# Federal Reserve Bank of Richmond

*2003 Annual Report*

## Sustaining Price Stability

# Message from the President and First Vice President

While the beginning of 2003 saw a continuation of the sluggish recovery that began in late 2001, overall economic activity accelerated briskly after midyear, led by renewed growth of business investment in equipment and software. Job growth, however, continued to lag. Payroll employment was essentially unchanged over the year, a surprisingly weak labor market performance so far into a recovery. One factor limiting hiring was the ability of firms to increase worker productivity by exploiting recent technological advances. Strong productivity growth also helped restrain inflationary pressures by holding down unit labor costs. Measures of core inflation fell throughout the year to around 1 percent—the lowest level in several decades.

The Fifth District's manufacturing sector continued to feel the effects of cyclical trends and a long-term structural transformation, especially in the Carolinas. In response to the strong advances in productivity and increasing global competition, District manufacturing employment has been falling since the mid-1990s, and the 2001 recession accelerated this decline. While the end of 2003 saw a pickup in measures of District manufacturing shipments, employment in that sector continued to sag, consistent with national trends. Service sector employment fared better during 2003, however, and overall District employment was flat for the year.

The rapid technological change evident in the national and regional economies has presented challenges for the Federal Reserve Banks. Increased competition in financial services and further consolidation in the banking and financial industries—both enabled by technology—have increased pressure on the Banks to reduce operating costs in their payments services and support activities. Technology is also driving a long-anticipated transition from paper to electronic payments, and, as a result, Reserve Bank check processing volumes continued to decline in 2003. This decline in paper processing is likely to be hastened by the recent passage of the Check 21 legislation, which, when it takes effect in October 2004, will enable increased electronic clearing of checks. While the pace and nature of the transition remain uncertain, it is clear that in the future Reserve Bank check operations will involve significantly fewer people and facilities, far less paper, and far more electronic services than at present.

These trends are clearly beneficial for the nation's payment system, but they require challenging adjustments by the Reserve Banks. Early in 2003 the Banks decided collectively to reduce the number of check processing sites nationwide. Three of the five check processing operations in the Fifth District will be closed in 2004, and District check adjustments processing will be centralized in the Charlotte Office. In order to absorb check

volume diverted from the other offices, and as part of national check modernization efforts, the Baltimore and Charlotte Offices successfully adopted new check hardware and software platforms. Closure of the Richmond, Charleston, and Columbia check processing operations, to be completed in 2004, will displace approximately 250 jobs. In connection with this and other restructuring efforts, the Bank initiated a Bankwide voluntary early retirement program, which will conclude in 2004, to provide job opportunities for some displaced employees.

Technological change also creates opportunities for the Reserve Banks as a group to reduce costs by consolidating support activities. In 2003 the Bank was pleased to be chosen to provide two important national support services for all Reserve Banks. As the central site for payroll processing, we initiated operations and successfully brought three other Banks into the consolidated processing environment. Our Bank was also selected to host the national procurement function and began staffing activities late in the year.

The extensive relationships between regional Reserve Banks and the businesses and communities in their respective Districts have been a foundation of the strength of the Federal Reserve System since its founding 90 years ago. The ongoing transformation of the financial services industry has brought a renewed focus on reinforcing the Bank's regional presence. Recognizing the growing importance of Charlotte as a national banking center, and with an eye to strengthening our connections with communities in the Carolinas, the senior officer over the District's bank supervision and regulation function was reassigned as officer in charge of the Charlotte Office in late 2003.

The banking industry continues to grow in scope and complexity, which requires all Reserve Banks to make retaining and attracting skilled and experienced staff a high priority. This need is especially pressing for our Bank given that several of the nation's largest banking companies are located in our District. During 2003, the Bank put a new supervisory program in place for several large regional banks with particular complexities or areas of specialization. This program, staffed with experienced examiners and industry specialists, provides customized, ongoing oversight for each company, similar to the national program for supervising the largest banking organizations.

The Bank's many and varied accomplishments in 2003 reflect the collective effort and energy of our employees, and we thank each member of our staff warmly for his or her contributions. We are also exceedingly fortunate to have a group of engaged and well-informed directors who provide us their perspective on District economic conditions and exercise oversight of the Bank's operations. Our directors encompass a wide range of professional backgrounds, and their participation in guiding the Bank is an extraordinarily important contribution to the Bank's strength. We especially thank our retiring directors, William "Buck" Duncan and James Haden. Buck shared his extensive knowledge as a community banker and his personal warmth in a way that engaged us all. Jim provided insightful perspective on local economic conditions

and trends in the health-care industry from the vantage point of a businessman and a keen observer of the economy. We are grateful for their service. We are also grateful to the members of our Small Business and Agricultural Advisory Council, our Community Development Advisory Council, and our Operations Advisory Committee for their outstanding support throughout the year.

As one of us nears retirement, we note that throughout the nearly 30 years that we have worked together, the Fed's predominant monetary policy challenge has been to reduce inflation. The long campaign toward this goal extended from the late 1970s through the late 1990s, and in 2003 there was widespread recognition that the Fed had achieved effective price stability. This hard-earned victory is exceptionally important because it reduces the uncertainties and risks faced by households and businesses in making financial decisions, and in that way fosters greater saving, investment, and growth in jobs and income. From now on, the focus of monetary policymakers will be *sustaining* rather than *attaining* price stability.

Academic and central bank economists have devoted considerable attention recently to determining how central banks can best sustain price stability. Our Annual Report essay this year, prepared by Al Broaddus and Marvin Goodfriend, presents an analytical framework, based on the new neoclassical synthesis, for understanding inflation and deflation, and explores the implications of this framework for some of the current challenges facing the Fed and other central banks. One key implication of this framework is that open and effective communication is critical to a central bank's credibility. The essay explains how an inflation target would work to support the Fed's credibility and its efforts to sustain price stability.

J. Alfred Broaddus, Jr.
*President*

Walter A. Varvel
*First Vice President*

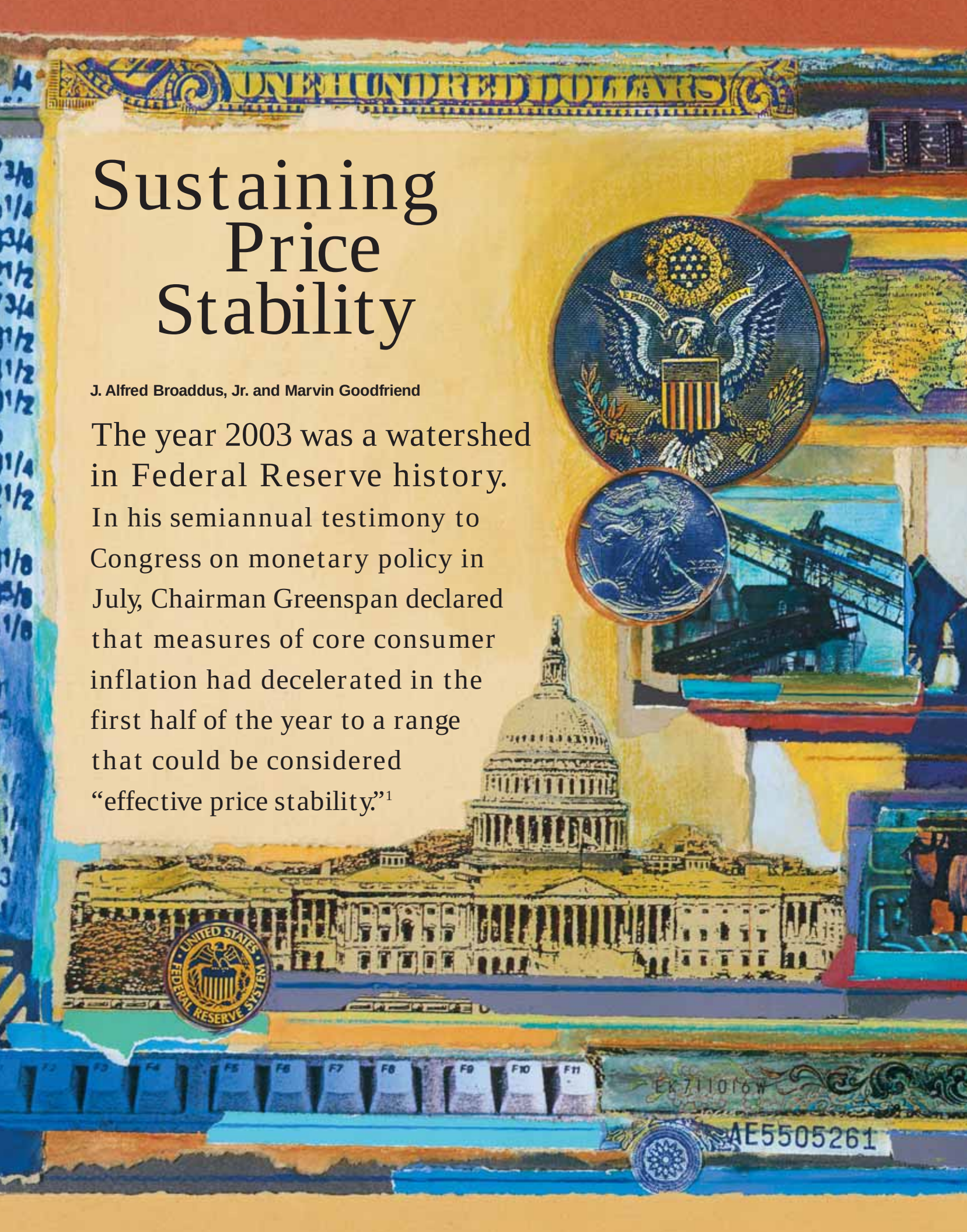
*This will be the last Annual Report prepared during my tenure as president. I have been honored by the privilege of serving the Bank, the Federal Reserve System, and, most importantly, all of our stakeholders in the Fifth Federal Reserve District, in this role. I am especially grateful to all of the present and past directors at all three of our offices who have helped guide the Bank — and me — over the years. I am also deeply grateful to my first vice president, Walter Varvel; his predecessor, Jimmie Monhollon; my predecessor, Bob Black; my principal policy advisor — and frequent co-author in these pages — Marvin Goodfriend; and all of the extraordinary staff teammates I've had the joy of working with over the years. I thank all of these wonderful colleagues for their support, guidance and friendship. I will miss the Bank very much, but I am confident that my successor will sustain the traditions of integrity, service, excellence, and respect for the individual that have been the Bank's foundation throughout its proud 90-year history.*

