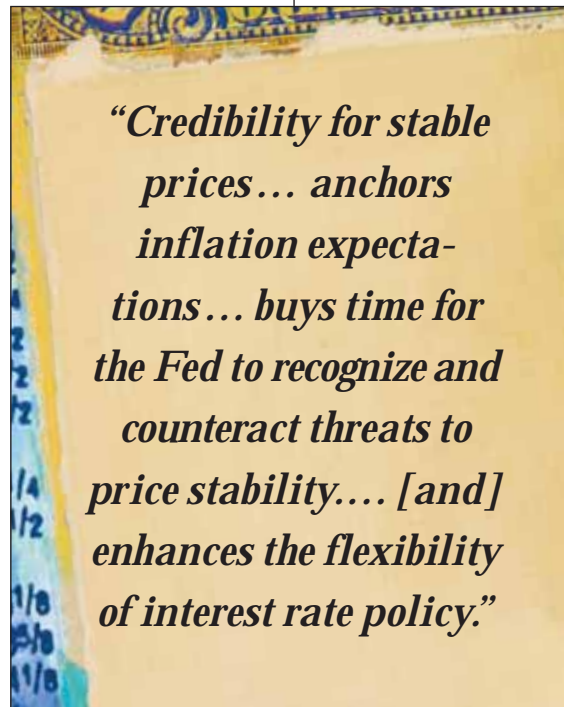
enough; estimating and tracking indicators of the average profit-maximizing markup is even more so. Modeling the transmission of interest rate policy actions to demand, production costs, and inflation requires sophisticated econometric techniques. And discerning whether the public *perceives* an increase in productivity growth as transitory or more lasting, for example, is not easy. Tasks like these are as

challenging as they are crucial. Some would refer to the judgements involved in this work as the “art” of monetary policy.

The Importance of Credibility for Stable Prices

As the foregoing has already suggested, *credibility* is an essential component of effective monetary policy.

The long campaign from the late 1970s through the early 1990s to reduce inflation and establish price stability arguably succeeded only when the Fed finally acquired credibility for low inflation in the eyes of the public in the late 1990s. Indeed, the acquisition of this credibility was essentially equivalent to establishing price stability—two ways to describe the same achievement. Similarly, the Fed needs to acquire credibility for *sustaining* price stability going forward.



The previous section showed how interest rate policy actions can counteract inflationary or deflationary shocks and perpetuate credibility presuming that it has already been established. In this section we explain why full credibility for maintaining price stability is so useful, and how its absence can cause serious problems.

Credibility for stable prices produces three critically important benefits. First, credibility *anchors* inflation expectations so that nominal federal funds rate target changes translate clearly into real interest rate changes, which helps the Fed gauge the likely impact of its policy actions on the economy. Second, credibility *buys time* for the Fed to recognize and counteract threats to price stability. Third, credibility *enhances the flexibility* of interest rate policy to respond aggressively to transitory shocks that threaten to destabilize financial markets and create unemployment.

The absence of credibility, on the other hand, creates problems for monetary policy. The history of post-World War II monetary policy in the United States features numerous *inflation scares* marked by sharply rising long-term bond rates reflecting increased expected inflation premia.¹² Inflation scares create a fundamental dilemma for monetary policy. At the initial nominal federal funds rate target, higher expected inflation lowers the *real* federal funds rate and intensifies the inflation scare by stimulating current aggregate demand and compressing the markup. In these circumstances, the Fed could raise its *nominal* federal funds rate target just enough to leave the real rate

unchanged; but that would do nothing to reverse the collapse of confidence.

Inflation scares are dangerous because ignoring them encourages even more doubt about the Fed's commitment to low inflation. And restoring credibility for low inflation requires the Fed to weaken labor markets deliberately with higher real interest rates in order to slow wage growth, elevate markups, and induce firms not to raise prices—rarely a popular policy stance with the public or the political establishment. It is in large part to avoid the risk of recession posed by inflation scares that the Fed has learned to preempt inflation with interest rate policy.

Unfortunately—and this is a crucial point in appreciating fully the policy implications of the transition from fighting for price stability to maintaining it—credibility for controlling inflation does not automatically translate into credibility for preventing deflation. A *deflation scare* obviously does not confront the Fed with a choice between contracting employment and losing credibility. On the contrary, the way to resist a deflation scare is to reduce real interest rates in order to stimulate demand, tighten labor markets, raise wages, and compress the markup. The problem is that given the zero bound on the nominal federal funds rate, interest rate policy alone might have insufficient leeway to deter deflation, especially since the federal funds rate is low on average when expected inflation is low. Moreover, the Fed would have to drive the nominal federal funds rate ever closer to zero to prevent disinflationary expectations from raising the real

federal funds rate. And deflation expectations would actually *raise* the real federal funds rate at the zero bound and exacerbate the deflation scare.

