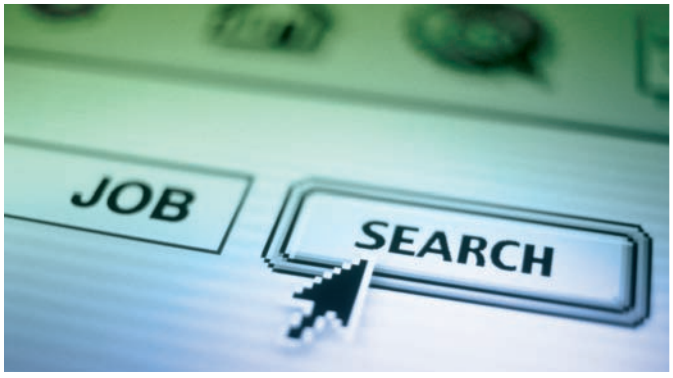
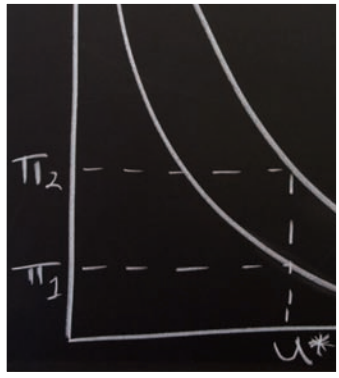
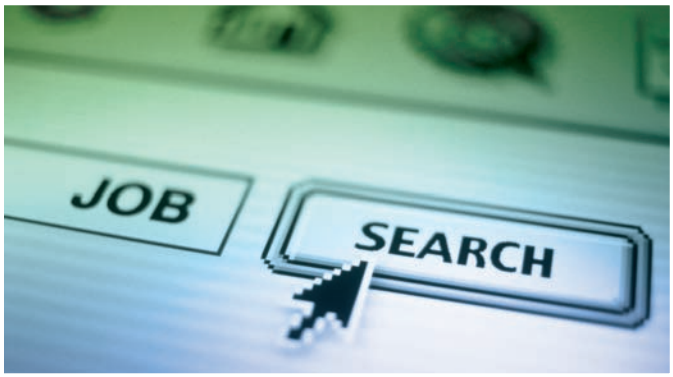
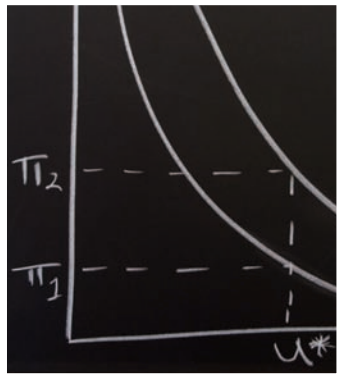




Inflation and Unemployment: A Layperson's Guide to the Phillips Curve





Mission

As a regional Reserve Bank, we work within the Federal Reserve System to foster the stability, integrity, and efficiency of the nation's monetary, financial, and payments systems. In doing so, we inspire trust and confidence in the U.S. financial system.

Vision

We will excel at everything we do, and make unique and important contributions to the Federal Reserve System's mission.

Contents

JEFFREY M. LACKER

Message from the President

Over the three years leading up to 2006, real growth in the U.S. economy was relatively rapid, and inflation remained relatively low and stable. Over the course of 2006, though, both those numbers deteriorated a bit. Growth dropped below 3 percent, and in fact was closer to 2 percent in the last half of the year. Meanwhile, inflation moved above 2.5 percent. While still relatively low by historical standards, I view that number—and, more importantly, the upward trend in inflation—with some caution. Inflation is, in my opinion, too high.

The pairing of softness in real economic growth with rising inflation creates a potential dilemma for policymakers, since these two phenomena are typically understood as requiring opposite policy responses—lowering the short-term interest rate in response to slower real growth while raising rates when inflation is too high. This dilemma points to the fundamental question facing the Federal Reserve—what is the relationship between growth and inflation? This question has been at the core of macroeconomics for the past 50 years. Can you "buy" greater growth by tolerating a little more inflation, and do you have to depress growth to lower inflation? Or is that one-to-one trade-off too simple? Instead, for instance, can we have both healthy growth and low, stable inflation? Prevailing thinking—both within the Federal Reserve and the economics profession in general—has changed much during that time. This year's Annual Report essay outlines the evolution of that thinking, discusses where we stand now, and considers the implications for policymakers.

> ***"This dilemma points to the fundamental question facing the Federal Reserve—what is the relationship between growth and inflation?"***

In 1957, A. W. Phillips looked at data on unemployment and wage inflation in the United Kingdom, and found that as unemployment went down, wage inflation tended to go up. This statistical relationship became known as the "Phillips curve." In the decades since Phillips published his findings, economists' understanding of this relationship has developed along two fronts—refinement of the statistical facts concerning the relationship, and the application of theory to explain that relationship and draw out its policy implications.

The history of the Phillips curve has three distinct phases: the Phillips curve as a stable menu of policy options; the Phillips curve as a short-run relationship that depends crucially on people's expectations; and the Phillips curve as one piece of a larger model that describes the complicated interactions of the decisions made by diverse participants in the economy. While this last phase may sound impractically complex, we believe it offers a clear understanding of macroeconomic behavior and a useful way to frame current policy debates.