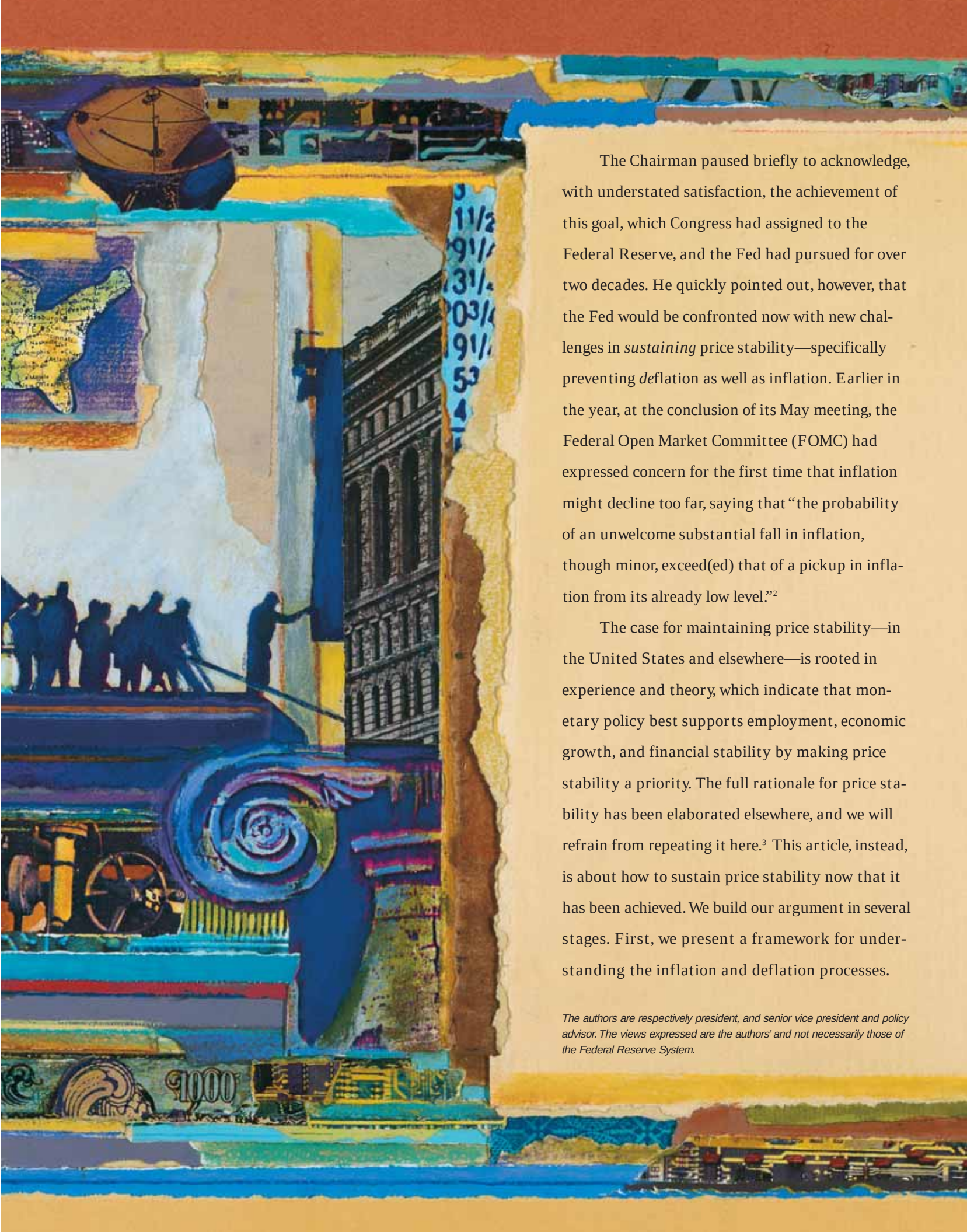
*Al Broaddus*

# 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 *de*flation 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.*

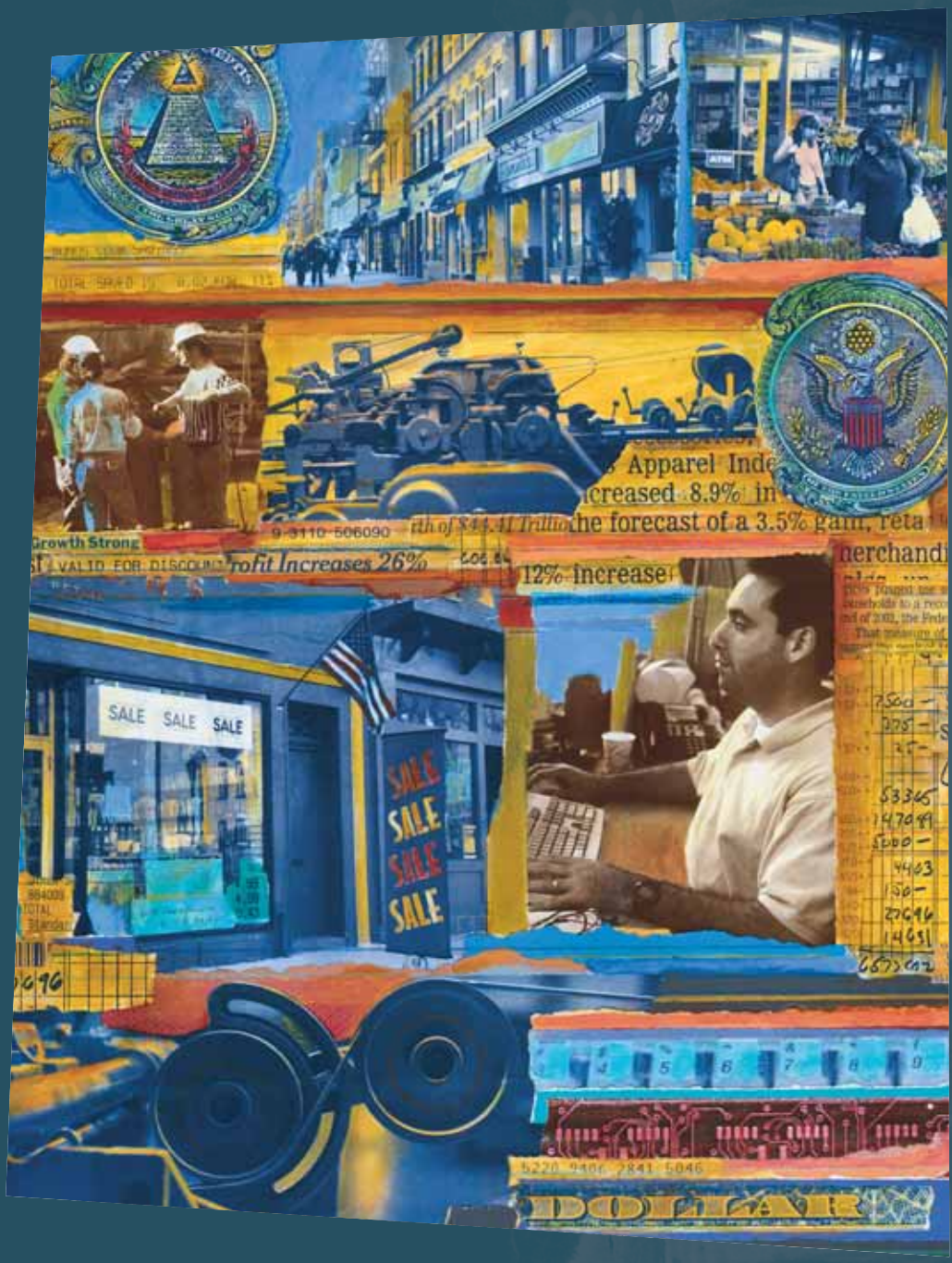
Our framework, borrowed from the "new neoclassical synthesis" macroeconomic model, focuses on the management of the markup of price over marginal cost by monopolistically competitive firms.[4] Next, we provide examples of shocks that are potentially inflationary or deflationary and explain how interest 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.

*"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."*

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 publicly 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.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## 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.

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## 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 *in*flationary 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 *de*flationary 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.

> *"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."*

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

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.

*"Credibility for stable prices… anchors inflation expectations… buys time for the Fed to recognize and counteract threats to price stability.… [and] enhances the flexibility of interest rate 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]

*"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!"*

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.

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.