In addition, a policy vacuum at the zero bound could encourage ill-advised fiscal actions. Some fiscal actions would be desirable as we explain below; but many would not be. For instance, the government might enact legislation that results in wasteful government spending, inefficient credit subsidies, or forbearance in the banking system related to deposit insurance. The government might also resort to off-budget policies such as anti-competitive measures to support wages or prices in particular sectors. All told, such fiscal actions

could lower potential GDP substantially.¹³ In doing so, they would lower future income prospects, lower current aggregate demand, contract current employment, lower wages and production costs, and exacerbate the deflation problem. This appears to be what happened in the Great Depression of the 1930s.¹⁴

Ultimately then, a deflation scare, like an inflation scare, is problematic because it has the potential to lead to a protracted recession. From this perspective, even those who care mainly about employment and output can understand why the Fed must establish credibility as a deflation fighter as well as an inflation fighter



by making price stability a priority and resisting deviations from it in either direction.

Moreover, credibility against inflation and credibility against deflation are mutually supportive: each strengthens the other, and each is weaker without the other.¹⁵ As we pointed out above with respect to inflation scares, policy must compensate for insufficient credibility in one direction by taking risks in the other direction. We make this point again as it pertains to establishing credibility against deflation.

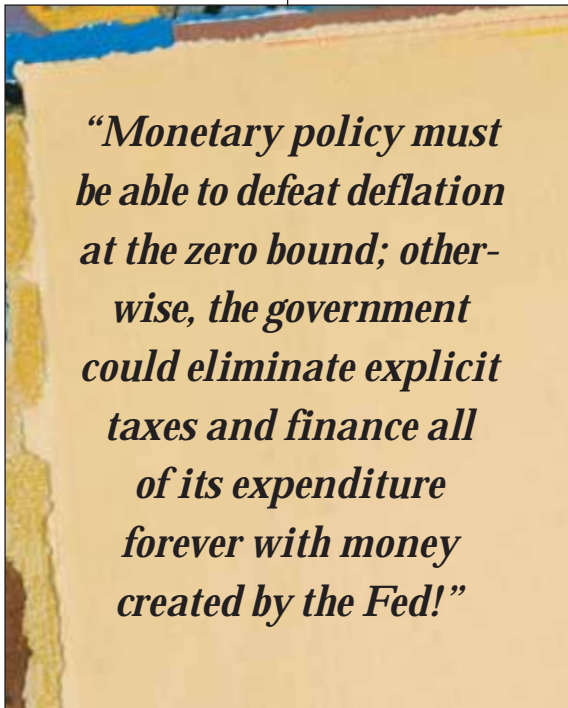
Defeating Deflation at the Zero Bound

But how can the Fed establish credibility for preventing deflation given the zero bound on the nominal funds rate? In brief, the Fed should make arrangements to

overcome operational and institutional obstacles identified below that could impede the effectiveness of monetary policy at the zero bound. The publication of a contingency plan for the aggressive pursuit of monetary policy against deflation at the zero bound would greatly reduce the likelihood and force of deflation scares and help guarantee that the devastating effects of deflation experienced earlier in U.S. history will not be repeated.¹⁶

But how, specifically, can the Fed confront a deflationary risk when the funds rate is *at* the zero bound? Most importantly in our view, the Fed can continue to inject money into the economy by buying assets and expanding its balance sheet when conventional interest rate policy is immobilized at the zero bound.¹⁷ Some economists believe that expanding the monetary base would stimulate spending directly through a monetarist channel of

monetary transmission. Others focus on how Fed purchases of long-term bonds would stimulate spending by lowering long-term interest rates. Still others believe that expanding the balance sheet would work by creating expectations of inflation that would push real interest rates below zero if the Fed held the nominal federal funds rate at zero.



“Monetary policy must be able to defeat deflation at the zero bound; otherwise, the government could eliminate explicit taxes and finance all of its expenditure forever with money created by the Fed!”

Even though we do not know the relative strength of these three transmission channels, and others that may exist, we do know this: monetary policy *must* be able to defeat deflation at the zero bound; otherwise, the government could eliminate explicit taxes and finance all of its expenditure forever with money created by the Fed!¹⁸ The challenge is to identify and overcome operational and institutional obstacles to the credible implementation of quantitative monetary policy as opposed to interest

rate policy, where “quantitative monetary policy” refers to open market purchases that expand the volume of assets and monetary liabilities on the Fed’s balance sheet.

What are these operational and institutional obstacles? One problem is that the bang for the buck of quantitative monetary policy at the zero bound is unknown and may be relatively weak. It follows that the Fed must be prepared, if necessary, to *overshoot* temporarily the long-term, steady state size of its balance sheet by a wide margin. But to do so, the Fed must have a credible *exit strategy* for draining whatever monetary base threatens excessive inflation *after* it has successfully concluded its deflation-fighting policy actions.

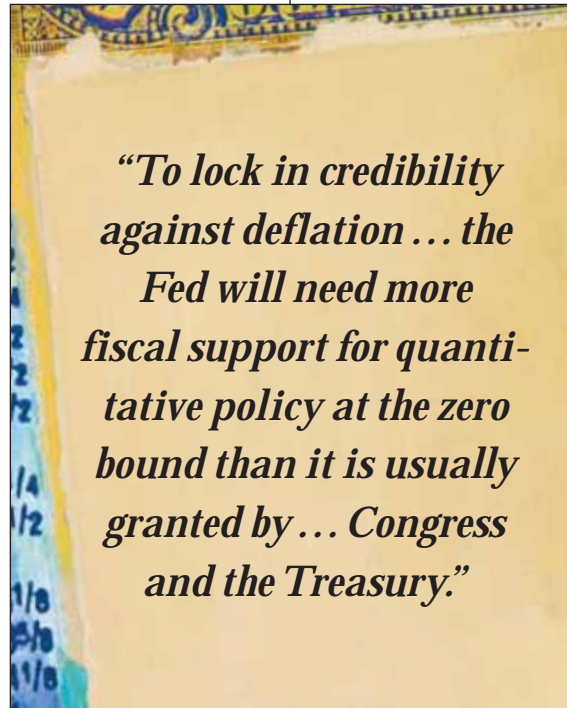
A second problem is that short-term government securities are perfect substitutes for the monetary base at the zero bound; therefore, the Fed would have to buy longer-term government securities, private assets, or foreign assets for quantitative policy to be effective at the zero bound.¹⁹ The current outstanding *stock* of longer-term government securities together with the prospective *flow* of future government borrowing may very well provide sufficient government securities for the Fed to buy—that is, monetize—to defeat deflation at the zero bound.

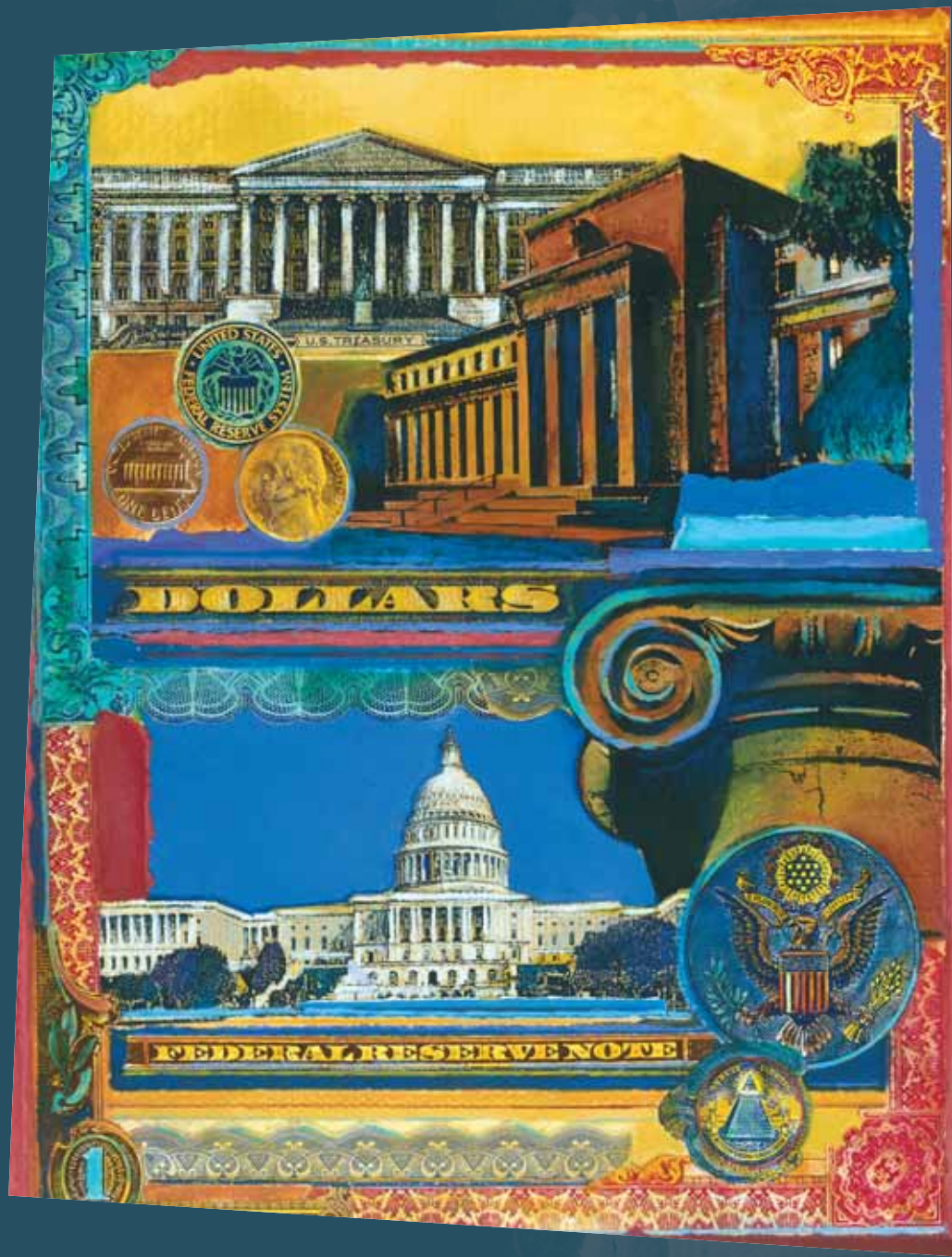
To lock in credibility against deflation, however, the Fed will need more fiscal support for quantitative policy at the zero bound than it is usually granted by the fiscal authorities, i.e., Congress and the Treasury. For example, in some circumstances, there might not be enough outstanding longer-term government bonds to purchase, or government budget deficits to monetize, to make the