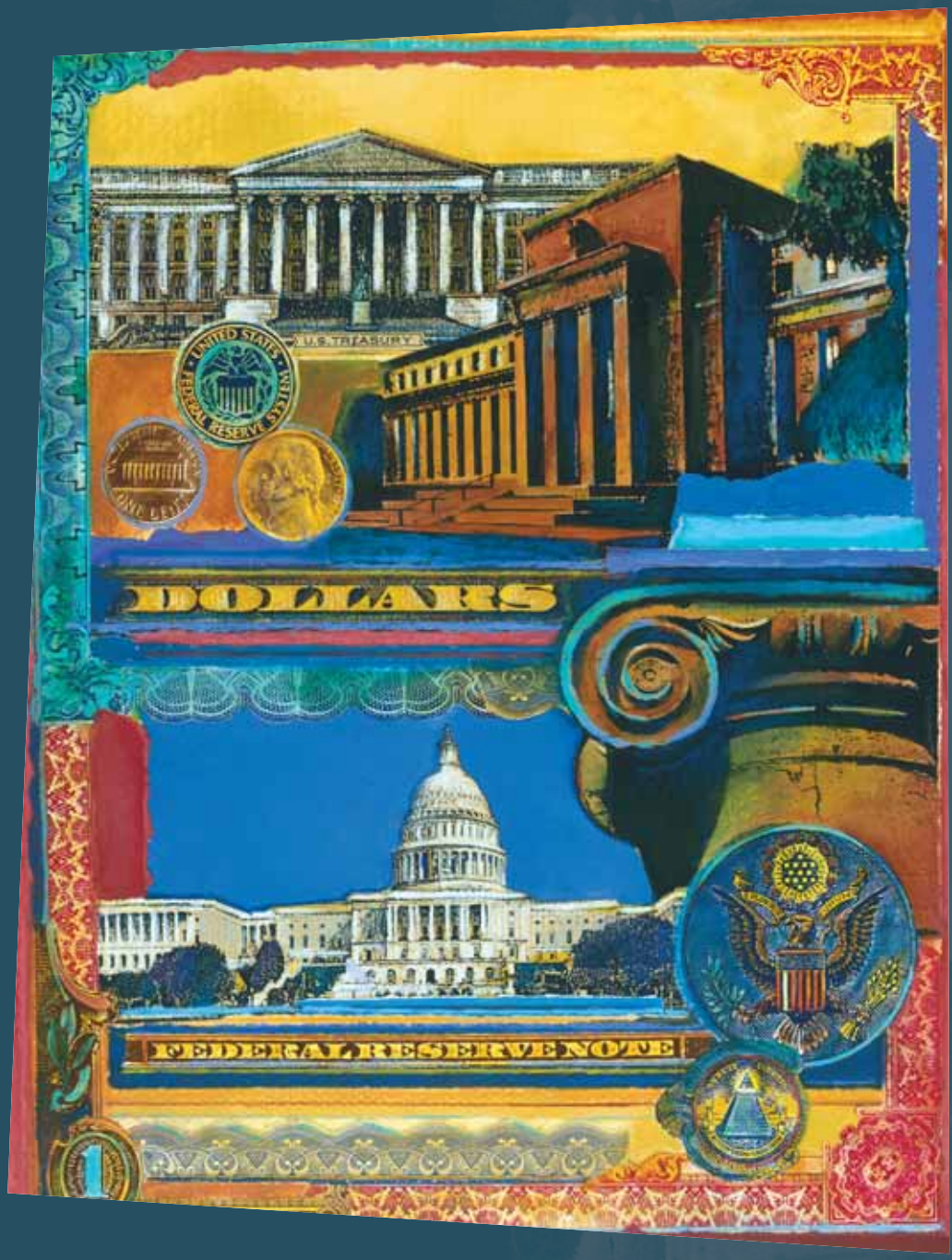
What are these operational and institutional obstacles? One problem is that the bang for the buck of quantitative monetary policy at the zero bound is unknown and may be relatively weak. It follows that the Fed must be prepared, if necessary, to *overshoot* temporarily the long-term, steady state size 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]

*"To lock in credibility against deflation … the Fed will need more fiscal support for quantitative policy at the zero bound than it is usually granted by … Congress and the Treasury."*

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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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.

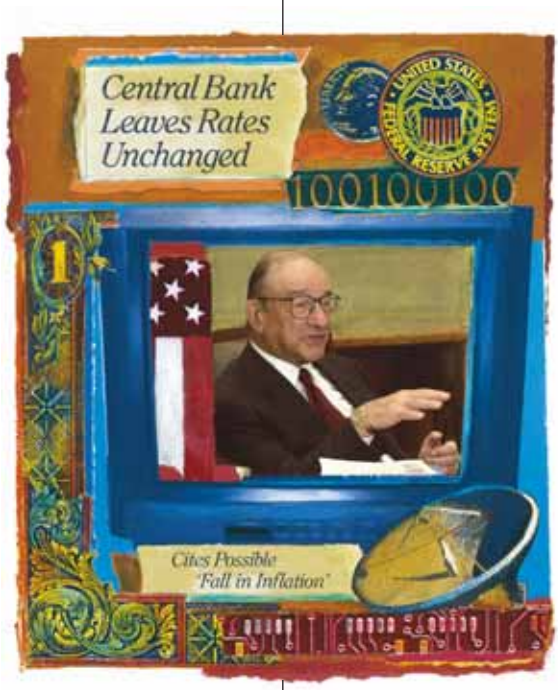
### Clarifying Short-Run Policy Aims with an Inflation Target

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 announcement 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 inflation 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]

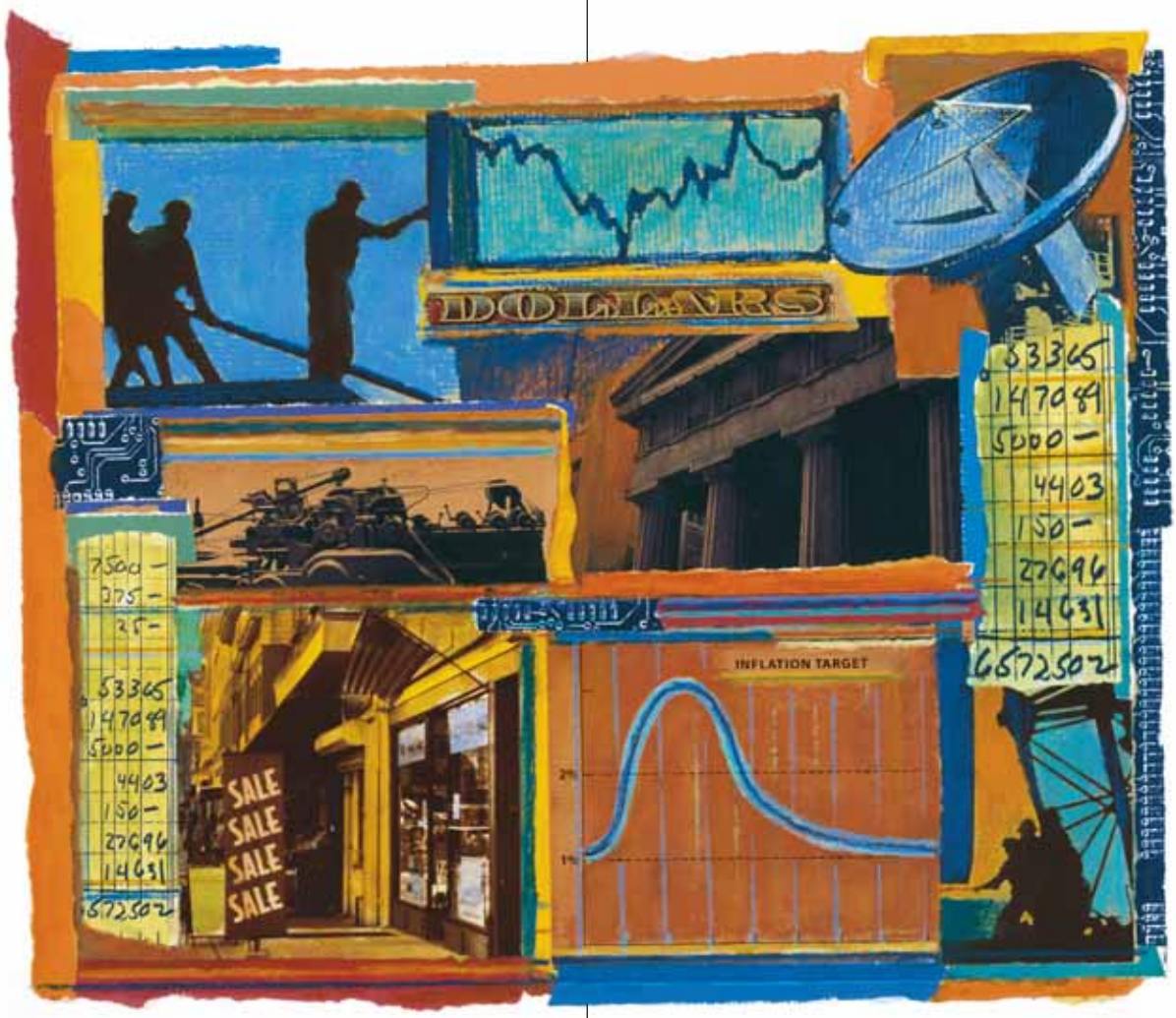
*"We recommend that the Fed publicly commit to maintaining core PCE inflation within a target range of 1 to 2 percent over the long run."*

## 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 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.

*"Fed economists necessarily employ … implicit estimates of the price-cost gap, the employment gap, and the output gap … Therefore, gaps ought to be mentioned more prominently in the Fed's post-FOMC policy statements."*

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, Galí, 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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The Bank's Board of Directors annually appoints the District's representative to the Federal Advisory Council, which consists of one member from each of the Federal Reserve Districts. The Council confers four times a year with the Board of Governors on business conditions and issues related to the banking industry.

## Baltimore and Charlotte Office Boards of Directors 28

Our Baltimore and Charlotte Offices have seven-member Boards that oversee operations at their respective offices, contribute to policymaking, and provide timely business and economic information. Four directors on each of these Boards are appointed by the Richmond Directors and three are appointed by the Board of Governors.