quantitative policy effective. Of course, the Fed could buy other assets. But buying domestic private assets or foreign assets on the large scale contemplated here would create other credibility problems.²⁰ Additionally, this strategy would expose the Fed to capital losses that might leave it with insufficient assets to reverse a huge expansion

of its balance sheet, should that be required.²¹

The fiscal authorities could enter the process in a number of ways. In particular, they could support the Fed’s exit strategy by committing to transfer enough government securities to the Fed—in effect to recapitalize the Fed if necessary—to allow the Fed to drain whatever base money needed to be withdrawn from the economy following an aggressive anti-deflation action by the Fed at the zero bound. In addition, the fiscal authorities could agree to run a budget deficit to help inject money





into the economy. The Fed could monetize short-term debt issued to finance the deficit and then withdraw excess base money later by selling the debt back to the public. In this way, monetary policy could be made *completely credible* against deflation in virtually any situation.

This discussion may strike some readers as far-fetched. But while the probability is low that a deflationary threat of the magnitude contemplated here at the zero bound will emerge in the future, if it did, the consequences of not being fully prepared to deal with it could be exceptionally damaging to the economy. Consequently, we believe it is essential to have contingency arrangements of the kind we have just described firmly in place in advance.

Improving Communication in Support of Price Stability

Up to this point, we have explained the economics of maintaining price stability in the context of a modern macroeconomic model, and indicated the critical importance of credibility in this effort, including credibility for confronting the risk of deflation at the zero bound. This last section of our article addresses a final element in the strategy for maintaining price stability: clear communication with the public regarding both the strategy itself and short-term actions taken in the defense of price stability.²²

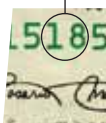
The macroeconomic model of the inflation and deflation processes outlined above suggests two substantial opportunities for the Fed to improve its communication practices in ways that would strengthen its strategy for maintaining price

stability. First, the Fed can lock in long-run price stability and clarify its short-run concerns and policy intentions regarding inflation by publicly announcing an explicit low long-run inflation target. Second, the Fed can clarify its reasons for taking particular short-run policy actions to preempt potential inflation or deflation by talking in terms of the average gap between the actual markup and the profit-maximizing markup, and closely related indicators of labor market tightness, which we identified earlier as the proximate determinants of price pressures. Our arguments for these two recommendations are developed below.

Clarifying Short-Run Policy Aims with an Inflation Target

Although the Fed has made price stability a priority for monetary policy, it does not publicly and explicitly specify a target range for inflation. Instead, the Fed signals its concerns about inflation or deflation in its post-FOMC meeting statements and minutes, and in the Chairman's monetary policy reports to Congress. We believe that the Fed's experience in the May–June 2003 period indicates that references to inflationary or deflationary risks cannot reliably substitute for an explicit long-run inflation target.

The indication in the announcement following the May 2003 FOMC meeting that significant further disinflation would be unwelcome, in our view, effectively put a lower bound on the Fed's tolerance range or comfort zone for inflation. At the time, inflation was running at around 1 percent in terms of the core PCE, one of the Fed's preferred



inflation measures.²³ The assertion of a lower bound seemed prudent given the deflation risk discussed above and the fact that the federal funds rate at the time was 1¼ percent. The Fed's statement served two useful purposes—it alerted the public to the small but real risk of deflation while also asserting implicitly that the Fed would act to deter further disinflation.