## Small Business and Agriculture Advisory Council 30

Established in 1985, the Small Business and Agriculture Advisory Council advises the Bank president and other senior officers on the impact that monetary, banking, and fiscal policies have on the District's small business and agricultural sectors. The Council's 12 members are appointed by the Bank's president.

## Community Development Advisory Council 31

The Bank organized the Community Development Advisory Council in 1998 to enhance communication between the Bank and the public concerning community development issues. The ten-member Council provides counsel to the Bank president and other senior officers on community development concerns and related policy matters. Council members are appointed by the Bank's president.

## Operations Advisory Committee 32

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## Officers 34

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Executive Vice President
Operations Division
The National Bank of South Carolina
Columbia, South Carolina

**James T. Riffe**
Executive Vice President and Chief Operating Officer
Highlands Union Bank
Abingdon, Virginia

**William F. Rogerson**
Executive Vice President
Wachovia Corporation
Richmond, Virginia

**Paul A. Slaby**
Vice President and Controller
Aberdeen Proving Ground Federal Credit Union
Edgewood, Maryland

**James H. Thompson, III**
Vice President and Cashier
The National Capital Bank of Washington
Washington, D.C.

**Melodye Mayes Tomlin**
Senior Vice President
Branch Banking and Trust Company
Wilson, North Carolina

**Michael A. Tucker**
President and Chief Executive Officer
West Virginia Central Credit Union
Parkersburg, West Virginia

**B. Martin Walker**
Senior Vice President
Bank of America
Richmond, Virginia

3339

# Officers

**Senior Vice Presidents** *Front row, left to right:* V. Rosson, J. Reese, M. Alfriend
*Back row, left to right:* J. Lacker, M. Shuler, J. Ramage, R. Wetzel, J. McAfee, V. Brugh, M. Goodfriend, J. Kane

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President

**Walter A. Varvel**
First Vice President

**Malcolm C. Alfriend**
Senior Vice President

**Victor M. Brugh, II**
Medical Director

**Marvin S. Goodfriend**
Senior Vice President and Policy Advisor

**Jeffrey M. Lacker**
Senior Vice President and Director of Research

**James McAfee**
Senior Vice President and General Counsel

**Joseph C. Ramage**
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**Hattie R. C. Barley**
Assistant Vice President

**Gwen W. Byer**
Assistant Vice President

**Whitley K. Crane**
Assistant Vice President

0343

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**Constance B. Frudden**
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**Howard S. Goldfine**
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**Patricia S. Tunstall**
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**John I. Turnbull, II**
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**Ronald D. Steele**
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**T. Stuart Desch**
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**Richard J. Kuhn**
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**Adam S. Pilsbury**
Assistant Vice President

**Jeffrey K. Thomas**
Assistant Vice President

**Helen S. Williams**
Assistant Vice President

**Ronald B. Holton**
Business Development Officer

**A. Thomas Ray**
Operations Officer

**David A. Swett**
Examining Officer

## Charleston

**Carlisle C. Jones, Jr.**
Assistant Vice President

## Columbia

**Ronald D. Steele**
Vice President

*Listing as of December 31, 2003*

3356

# Financial Statements


| | |
|---|---|
| Management Assertion | 37 |
| Report of Independent Accountants | 38 |
| Report of Independent Auditors | 39 |
| Comparative Financial Statements | 40 |
| Notes to Financial Statements | 43 |


*The firm engaged by the Board of Governors for the audits of the individual and combined financial statements of the Reserve Banks for 2003 was PricewaterhouseCoopers LLP (PwC). Fees for these services totaled $1.4 million. To ensure auditor independence, the Board of Governors requires that PwC be independent in all matters relating to the audit. Specifically, PwC may not perform services for the Reserve Banks or others that would place it in a position of auditing its own work, making management decisions on behalf of the Reserve Banks, or in any other way impairing its audit independence. In 2003, the Bank did not engage PwC for advisory services.*

# Management Assertion

December 31, 2003

To the Board of Directors:

The management of the Federal Reserve Bank of Richmond ("FRB Richmond") is responsible for the preparation and fair presentation of the Statement of Financial Condition, Statement of Income, and Statement of Changes in Capital as of December 31, 2003 (the "Financial Statements"). The Financial Statements have been prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System and as set forth in the Financial Accounting Manual for the Federal Reserve Banks ("Manual"), and as such, include amounts, some of which are based on judgments and estimates of management. To our knowledge, the Financial Statements are, in all material respects, fairly presented in conformity with the accounting principles, policies, and practices documented in the Manual and include all disclosures necessary for such fair presentation.

The management of the FRB Richmond is responsible for maintaining an effective process of internal controls over financial reporting including the safeguarding of assets as they relate to the Financial Statements. Such internal controls are designed to provide reasonable assurance to management and to the Board of Directors regarding the preparation of reliable Financial Statements. This process of internal controls contains self-monitoring mechanisms, including, but not limited to, divisions of responsibility and a code of conduct. Once identified, any material deficiencies in the process of internal controls are reported to management, and appropriate corrective measures are implemented.

Even an effective process of internal controls, no matter how well designed, has inherent limitations, including the possibility of human error, and therefore can provide only reasonable assurance with respect to the preparation of reliable financial statements.

The management of the FRB Richmond assessed its process of internal controls over financial reporting including the safeguarding of assets reflected in the Financial Statements, based upon the criteria established in the "Internal Control–Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this assessment, we believe that the FRB Richmond maintained an effective process of internal controls over financial reporting including the safeguarding of assets as they relate to the Financial Statements.

Federal Reserve Bank of Richmond

J. Alfred Broaddus, Jr.
*President*

Walter A. Varvel
*First Vice President*

James D. Reese
*Senior Vice President and Chief Financial Officer*

# Report of Independent Accountants

To the Board of Directors of the Federal Reserve Bank of Richmond:

We have examined management's assertion, included in the accompanying Management Assertion, that the Federal Reserve Bank of Richmond ("FRB Richmond") maintained effective internal control over financial reporting and the safeguarding of assets as they relate to the financial statements as of December 31, 2003, based on criteria established in *Internal Control – Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission. FRB Richmond's management is responsible for maintaining effective internal control over financial reporting and safeguarding of assets as they relate to the financial statements. Our responsibility is to express an opinion on management's assertion based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants and, accordingly, included obtaining an understanding of internal control over financial reporting, testing and evaluating the design and operating effectiveness of internal control, and performing such other procedures as we considered necessary in the circumstances. We believe that our examination provides a reasonable basis for our opinion.

Because of inherent limitations in any internal control, misstatements due to error or fraud may occur and not be detected. Also, projections of any evaluation of internal control over financial reporting to future periods are subject to the risk that the internal control may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

In our opinion, management's assertion that FRB Richmond maintained effective internal control over financial reporting and over the safeguarding of assets as they relate to the financial statements as of December 31, 2003, is fairly stated, in all material respects, based on criteria established in *Internal Control – Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

This report is intended solely for the information and use of management and the Board of Directors and Audit Committee of FRB Richmond, and any organization with legally defined oversight responsibilities and is not intended to be and should not be used by anyone other than these specified parties.

PricewaterhouseCoopers LLP

March 1, 2004

# Report of Independent Auditors

To the Board of Governors of the Federal Reserve System and
the Board of Directors of the Federal Reserve Bank of Richmond:

We have audited the accompanying statements of condition of the Federal Reserve Bank of Richmond (the "Bank") as of December 31, 2003 and 2002, and the related statements of income and changes in capital for the years then ended, which have been prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System. These financial statements are the responsibility of the Bank's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

As described in Note 3, these financial statements were prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System. These principles, policies, and practices, which were designed to meet the specialized accounting and reporting needs of the Federal Reserve System, are set forth in the *Financial Accounting Manual for Federal Reserve Banks* and constitute a comprehensive basis of accounting other than accounting principles generally accepted in the United States of America.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Bank as of December 31, 2003 and 2002, and results of its operations for the years then ended, on the basis of accounting described in Note 3.

PricewaterhouseCoopers LLP

March 1, 2004

# Statements of Condition *in millions*

| *As of December 31,* | **2003** | 2002 |
|---|---|---|
| ASSETS | | |
| Gold certificates | **$ 808** | $ 819 |
| Special drawing rights certificates | **147** | 147 |
| Coin | **83** | 144 |
| Items in process of collection | **714** | 917 |
| U.S. government and federal agency securities, net | **51,954** | 49,847 |
| Investments denominated in foreign currencies | **4,915** | 4,048 |
| Accrued interest receivable | **388** | 425 |
| Interdistrict settlement account | **2,793** | — |
| Bank premises and equipment, net | **267** | 246 |
| Other assets | **118** | 129 |
| Total assets | **$ 62,187** | $ 56,722 |
| LIABILITIES AND CAPITAL | | |
| Liabilities: | | |
| Federal Reserve notes outstanding, net | **50,094** | 45,349 |
| Securities sold under agreements to repurchase | **1,973** | 1,645 |
| Deposits: | | |
| Depository institutions | **5,087** | 1,381 |
| Other deposits | **69** | 57 |
| Deferred credit items | **628** | 808 |
| Interest on Federal Reserve notes due U.S. Treasury | **44** | 137 |
| Interdistrict settlement account | **—** | 3,052 |
| Accrued benefit costs | **99** | 89 |
| Other liabilities | **45** | 58 |
| Total liabilities | **58,039** | 52,576 |
| Capital: | | |
| Capital paid-in | **2,074** | 2,073 |
| Surplus | **2,074** | 2,073 |
| Total capital | **4,148** | 4,146 |
| Total liabilities and capital | **$ 62,187** | $ 56,722 |

*The accompanying notes are an integral part of these financial statements.*

# Statements of Income *in millions*

| *For the years ended December 31,* | **2003** | 2002 |
|---|---|---|
| INTEREST INCOME | | |
| Interest on U.S. government and federal agency securities | **$ 1,722** | $ 1,834 |
| Interest on investments denominated in foreign currencies | **64** | 65 |
| Total interest income | **1,786** | 1,899 |
| INTEREST EXPENSE | | |
| Interest expense on securities sold under agreements to repurchase | **16** | 1 |
| Net interest income | **1,770** | 1,898 |
| OTHER OPERATING INCOME | | |
| Income from services | **72** | 80 |
| Reimbursable services to government agencies | **35** | 36 |
| Foreign currency gains, net | **666** | 498 |
| U.S. government securities gains, net | **—** | 5 |
| Other income | **5** | 4 |
| Total other operating income | **778** | 623 |
| OPERATING EXPENSES | | |
| Salaries and other benefits | **236** | 214 |
| Occupancy expense | **30** | 30 |
| Equipment expense | **84** | 79 |
| Assessments by Board of Governors | **110** | 81 |
| Other credits | **(117)** | (91) |
| Total operating expenses | **343** | 313 |
| Net income prior to distribution | **$ 2,205** | $ 2,208 |
| DISTRIBUTION OF NET INCOME | | |
| Dividends paid to member banks | **$ 125** | $ 120 |
| Transferred to surplus | **1** | 316 |
| Payments to U.S. Treasury as interest on Federal Reserve notes | **2,079** | 1,772 |
| Total distribution | **$ 2,205** | $ 2,208 |

*The accompanying notes are an integral part of these financial statements.*

# Statements of Changes in Capital *in millions*

| *For the years ended December 31, 2003 and December 31, 2002* | Capital Paid-in | Surplus | Total Capital |
|---|---|---|---|
| Balance at January 1, 2002 (35.1 million shares) | $ 1,757 | $ 1,757 | $ 3,514 |
| Net income transferred to surplus | — | 316 | 316 |
| Net change in capital stock issued (6.3 million shares) | 316 | — | 316 |
| Balance at December 31, 2002 (41.4 million shares) | $ 2,073 | $ 2,073 | $ 4,146 |
| Net income transferred to surplus | — | 1 | 1 |
| Net change in capital stock issued (.01 million shares) | 1 | — | 1 |
| Balance at December 31, 2003 (41.4 million shares) | **$ 2,074** | **$ 2,074** | **$ 4,148** |

*The accompanying notes are an integral part of these financial statements.*

# Notes to Financial Statements

## 1. Structure

The Federal Reserve Bank of Richmond ("Bank") is part of the Federal Reserve System ("System") created by Congress under the Federal Reserve Act of 1913 ("Federal Reserve Act") which established the central bank of the United States. The System consists of the Board of Governors of the Federal Reserve System ("Board of Governors") and twelve Federal Reserve Banks ("Reserve Banks"). The Reserve Banks are chartered by the federal government and possess a unique set of governmental, corporate, and central bank characteristics. The Bank and its branches in Baltimore, Maryland, and Charlotte, North Carolina, serve the Fifth Federal Reserve District, which includes Maryland, North Carolina, South Carolina, Virginia, the District of Columbia, and a portion of West Virginia. Other major elements of the System are the Federal Open Market Committee ("FOMC") and the Federal Advisory Council. The FOMC is composed of members of the Board of Governors, the president of the Federal Reserve Bank of New York ("FRBNY") and, on a rotating basis, four other Reserve Bank presidents. Banks that are members of the System include all national banks and any state-chartered bank that applies and is approved for membership in the System.

*Board of Directors*

In accordance with the Federal Reserve Act, supervision and control of the Bank are exercised by a Board of Directors. The Federal Reserve Act specifies the composition of the Board of Directors for each of the Reserve Banks. Each board is composed of nine members serving three-year terms: three directors, including those designated as Chairman and Deputy Chairman, are appointed by the Board of Governors, and six directors are elected by member banks. Of the six elected by member banks, three represent the public and three represent member banks. Member banks are divided into three classes according to size. Member banks in each class elect one director representing member banks and one representing the public. In any election of directors, each member bank receives one vote, regardless of the number of shares of Reserve Bank stock it holds.

## 2. Operations and Services

The System performs a variety of services and operations. Functions include: formulating and conducting monetary policy; participating actively in the payments mechanism, including large-dollar transfers of funds, automated clearinghouse ("ACH") operations and check processing; distributing coin and currency; performing fiscal agency functions for the U.S. Treasury and certain federal agencies; serving as the federal government's bank; providing short-term loans to depository institutions; serving the consumer and the community by providing educational materials and information regarding consumer laws; supervising bank holding companies and state member banks; and administering other regulations of the Board of Governors. The Board of Governors' operating costs are funded through assessments on the Reserve Banks.

In performing fiscal agency functions for the U.S. Treasury, the Bank provides U.S. securities direct purchase and savings bond processing services. In December 2003, the U.S. Treasury announced plans to consolidate the provision of these services at FRB Cleveland and Minneapolis. An implementation plan is expected to be announced in March 2004. At this time, the Bank has not developed a detailed estimate of the financial effect of the consolidation.

The FOMC establishes policy regarding open market operations, oversees these operations, and issues authorizations and directives to the FRBNY for its execution of transactions. Authorized transaction types include direct purchase and sale of securities, matched sale-purchase transactions, the purchase of securities under agreements to resell, the sale of securities under agreements to repurchase, and the lending of U.S. government securities. The FRBNY is also authorized by the FOMC to hold balances of, and to execute spot and forward foreign exchange ("F/X") and securities contracts in, nine foreign currencies, maintain reciprocal currency arrangements ("F/X swaps") with various central banks, and "warehouse" foreign currencies for the U.S. Treasury and Exchange Stabilization Fund ("ESF") through the Reserve Banks.

## 3. Significant Accounting Policies

Accounting principles for entities with the unique powers and responsibilities of the nation's central bank have not been formulated by the Financial Accounting Standards Board. The Board of Governors has developed specialized accounting principles and practices that it believes are appropriate for the significantly different nature and function of a central bank as compared with the private sector. These accounting principles and practices are documented in the *Financial Accounting Manual for Federal Reserve Banks* ("Financial Accounting Manual"), which is issued by the Board of Governors. All Reserve Banks are required to adopt and apply accounting policies and practices that are consistent with the Financial Accounting Manual.

The financial statements have been prepared in accordance with the Financial Accounting Manual. Differences exist between the accounting principles and practices of the System and accounting principles generally accepted in the United States of America ("GAAP"). The primary differences are the presentation of all security holdings at amortized cost, rather than at the fair value presentation requirements of GAAP, and the accounting for matched sale-purchase transactions as separate sales and purchases, rather than secured borrowings with pledged collateral, as is generally required by GAAP. In addition, the Bank has elected not to present a Statement of Cash Flows. The Statement of Cash Flows has not been included because the liquidity and cash position of the Bank are not of primary concern to the users of these financial statements. Other information regarding the Bank's activities is provided in, or may be derived from, the Statements of Condition, Income, and Changes in Capital. A Statement of Cash Flows, therefore, would not provide any additional useful information. There are no other significant differences between the policies outlined in the Financial Accounting Manual and GAAP.

Each Reserve Bank provides services on behalf of the System for which costs are not shared. Major services provided on behalf of the System by the Bank, for which the costs were not redistributed to the other Reserve Banks, include: Standard Cash Automation and the Currency Technology Office. Costs are, however, redistributed to other Reserve Banks for computing and support services the Bank provides for the System. The Bank's total reimbursement for these services was $216 million and $187 million for the years ended December 31, 2003 and 2002, respectively, and is included in "Other credits" on the Statements of Income.

The preparation of the financial statements in conformity with the Financial Accounting Manual requires management to make certain estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of income and expenses during the reporting period. Actual results could differ from those estimates. Unique accounts and significant accounting policies are explained below.

*a. Gold Certificates*

The Secretary of the Treasury is authorized to issue gold certificates to the Reserve Banks to monetize gold held by the U.S. Treasury. Payment for the gold certificates by the Reserve Banks is made by crediting equivalent amounts in dollars into the account established for the U.S. Treasury. These gold certificates held by the Reserve Banks are required to be backed by the gold of the U.S. Treasury. The U.S. Treasury may reacquire the gold certificates at any time and the Reserve Banks must deliver them to the U.S. Treasury. At such time, the U.S. Treasury's account is charged, and the Reserve Banks' gold certificate accounts are lowered. The value of gold for purposes of backing the gold certificates is set by law at $42 2/9 a fine troy ounce. The Board of Governors allocates the gold certificates among Reserve Banks once a year based on average Federal Reserve notes outstanding in each District.

*b. Special Drawing Rights Certificates*

Special drawing rights ("SDRs") are issued by the International Monetary Fund ("Fund") to its members in proportion to each member's quota in the Fund at the time of issuance. SDRs serve as a supplement to international monetary reserves and may be transferred from one national monetary authority to another. Under the law providing for United States participation in the SDR system, the Secretary of the U.S. Treasury is authorized to issue SDR certificates, somewhat like gold certificates, to the Reserve Banks. At such time, equivalent amounts in dollars are credited to the account established for the U.S. Treasury, and the Reserve Banks' SDR

certificate accounts are increased. The Reserve Banks are required to purchase SDR certificates, at the direction of the U.S. Treasury, for the purpose of financing SDR acquisitions or for financing exchange stabilization operations. At the time SDR transactions occur, the Board of Governors allocates SDR certificate transactions among Reserve Banks based upon Federal Reserve notes outstanding in each District at the end of the preceding year. There were no SDR transactions in 2003 or 2002.