The assertion of the lower bound on inflation, however, came as a surprise that took the expected future path of the federal funds rate sharply lower and pulled longer-term interest rates down as well. Commentary in the media amplified nervousness about deflation well beyond what was justified in the economic data. In the event, the Fed reduced its federal funds rate target only 25 basis points, rather than the widely anticipated 50 basis points, at the June FOMC meeting. And longer-term interest rates promptly reversed field.²⁴

Our reading of this episode is that references to the probability of rising or falling inflation in FOMC policy statements cannot reliably substitute for an announced, explicit inflation target range. One of the most important lessons of rational expectations theory is that it is particularly difficult for the public to gauge the intent of

a policy action taken out of context, and, therefore, it is particularly difficult for the Fed to predict the effect of an unsystematic policy action.²⁵ We think this reasoning extends to policy *announcements* as well. Since the ad hoc implicit announcement of a lower bound on the Fed's tolerance range for inflation was unsystematic by definition, it is not surprising that the announce-

ment caused confusion, nor that the Fed failed to predict the public's reaction. In this case the reaction was excessive, but in another situation there might have been an insufficient reaction.

If an inflation target range had been in place in 2003, the public could have inferred the Fed's growing concern about disinflation as the infla-

tion rate drifted down toward the bottom of the range through the first half of the year. Expected future federal funds rates and longer-term interest rates would have moved lower continuously, with less chance of overshooting or undershooting the Fed's intended policy stance. We recommend that the Fed publicly commit to maintaining core PCE inflation within a target range of 1 to 2 percent over the long run so that such misunderstandings won't recur at *either* end of the Fed's tolerance range for inflation.²⁶



The Fed's assertion of an inflation target might appear to some to usurp a congressional prerogative. We think otherwise for three reasons.

First, we believe a compelling case can be made that, beyond underlining the Fed's long-term responsibilities for price stability, an inflation target would be a valuable addition to the Fed's *operational* communications procedures. From this perspective, we believe that at least implicitly Congress has already delegated authority to set an inflation target to the Fed as part of its operational independence.

Second, as we emphasized earlier, monetary policy best facilitates achievement of the Fed's other mandated policy goals—such as maximum sustainable employment, economic growth, and financial stability—by making price stability a priority.


Third, an inflation target would not prevent or hinder the Fed from taking the kinds of policy actions it takes today to stabilize employment and output in the short run. What it would do is to discipline the Fed to ensure that these actions are consistent with its commitment to protect the purchasing power of the currency.²⁷

Clarifying Short-Run Policy Aims with Gap Indicators

The second opportunity for improved communication noted above is more effective explanation of the reasons for particular short-term policy actions. The macroeconomic framework presented above locates the potential for departures from price stability in the sign, size, and expected persistence of

the average *price-cost gap* between actual markups and the respective profit-maximizing markups. In practice, indicators of the *employment gap* and the *output gap* are also used, in conjunction with preferable but hard-to-measure price-cost gap indicators, to assess the risks to price stability.²⁸ (Recall that tightness or slack in the labor market is what causes

nominal wages to accelerate or decelerate. Markup dynamics then govern the transmission of these nominal wage dynamics to the price level.) Recently, the Fed has mentioned only the *growth* of output or productivity, and the *improvement* or *deterioration* in employment in its policy statements, and has rarely if ever mentioned markups, price-cost gaps, or employment and output gaps.

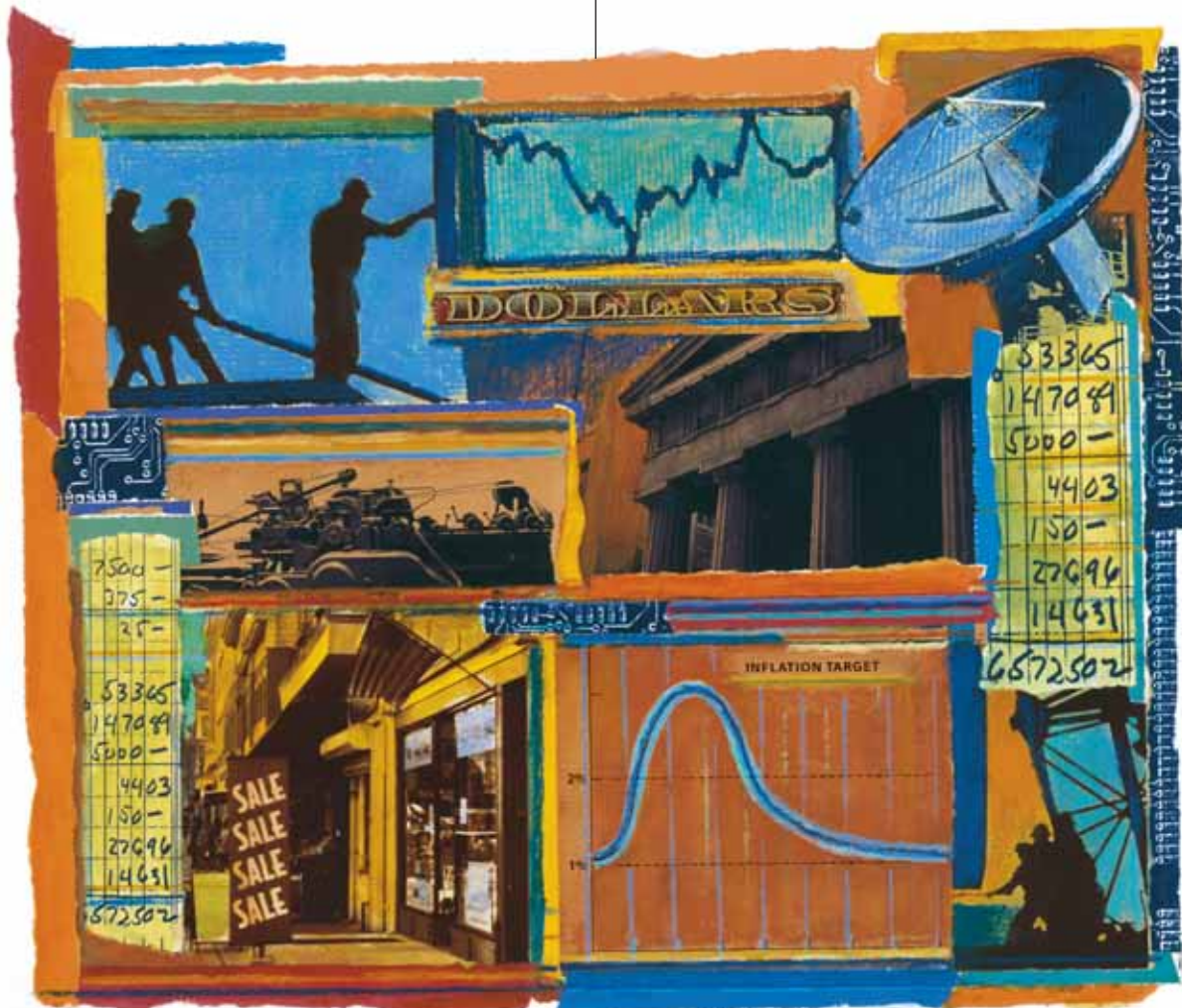


“We recommend that the Fed publicly commit to maintaining core PCE inflation within a target range of 1 to 2 percent over the long run.”

We recognize that gap indicators are particularly difficult to estimate, especially in real time. One must *measure* the average markup, aggregate employment and output and *estimate* the time-varying levels of these aggregates believed to be consistent with price stability. And one must *forecast* future changes in these gap indicators in order to assess the risks to price stability. Furthermore, one must decide how to weight the various indicators in the overall assessment when inevitable inconsistencies occur.

There is a natural reluctance to feature gaps in the Fed's policy statements because of the unfortunate experience in the 1960s and '70s,

when calling attention to employment and output gaps created pressure that ultimately led to inflationary monetary policy and very poor macroeconomic performance.²⁹ Even so, Fed economists necessarily employ, internally at least, implicit estimates of the price-cost gap, the employment gap, and the output gap to evaluate the potential for inflation or deflation. Therefore, gaps ought to be mentioned more prominently in the Fed's post-FOMC policy statements and other important regular policy reports such as the FOMC meeting minutes and the semiannual monetary policy reports to Congress.³⁰ This would help to



avoid confusion in periods such as the recent past when productivity growth has been rising and fluctuating widely with substantial effects on employment and production costs.

In the second half of 2003 the Fed had difficulty convincing financial markets of its inclination to maintain a low federal funds rate for a “considerable period.”³¹ One reason for this, in our view, was that its policy statements emphasized explicitly strong real economic growth during the period but paid insufficient attention to the sizable gap in employment and the cumulative deflation in unit labor costs that had almost certainly widened the price-cost gap. The apparent size and likely persistence of these gaps produced the disinflation that occurred in 2003 and constituted the deflation risk that inclined the Fed to keep the federal funds rate low.

To sum up, we believe that the Fed has much to gain and little to lose by referring to price-cost, employment, and output gaps more prominently.³² By communicating more explicitly in terms of gap indicators, the Fed could clarify substantially its views regarding inflationary or deflationary risks and make expected future federal funds rates conform more closely to its preemptive policy intentions.