*c. Loans to Depository Institutions*

The Depository Institutions Deregulation and Monetary Control Act of 1980 provides that all depository institutions that maintain reservable transaction accounts or nonpersonal time deposits, as defined in Regulation D issued by the Board of Governors, have borrowing privileges at the discretion of the Reserve Banks. Borrowers execute certain lending agreements and deposit sufficient collateral before credit is extended. Loans are evaluated for collectibility. If loans were ever deemed to be uncollectible, an appropriate reserve would be established. Interest is accrued using the applicable discount rate established at least every fourteen days by the Boards of Directors of the Reserve Banks, subject to review by the Board of Governors. There were no outstanding loans to depository institutions at December 31, 2003 and 2002, respectively.

*d. U.S. Government and Federal Agency Securities and Investments Denominated in Foreign Currencies*

The FOMC has designated the FRBNY to execute open market transactions on its behalf and to hold the resulting securities in the portfolio known as the System Open Market Account ("SOMA"). In addition to authorizing and directing operations in the domestic securities market, the FOMC authorizes and directs the FRBNY to execute operations in foreign markets for major currencies in order to counter disorderly conditions in exchange markets or to meet other needs specified by the FOMC in carrying out the System's central bank responsibilities. Such authorizations are reviewed and approved annually by the FOMC.

In December 2002, the FRBNY replaced matched sale-purchase ("MSP") transactions with securities sold under agreements to repurchase. MSP transactions, accounted for as separate sale and purchase transactions, are transactions in which the FRBNY sells a security and buys it back at the rate specified at the commencement of the transaction. Securities sold under agreements to repurchase are treated as secured borrowing transactions with the associated interest expense recognized over the life of the transaction.

The FRBNY has sole authorization by the FOMC to lend U.S. government securities held in the SOMA to U.S. government securities dealers and to banks participating in U.S. government securities clearing arrangements on behalf of the System, in order to facilitate the effective functioning of the domestic securities market. These securities-lending transactions are fully collateralized by other U.S. government securities. FOMC policy requires the FRBNY to take possession of collateral in excess of the market values of the securities loaned. The market values of the collateral and the securities loaned are monitored by the FRBNY on a daily basis, with additional collateral obtained as necessary. The securities loaned continue to be accounted for in the SOMA.

F/X contracts are contractual agreements between two parties to exchange specified currencies, at a specified price, on a specified date. Spot foreign contracts normally settle two days after the trade date, whereas the settlement date on forward contracts is negotiated between the contracting parties, but will extend beyond two days from the trade date. The FRBNY generally enters into spot contracts, with any forward contracts generally limited to the second leg of a swap/warehousing transaction.

The FRBNY, on behalf of the Reserve Banks, maintains renewable, short-term F/X swap arrangements with two authorized foreign central banks. The parties agree to exchange their currencies up to a pre-arranged maximum amount and for an agreed-upon period of time (up to twelve months), at an agreed-upon interest rate. These arrangements give the FOMC temporary access to foreign currencies it may need for intervention operations to support the dollar and give the partner foreign central bank temporary access to dollars it may need to support its own currency. Drawings under the F/X swap arrangements can be initiated by either the FRBNY or the partner foreign central bank and must be agreed to by the drawee. The F/X swaps are structured so that the party initiating the transaction (the drawer) bears the exchange rate risk upon maturity. The FRBNY will generally invest the foreign currency received under an F/X swap in interest-bearing instruments.

Warehousing is an arrangement under which the FOMC agrees to exchange, at the request of the Treasury, U.S. dollars for foreign currencies held by the Treasury or ESF over a limited period of time. The purpose of the warehousing facility is to supplement the U.S. dollar resources of the Treasury and ESF for financing purchases of foreign currencies and related international operations.

In connection with its foreign currency activities, the FRBNY, on behalf of the Reserve Banks, may enter into contracts that contain varying degrees of off-balance-sheet market risk, because they represent contractual commitments involving future settlement and counter-party credit risk. The FRBNY controls credit risk by obtaining credit approvals, establishing transaction limits, and performing daily monitoring procedures.

While the application of current market prices to the securities currently held in the SOMA portfolio and investments denominated in foreign currencies may result in values substantially above or below their carrying values, these unrealized changes in value would have no direct effect on the quantity of reserves available to the banking system or on the prospects for future Reserve Bank earnings or capital. Both the domestic and foreign components of the SOMA portfolio from time to time involve transactions that may result in gains or losses when holdings are sold prior to maturity. Decisions regarding the securities and foreign currencies transactions, including their purchase and sale, are motivated by monetary policy objectives rather than profit. Accordingly, market values, earnings, and any gains or losses resulting from the sale of such currencies and securities are incidental to the open market operations and do not motivate its activities or policy decisions.

U.S. government and federal agency securities and investments denominated in foreign currencies comprising the SOMA are recorded at cost, on a settlement-date basis, and adjusted for amortization of premiums or accretion of discounts on a straight-line basis. Interest income is accrued on a straight-line basis and is reported as "Interest on U.S. government and federal agency securities" or "Interest on investments denominated in foreign currencies," as appropriate. Income earned on securities lending transactions is reported as a component of "Other income." Gains and losses resulting from sales of securities are determined by specific issues based on average cost. Gains and losses on the sales of U.S. government and federal agency securities are reported as "U.S. government securities gains, net." Foreign-currency-denominated assets are revalued daily at current foreign currency market exchange rates in order to report these assets in U.S. dollars. Realized and unrealized gains and losses on investments denominated in foreign currencies are reported as "Foreign currency gains, net." Foreign currencies held through F/X swaps, when initiated by the counter-party, and warehousing arrangements are revalued daily with the unrealized gain or loss reported by the FRBNY as a component of "Other assets" or "Other liabilities," as appropriate.

Balances of U.S. government and federal agency securities bought outright, securities sold under agreements to repurchase, securities loaned, investments denominated in foreign currency, interest income and expense, securities lending fee income, amortization of premiums and discounts on securities bought outright, gains and losses on sales of securities, and realized and unrealized gains and losses on investments denominated in foreign currencies, excluding those held under an F/X swap arrangement, are allocated to each Reserve Bank. Securities purchased under agreements to resell and unrealized gains and losses on the revaluation of foreign currency holdings under F/X swaps and warehousing arrangements are allocated to the FRBNY and not to other Reserve Banks.

In 2003, additional interest income of $61 million, representing one day's interest on the SOMA portfolio, was accrued to reflect a change in interest accrual methods, of which $4.8 million was allocated to the Bank. Interest accruals and the amortization of premiums and discounts are now recognized beginning the day that a security is purchased and ending the day before the security matures or is sold. Previously, accruals and amortization began the day after the security was purchased and ended on the day that the security matured or was sold. The effect of this change was not material; therefore, it was included in the 2003 interest income.

*e. Bank Premises, Equipment, and Software*
Bank premises and equipment are stated at cost less accumulated depreciation. Depreciation is calculated on a straight-line basis over estimated useful lives of assets ranging from two to fifty years. Major alterations, renovations, and improvements are capitalized at cost as additions to the asset accounts. Maintenance, repairs, and minor replacements are charged to operations in the year incurred. Costs incurred for software, either developed internally or acquired for internal use, during the application development stage are capitalized based on the cost of direct services and materials associated with designing, coding, installing, or testing software. Capitalized software costs are amortized on a straight-line basis over the estimated useful lives of the software applications, which range from two to five years.

*f. Interdistrict Settlement Account*
At the close of business each day, all Reserve Banks and branches assemble the payments due to or from other Reserve Banks and branches as a result of transactions involving accounts residing in other Districts that occurred during the day's operations. Such transactions may include funds settlement, check clearing and ACH operations, and allocations of shared expenses. The cumulative net amount due to or from other Reserve Banks is reported as the "Interdistrict settlement account."

*g. Federal Reserve Notes*
Federal Reserve notes are the circulating currency of the United States. These notes are issued through the various Federal Reserve agents (the Chairman of the Board of Directors of each Reserve Bank) to the Reserve Banks upon deposit with such agents of certain classes of collateral security, typically U.S. government securities. These notes are identified as issued to a specific Reserve Bank. The Federal Reserve Act provides that the collateral security tendered by the Reserve Bank to the Federal Reserve agent must be equal to the sum of the notes applied for by such Reserve Bank. In 2003, the Federal Reserve Act was amended to expand the assets eligible to be pledged as collateral security to include all Federal Reserve Bank assets. Prior to the amendment, only gold certificates, special drawing rights certificates, U.S. government and federal agency securities, securities purchased under agreements to resell, loans to depository institutions, and investments denominated in foreign currencies could be pledged as collateral. The collateral value is equal to the book value of the collateral tendered, with the exception of securities, whose collateral value is equal to the par value of the securities tendered. The par value of securities pledged for securities sold under agreements to repurchase is similarly deducted. The Board of Governors may, at any time, call upon a Reserve Bank for additional security to adequately collateralize the Federal Reserve notes. The Reserve Banks have entered into an agreement that provides for certain assets of the Reserve Banks to be jointly pledged as collateral for the Federal Reserve notes of all Reserve Banks in order to satisfy their obligation of providing sufficient collateral for outstanding Federal Reserve notes. In the event that this collateral is insufficient, the Federal Reserve Act provides that Federal Reserve notes become a first and paramount lien on all the assets of the Reserve Banks. Finally, as obligations of the United States, Federal Reserve notes are backed by the full faith and credit of the United States government.

The "Federal Reserve notes outstanding, net" account represents the Bank's Federal Reserve notes outstanding reduced by its currency holdings of $9,855 million, and $9,023 million at December 31, 2003 and 2002, respectively.