If the Fed clarifies its short-run policy aims with gap indicators, however, it is critical that it also discipline itself by announcing an explicit long-run inflation target to deal with any inconsistencies that may appear between gap indicators and inflation performance. The Fed should acknowledge its definition of price stability to avoid repeating either the inflationary mistakes of the 1960s and '70s or the deflationary mistakes of the 1930s.

Summary and Conclusion

In this article, we have sought to provide a framework for thinking about how monetary policy can maintain price stability. The core principle—taken from the new neoclassical synthesis—is that inflation will remain low and stable if and only if firms, on average across the economy, expect departures from their profit-maximizing markups to be relatively small and transitory. We explained how interest rate policy works to maintain price stability by managing aggregate demand to offset the effect on production costs of shocks to expected future income prospects and current productivity.

Monetary policy is most effective when the public is confident that the Fed will act to stabilize production costs promptly after a shock—what we referred to as “credibility” for price stability. When the Fed has credibility, prices are relatively insensitive to cost shocks on average, since firms expect the Fed to manage aggregate demand to reverse pressures on costs in either direction promptly. Credibility anchors expected inflation and enables the Fed to act aggressively to prevent recessions. On the other hand, we indicated how the absence of credibility raises the risk of recession whenever the economy is confronted with either an inflation scare or a deflation scare.

The Fed’s current credibility as an inflation fighter is now firmly established, but the zero bound on interest rate policy impedes the extension of that credibility, in any straightforward way, to deflation. We pointed out, however, that ultimately monetary policy must be able to deter



deflation at the zero bound; otherwise, the government could eliminate explicit taxes and finance all of its expenditure forever with money created by the Fed.

We identified several operational and institutional obstacles that the Fed should address to make quantitative policy (as opposed to interest rate policy) credible against deflation at the zero bound. In particular, we pointed out that in order to secure full credibility against deflation, the Fed will need more fiscal support for quantitative policy at the zero bound than is usually granted by the fiscal authorities.

Finally, we offered two recommendations for improving the Fed's communication policy designed to address the kinds of problems the Fed faced in conveying its concerns about deflation last year. First, the Fed should commit publicly to maintaining core PCE inflation within a target range of 1 to 2 percent over the long run. We think that an inflation target should be regarded, not just as a policy goal, but as an essential part of communication policy.

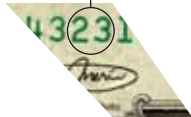
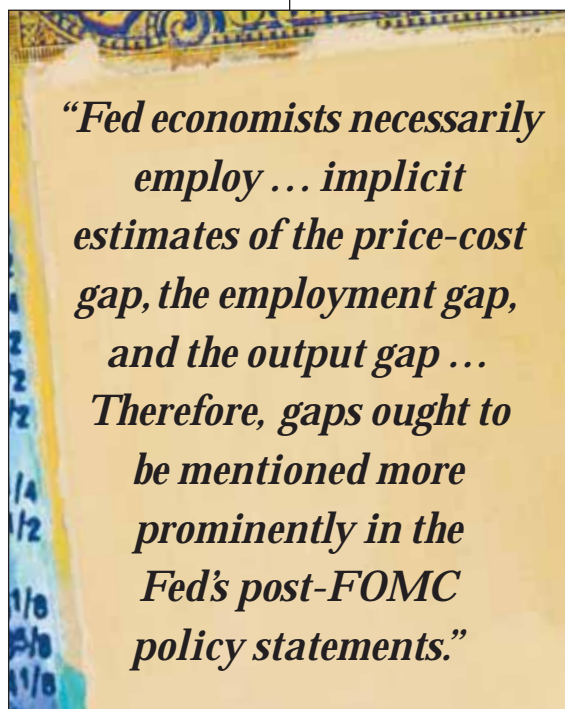
Second, the sign, size, and expected persistence of price-cost, output, and employment gap indicators play a central role in gauging the risks to price stability and in preempting inflation and deflation. We recommend that the Fed feature such gap indicators more prominently in its statements and discussions about policy to clarify the potential for inflation or deflation in its outlook,

and to clarify its intentions for dealing with these threats. We emphasize that the Fed should announce an explicit inflation target so that it does not stray far from price stability under any circumstances.

The role of monetary policy in halting what seemed to be an inexorable rise in inflation in the 1970s, and subsequently

reducing it during the '80s and '90s to an acceptable level, is in our view one of the greatest achievements in the Fed's history. We hope that our article will help the Fed to surmount its next challenge—the maintenance of price stability—in the years ahead.

Robert Hetzel, Jeffrey Lacker, Bennett McCallum, Aaron Steelman, and John Walter contributed valuable comments to this article.



ENDNOTES

1. See Greenspan (2003), page 5.
2. See Bernanke (2003) for a discussion of the nature of the deflation risk.
3. See, for instance, Goodfriend and King (2001), and Goodfriend (2004).
4. New neoclassical synthesis (NNS) models feature complete microeconomic foundations as in real business cycle economies and imperfect competition and sticky prices as in New Keynesian economies. New synthesis models are thoroughly discussed and analyzed in Goodfriend and King (1997, 2001) and Woodford (2003). The Federal Reserve Board's FRB-U.S. macromodel shares many of the central features of the NNS approach (see Brayton et al. [1997]), as does the model of monetary policy discussed extensively in Clarida, Gali, and Gertler (1999).
5. Monopolistically competitive firms have the market power to set their product price above the marginal cost of production.
6. The term "on average" is important. Obviously, individual firms adjust particular prices in response to sector- and firm-specific demand and supply conditions as well as the broader pricing environment.
7. An excessively high markup is counterproductive because it yields too much market share to competitors; conversely, a markup that is too small does not exploit a firm's market power sufficiently.
8. We focus on labor and ignore capital and raw material costs to simplify our exposition. Labor costs alone account for about two-thirds of the cost of producing goods and services.
9. See Goodfriend (2002) for an exposition of the mechanics of interest rate policy geared to maintaining price stability in a new synthesis model. Woodford (2003) presents an extensive treatment of interest rate policy. Clarida, Gali, and Gertler (1999) provides a useful survey. We ignore the zero-bound constraint on interest rate policy in this section, assuming, in effect, that the shocks are small enough that the zero-bound constraint never binds.
10. Optimism or pessimism regarding job prospects, profitable investment opportunities, taxes, and war, for example, would all affect future income prospects.
11. Weak productivity growth, however, was only part of the story in the 1970s: inflation rose long before the extended productivity slowdown began in 1974 and fell briefly thereafter, before rising again in 1978.
12. See Goodfriend (1993). See Orphanides and Williams (2004) for a quantitative, theoretical analysis of inflation scares in a model of perpetual learning.
13. Potential GDP refers to the path of output consistent with the maintenance of price stability.
14. Kennedy (1999) describes U.S. economic policies in the 1930s as a collection of market interventions taken to support favored sectors of the economy. Cole and Ohanian (2001) model these interventions and show quantitatively that they can explain the persistence of the Great Depression in the United States.
15. It is worth pointing out that credibility for price stability is also threatened when Fed participation in foreign exchange operations with the Treasury creates doubt about whether monetary policy will support domestic or international objectives. See Broaddus and Goodfriend (1996).
16. Deflations in the early 1920s and in the 1930s were particularly destructive; milder deflations at other times caused less distress.
17. The Fed is not free to expand the size of its balance sheet as long as it targets a federal funds rate even slightly above zero. In that case, the size of its balance sheet is constrained to create a scarcity of bank reserves just sufficient to maintain the desired positive federal funds rate.
18. Technically, a deflation trap is not a possible rational-expectations equilibrium if the nominal value of total government liabilities will not decline, even in the presence of sustained deflation. See Woodford (2003), page 133.
19. When the federal funds rate has been pushed to zero, there is no opportunity cost to holding currency or bank reserves relative to short-term securities. Hence, the public is indifferent at the margin between holding cash or short-term securities, and open market purchases of short-term securities have no effect.
20. See Broaddus and Goodfriend (2001).
21. For instance, long-term bonds purchased to stimulate the economy when interest rates are near zero suffer large capital losses when interest rates rise as the economy recovers.
22. See Dudley (2003).
23. See Federal Open Market Committee (1996), page 11.
24. See Ip (2003, June 27 and August 15).
25. McCallum (2004) makes a related point.
26. While the core PCE, the Fed's preferred inflation measure internally, seems a straightforward choice for the index on which to base its target measure, the better-known consumer price index could be used instead. Our framework suggests that the Fed should target a core inflation index that closely reflects sticky prices set by monopolistically competitive firms.
27. This repeats a point made by Broaddus at the January 1995 FOMC meeting. See Federal Open Market Committee (1995), page 41.
28. The output gap measures aggregate output relative to an estimated potential level of output consistent with price stability. The employment gap measures aggregate employment relative to an estimated level of employment believed to be consistent with price stability.
29. See, for example, Orphanides (2002).
30. McCallum (2001) discusses conceptual and operational problems involved in measuring employment gaps and output gaps, and argues that monetary policy should not respond strongly to such gaps in its monetary policy rule.
31. These words were employed initially in the policy statement following the August 2003 FOMC meeting. See Ip (2003, August 13). The FOMC dropped the "considerable period" language at its January 2004 meeting, saying instead that it could be "patient" in raising interest rates.
32. Our recommendation is consistent with evidence presented in Kohn and Sack (2003) that greater clarity in the Fed's statements about the economic outlook would improve monetary policy.

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