*h. Capital Paid-in*
The Federal Reserve Act requires that each member bank subscribe to the capital stock of the Reserve Bank in an amount equal to 6 percent of the capital and surplus of the member bank. As a member bank's capital and surplus changes, its holdings of the Reserve Bank's stock must be adjusted. Member banks are those state-chartered banks that apply and are approved for membership in the System and all national banks. Currently, only one-half of the subscription is paid-in and the remainder is subject to call. These shares are nonvoting with a par value of $100. They may not be transferred or hypothecated. By law, each member bank is entitled to receive an annual dividend of 6 percent on the paid-in capital stock. This cumulative dividend is paid semiannually. A member bank is liable for Reserve Bank liabilities up to twice the par value of stock subscribed by it.

F 474

*i. Surplus*

The Board of Governors requires Reserve Banks to maintain a surplus equal to the amount of capital paid-in as of December 31. This amount is intended to provide additional capital and reduce the possibility that the Reserve Banks would be required to call on member banks for additional capital. Pursuant to Section 16 of the Federal Reserve Act, Reserve Banks are required by the Board of Governors to transfer to the U.S. Treasury as interest on Federal Reserve notes excess earnings, after providing for the costs of operations, payment of dividends, and reservation of an amount necessary to equate surplus with capital paid-in.

In the event of losses or a substantial increase in capital, payments to the U.S. Treasury are suspended until such losses are recovered through subsequent earnings. Weekly payments to the U.S. Treasury may vary significantly.

*j. Income and Costs related to Treasury Services*

The Bank is required by the Federal Reserve Act to serve as fiscal agent and depository of the United States. By statute, the Department of the Treasury is permitted, but not required, to pay for these services.

*k. Taxes*

The Reserve Banks are exempt from federal, state, and local taxes, except for taxes on real property. The Bank's real property taxes were $2.2 million and $1.9 million for the years ended December 31, 2003 and 2002, respectively, and are reported as a component of "Occupancy expense."

*l. Recent Accounting Developments*

In May 2003, the Financial Accounting Standards Board issued SFAS No. 150, "Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity." SFAS No. 150, which will become applicable for the Bank in 2004, establishes standards for how an issuer classifies and measures certain financial instruments with characteristics of both liabilities and equity and imposes certain additional disclosure requirements. When adopted, there may be situations in which the Bank has not yet processed a member bank's application to redeem its Reserve Bank stock. In those situations, this standard requires that the portion of the capital paid-in that is mandatorily redeemable be reclassified as debt.

*m. 2003 Restructuring Charges*

In 2003, the System restructured several operations, primarily in the check and cash services. The restructuring included streamlining the management and support structures, reducing staff, decreasing the number of processing locations, and increasing processing capacity in the remaining locations.

Footnote 10 describes the restructuring and provides information about the Bank's costs and liabilities associated with employee separations and contract terminations. The costs associated with the write-down of certain Bank assets are discussed in footnote 6. Costs and liabilities associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY as discussed in footnote 8 and those associated with the Bank's enhanced postretirement benefits are disclosed in footnote 9.

## 4. U.S. Government and Federal Agency Securities

Securities bought outright are held in the SOMA at the FRBNY. An undivided interest in SOMA activity and the related premiums, discounts, and income, with the exception of securities purchased under agreements to resell, is allocated to each Reserve Bank on a percentage basis derived from an annual settlement of interdistrict clearings. The settlement, performed in April of each year, equalizes Reserve Bank gold certificate holdings to Federal Reserve notes outstanding. The Bank's allocated share of SOMA balances was approximately 7.690 percent and 7.799 percent at December 31, 2003 and 2002, respectively.

The Bank's allocated share of securities held in the SOMA at December 31, that were bought outright, was as follows (in millions):

| | 2003 | 2002 |
|---|---|---|
| Par value: | | |
| Federal agency | $ — | $ 1 |
| U.S. government: | | |
| Bills | 18,828 | 17,680 |
| Notes | 24,868 | 23,233 |
| Bonds | 7,573 | 8,176 |
| Total par value | 51,269 | 49,090 |
| Unamortized premiums | 754 | 839 |
| Unaccreted discounts | (69) | (82) |
| Total allocated to Bank | $ 51,954 | $ 49,847 |

The total of SOMA securities bought outright was $675,569 million and $639,125 million at December 31, 2003 and 2002, respectively.

As noted in footnote 3, the FRBNY replaced MSP transactions with securities sold under agreements to repurchase in December 2002. At December 31, 2003 and 2002, securities sold under agreements to repurchase with a contract amount of $25,652 million and $21,091 million, respectively, were outstanding, of which $1,973 million and $1,645 million were allocated to the Bank. At December 31, 2003 and 2002, securities sold under agreements to repurchase with a par value of $25,658 million and $23,188 million, respectively, were outstanding, of which $1,973 million and $1,385 million were allocated to the Bank.

The maturity distribution of U.S. government securities bought outright and securities sold under agreements to repurchase, that were allocated to the Bank at December 31, 2003, was as follows (in millions):

| Maturities of Securities Held | U.S. Government Securities (Par value) | Securities Sold Under Agreements to Repurchase (Contract amount) |
|---|---|---|
| Within 15 days | $ 3,671 | $ 1,973 |
| 16 to 90 days | 10,716 | — |
| 91 days to 1 year | 12,617 | — |
| Over 1 year to 5 years | 14,385 | — |
| Over 5 years to 10 years | 3,946 | — |
| Over 10 years | 5,933 | — |
| Total | $ 51,268 | $ 1,973 |

At December 31, 2003 and 2002, U.S. government securities with par values of $4,426 million and $1,841 million, respectively, were loaned from the SOMA, of which $340 million and $144 million were allocated to the Bank.

## 5. Investments Denominated in Foreign Currencies

The FRBNY, on behalf of the Reserve Banks, holds foreign currency deposits with foreign central banks and the Bank for International Settlements, and invests in foreign government debt instruments. Foreign government debt instruments held include both securities bought outright and securities purchased under agreements to resell. These investments are guaranteed as to principal and interest by the foreign governments.

Each Reserve Bank is allocated a share of foreign-currency-denominated assets, the related interest income, and realized and unrealized foreign currency gains and losses, with the exception of unrealized gains and losses on F/X swaps and warehousing transactions. This allocation is based on the ratio of each Reserve Bank's capital and surplus to aggregate capital and surplus at the preceding December 31. The Bank's allocated share of investments denominated in foreign currencies was approximately 24.740 percent and 23.935 percent at December 31, 2003 and 2002, respectively.

The Bank's allocated share of investments denominated in foreign currencies, valued at current foreign currency market exchange rates at December 31, was as follows (in millions):

| | 2003 | 2002 |
|---|---|---|
| European Union Euro: | | |
| Foreign currency deposits | $ 1,699 | $ 1,336 |
| Government debt instruments including agreements to resell | 1,012 | 789 |
| Japanese Yen: | | |
| Foreign currency deposits | 365 | 428 |
| Government debt instruments including agreements to resell | 1,816 | 1,475 |
| Accrued interest | 23 | 20 |
| Total | $ 4,915 | $ 4,048 |

Total investments denominated in foreign currencies were $19,868 million and $16,913 million at December 31, 2003 and 2002, respectively.

The maturity distribution of investments denominated in foreign currencies which were allocated to the Bank at December 31, 2003, was as follows (in millions):

| Maturities of Investments Denominated in Foreign Currencies | |
|---|---|
| Within 1 year | $ 4,513 |
| Over 1 year to 5 years | 320 |
| Over 5 years to 10 years | 82 |
| Over 10 years | — |
| Total | **$ 4,915** |

At December 31, 2003 and 2002, there were no outstanding F/X swaps or material open foreign exchange contracts.

At December 31, 2003 and 2002, the warehousing facility was $5,000 million, with no balance outstanding.

## 6. Bank Premises, Equipment, and Software

A summary of bank premises and equipment at December 31 is as follows (in millions):

| | **2003** | 2002 |
|---|---|---|
| Bank premises and equipment: | | |
| Land | **$ 22.6** | $ 19.7 |
| Buildings | **133.6** | 122.3 |
| Building machinery and equipment | **49.1** | 45.6 |
| Construction in progress | **4.9** | 1.2 |
| Furniture and equipment | **315.7** | 298.0 |
| Subtotal | **$ 525.9** | $ 486.8 |
| Accumulated depreciation | **(259.0)** | (240.8) |
| Bank premises and equipment, net | **$ 266.9** | $ 246.0 |
| Depreciation expense, for the years ended | **$ 39.9** | $ 36.0 |

Bank premises and equipment at December 31 include the following amounts for leases that have been capitalized (in millions):

| | **2003** | 2002 |
|---|---|---|
| Bank premises and equipment | **$ 35** | $ 15 |
| Accumulated depreciation | **(26)** | (11) |
| Capitalized leases, net | **$ 9** | $ 4 |

The Bank leases unused space to outside tenants. Those leases have terms ranging from one to three years. Rental income from such leases was $1.6 million and $1.4 million for the years ended December 31, 2003 and 2002, respectively. Future minimum lease payments under noncancelable agreements in existence at December 31, 2003, were (in millions):

| | |
|---|---|
| 2004 | $ 1.2 |
| 2005 | 1.3 |
| 2006 | 1.3 |
| 2007 | — |
| 2008 | — |
| Thereafter | — |
| | **$ 3.8** |

The Bank has capitalized software assets, net of amortization, of $51 and $45 at December 31, 2003 and 2002, respectively. Amortization expense was $29 million and $21 million for the years ended December 31, 2003 and 2002, respectively.

Assets impaired as a result of the Bank's restructuring plan, as discussed in footnote 10, include furniture and equipment. Asset impairment losses of $163,299 for the period ending December 31, 2003 were determined using fair values based on quoted market values or other valuation techniques and are reported as a component of "Other expenses."

## 7. Commitments and Contingencies

At December 31, 2003, the Bank was obligated under noncancelable leases for premises and equipment with terms ranging from one to approximately 5 years. These leases provide for increased rental payments based upon increases in real estate taxes, operating costs, or selected price indices.

8501

Rental expense under operating leases for certain operating facilities, warehouses, and data processing and office equipment (including taxes, insurance and maintenance when included in rent), net of sublease rentals, was $38 million and $42 million for the years ended December 31, 2003 and 2002, respectively. Certain of the Bank's leases have options to renew.

Future minimum rental payments under capital leases, net of sublease rentals, with terms of one year or more, at December 31, 2003, were (in millions):

| | Capital |
|---|---|
| 2004 | $ 1.3 |
| 2005 | 0.6 |
| 2006 | 0.5 |
| 2007 | 0.1 |
| 2008 | — |
| Thereafter | — |
| | 2.5 |
| Amount representing interest | (0.1) |
| Present value of net minimum lease payment | **$ 2.4** |

The Bank's future minimum rental payments under noncancelable operating leases, net of sublease rentals, with terms of one year or more, at December 31, 2003 were not material.

At December 31, 2003, the Bank, acting on behalf of the Reserve Banks, had a contractual commitment through March 2007 totaling $79 million, none of which has been recognized. This contract represents costs for maintenance of currency processing machines that will be allocated annually to other Reserve Banks. It is estimated that the Bank's allocated share will be $8 million.

Under the Insurance Agreement of the Federal Reserve Banks dated as of March 2, 1999, each of the Reserve Banks has agreed to bear, on a per incident basis, a pro rata share of losses in excess of one percent of the capital paid-in of the claiming Reserve Bank, up to 50 percent of the total capital paid-in of all Reserve Banks. Losses are borne in the ratio that a Reserve Bank's capital paid-in bears to the total capital paid-in of all Reserve Banks at the beginning of the calendar year in which the loss is shared. No claims were outstanding under such agreement at December 31, 2003 or 2002.

The Bank is involved in certain legal actions and claims arising in the ordinary course of business. Although it is difficult to predict the ultimate outcome of these actions, in management's opinion, based on discussions with counsel, the aforementioned litigation and claims will be resolved without material adverse effect on the financial position or results of operations of the Bank.

## 8. Retirement and Thrift Plans

### *Retirement Plans*

The Bank currently offers two defined benefit retirement plans to its employees, based on length of service and level of compensation. Substantially all of the Bank's employees participate in the Retirement Plan for Employees of the Federal Reserve System ("System Plan") and the Benefit Equalization Retirement Plan ("BEP"). In addition, certain Bank officers participate in the Supplemental Employee Retirement Plan ("SERP").

The System Plan is a multi-employer plan with contributions fully funded by participating employers. Participating employers are the Federal Reserve Banks, the Board of Governors of the Federal Reserve System, and the Office of Employee Benefits of the Federal Reserve Employee Benefits System. No separate accounting is maintained of assets contributed by the participating employers. The FRBNY acts as a sponsor of the Plan for the System and the costs associated with the Plan are not redistributed to the Bank. The Bank's projected benefit obligation and net pension costs for the BEP and the SERP at December 31, 2003 and 2002, and for the years then ended, are not material.

### *Thrift Plan*

Employees of the Bank may also participate in the defined contribution Thrift Plan for Employees of the Federal Reserve System ("Thrift Plan"). The Bank's Thrift Plan contributions totaled $8 million for each of the years ended December 31, 2003 and 2002, and are reported as a component of "Salaries and other benefits."

## 9. Postretirement Benefits Other Than Pensions and Postemployment Benefits

*Postretirement Benefits other than Pensions*
In addition to the Bank's retirement plans, employees who have met certain age and length of service requirements are eligible for both medical benefits and life insurance coverage during retirement.

The Bank funds benefits payable under the medical and life insurance plans as due and, accordingly, has no plan assets. Net postretirement benefit costs are actuarially determined using a January 1 measurement date.

Following is a reconciliation of beginning and ending balances of the benefit obligation (in millions):

| | **2003** | 2002 |
|---|---|---|
| Accumulated postretirement benefit obligation at January 1 | **$ 87.1** | $ 77.4 |
| Service cost-benefits earned during the period | **2.1** | 2.2 |
| Interest cost of accumulated benefit obligation | **5.7** | 5.5 |
| Actuarial loss | **11.7** | 6.7 |
| Curtailment loss | **3.7** | — |
| Special termination loss | **0.6** | — |
| Contributions by plan participants | **0.6** | 0.5 |
| Benefits paid | **(3.7)** | (4.1) |
| Plan amendments | **—** | (1.1) |
| Accumulated postretirement benefit obligation at December 31 | **$ 107.8** | $ 87.1 |

Following is a reconciliation of the beginning and ending balance of the plan assets, the unfunded postretirement benefit obligation, and the accrued postretirement benefit costs (in millions):

| | **2003** | 2002 |
|---|---|---|
| Fair value of plan assets at January 1 | **$ —** | $ — |
| Actual return on plan assets | **—** | — |
| Contributions by the employer | **3.1** | 3.6 |
| Contributions by plan participants | **0.6** | 0.5 |
| Benefits paid | **(3.7)** | (4.1) |
| Fair value of plan assets at December 31 | **$ —** | $ — |
| Unfunded postretirement benefit obligation | **$ 107.8** | $ 87.1 |
| Unrecognized prior service cost | **9.9** | 11.7 |
| Unrecognized net actuarial loss | **(36.6)** | (25.8) |
| Accrued postretirement benefit costs | **$ 81.1** | $ 73.0 |

Accrued postretirement benefit costs are reported as a component of "Accrued benefit costs."

At December 31, 2003 and 2002, the weighted average discount rate assumptions used in developing the benefit obligation were 6.25 percent and 6.75 percent, respectively.

For measurement purposes, a 10.00 percent annual rate of increase in the cost of covered health care benefits was assumed for 2004. Ultimately, the health care cost trend rate is expected to decrease gradually to 5.00 percent by 2011 and remain at that level thereafter.

Assumed health care cost trend rates have a significant effect on the amounts reported for health care plans. A one percentage point change in assumed health care cost trend rates would have the following effects for the year ended December 31, 2003 (in millions):

| | One Percentage Point Increase | One Percentage Point Decrease |
|---|---|---|
| Effect on aggregate of service and interest cost components of net periodic postretirement benefit costs | $ 0.4 | $ (0.8) |
| Effect on accumulated postretirement benefit obligation | 6.2 | (9.8) |

The following is a summary of the components of net periodic postretirement benefit costs for the years ended December 31 (in millions):

| | **2003** | 2002 |
|---|---|---|
| Service cost-benefits earned during the period | **$ 2.1** | $ 2.2 |
| Interest cost of accumulated benefit obligation | **5.7** | 5.5 |
| Amortization of prior service cost | **(1.0)** | (1.0) |
| Recognized net actuarial loss | **1.0** | 0.9 |
| Total periodic expense | **$ 7.8** | $ 7.6 |
| Curtailment loss | **2.9** | — |
| Special termination loss | **0.6** | — |
| Net periodic postretirement benefit costs | **$ 11.3** | $ 7.6 |

Net periodic postretirement benefit costs are reported as a component of "Salaries and other benefits."

The recognition of special termination and curtailment losses is the result of enhanced retirement benefits provided to employees during the restructuring described in footnote 10.

Following the guidance of the Financial Accounting Standards Board, the Bank elected to defer recognition of the financial effects of the Medicare Prescription Drug Improvement and Modernization Act of 2003 until further guidance is issued. Neither the accumulated postretirement benefit obligation at December 31, 2003 nor the net periodic postretirement cost for the year then ended reflect the effect of the Act on the plan.

*Postemployment Benefits*

The Bank offers benefits to former or inactive employees. Postemployment benefit costs are actuarially determined and include the cost of medical and dental insurances, survivor income, disability benefits, and self-insured workers' compensation expenses. Costs were projected using the same discount rate and health care trend rates as were used for projecting postretirement costs. The accrued postemployment benefit costs recognized by the Bank at December 31, 2003 and 2002, were $17.6 million and $15.8 million, respectively. This cost is included as a component of "Accrued benefit costs." Net periodic postemployment benefit costs included in 2003 and 2002 operating expenses were $3.5 million.

## 10. Restructuring Charges

In 2003, the Bank announced plans for restructuring to streamline operations and reduce costs, including consolidation of check operations and staff reductions in various functions of the Bank. These actions resulted in the following business restructuring charges:

| Major catagories of expense *(in millions):* | Total Estimated Costs | Accrued Liability 12/31/02 | Total Charges | Total Paid | Accrued Liability 12/31/03 |
|---|---|---|---|---|---|
| Employee separation | $ 5.6 | $ — | $ 5.6 | $ — | $ 5.6 |
| Contract termination | 0.3 | — | 0.3 | (0.3) | — |
| Other | — | — | — | — | — |
| Total | **$ 5.9** | **$ —** | **$ 5.9** | **$ (0.3)** | **$ 5.6** |

Employee separation costs are primarily severance costs related to reductions of approximately 183 staff and are reported as a component of "Salaries and other benefits." Contract termination costs include the charges resulting from terminating existing lease and other contracts and are shown as a component of "Other expenses."

Costs associated with the write-down of certain Bank assets, including furniture and equipment, are discussed in footnote 6. Costs associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY as discussed in footnote 8. Costs associated with enhanced postretirement benefits are disclosed in footnote 9.

The Bank anticipates substantially completing its announced plans by December 31, 2004.

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