In the first phase, Paul Samuelson and Robert Solow showed that Phillips' empirical finding held also for U.S. data on unemployment and price inflation. And they argued that this statistical relationship implied a set of choices for society. If you wanted faster economic growth, then you should put more money into the economy. This could be done either through fiscal policy (say, by cutting taxes or increasing government spending) or through monetary policy (say, by cutting interest rates). This would produce higher inflation, but that was a trade-off sometimes worth making. Conversely, if you felt inflation was getting too high, then you should take money out of the economy. This version of the Phillips curve was appealing to many policymakers because it implied a simple, almost mechanistic, approach to the macroeconomy, one where desired results could be achieved through straightforward measures.

Beginning in the late 1960s, and led initially by Milton Friedman and Edmund Phelps, economists came to recognize the importance of people's expectations for the relationship between inflation and such real economic indicators as unemployment. Inflation that was anticipated would not stimulate real economic growth, nor would disinflation that was anticipated slow it. Over the long run, they argued, economic growth

was determined by fundamentals, such as productivity and population growth. The appearance of a correlation between inflation and unemployment in the data was the result of episodes in which unanticipated changes in inflation had temporary real effects.

This theory gained credence in the 1970s, as the U.S. economy experienced both slow economic growth and rising inflation. The original Phillips curve seemed to be breaking down and the menu of options that policymakers supposedly had at their disposal no longer seemed useful. At the same time, Robert Lucas, Edward C. Prescott, and Finn Kydland extended the work of Friedman and Phelps and focused on the forward-looking nature of people's expectations. This "rational expectations" approach to the Phillips curve suggested that the public understands when policymakers might be tempted to try to exploit the seeming relationship between inflation and unemployment, and change their expectations even before a policy action has been taken. As a result, an attempt to bring down unemployment by letting inflation increase will not work—prices will rise but growth will not.

Modern work builds on this approach by studying economies in which realistic imperfections in markets create a short-run relationship between inflation and real variables similar to what we observe in the data. These models have the important implication that the relationship between inflation and real activity is not *causal*. Both inflation and unemployment are the outcomes of the behavior of markets for goods and for labor. In turn, the behavior of markets is the product of decisions made by an array of households, firms, and policymakers. If people are forward looking, their expectations about the future conduct of policy will play the dominant role in how inflation and unemployment interact. This means that unless policymakers can influence expectations, they will have only limited ability to fine-tune the economy, even temporarily, and that maintaining economic stability hinges largely on people's confidence in future policy actions.

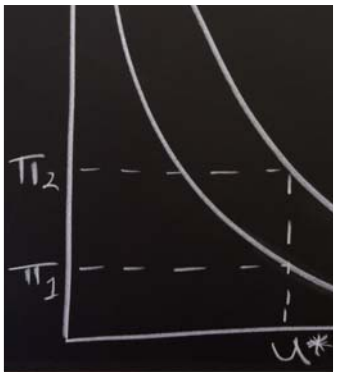
> ***"If people are forward looking, their expectations about the future conduct of policy will play the dominant role in how inflation and unemployment interact."***

In the late 1970s and early 1980s, the Federal Reserve under Paul Volcker began a long and often difficult campaign to regain the credibility it had lost during the previous decade. Alan Greenspan continued that fight, and by the 1990s, the Fed arguably had established such credibility. Happily, the economy responded well: we witnessed strong economic growth without a concomitant rise in inflation.

In light of the modern understanding of the Phillips curve, the real lesson of the Volcker-Greenspan disinflation is that the best contribution the Fed can make to economic growth is to keep inflation low and stable. And the key to low inflation is the stability of people's expectations about the future conduct of monetary policy. Monetary policy works best when it allows the real economy to respond appropriately to economic fundamentals, rather than attempts to insulate the economy from shocks by tolerating swings in inflation. This is the lesson of the modern Phillips curve and of our macroeconomic history over the last half century.

Jeffrey M. Lacker
President

Inflation and Unemployment:
A Layperson's Guide to the Phillips Curve



by Jeffrey M. Lacker and John A. Weinberg

What do you remember from the economics class you took in college? Even if you didn't take economics, what basic ideas do you think are important for understanding the way markets work? In either case, one thing you might come up with is that when the demand for a good rises—when more and more people want more and more of that good—its price will tend to increase. This basic piece of economic logic helps us understand the phenomena we observe in many specific markets—from the tendency of gasoline prices to rise as the summer sets in and people hit the road on their family vacations, to the tendency for last year's styles to fall in price as consumers turn to the new fashions.

This notion paints a picture of the price of a good moving together in the same direction with its quantity—when people are buying more, its price is rising. Of course supply matters, too, and thinking about variations in supply—goods becoming more or less plentiful or more or less costly to produce—complicates the picture. But in many cases such as the examples above, we might expect movements up and down in demand to happen more frequently than movements in supply. Certainly for goods produced by a stable industry in an environment of little technological change, we would expect that many movements in price and quantity are driven by movements in demand, which would cause price and quantity to move up and down together. Common sense suggests that this logic would carry over to how one thinks about not only the price of one good but also the prices of all goods. Should an average measure of all prices in the economy—the consumer price index, for example—be expected to move up when our total measures of goods produced and consumed rise? And should faster growth in these quantities—as measured, say, by gross domestic product—be accompanied by faster increases in prices? That is, should inflation move up and down with real economic growth?

The authors are respectively President and Senior Vice President and Director of Research.
The views expressed are the authors' and not necessarily those of the Federal Reserve System.

The simple intuition behind this series of questions is seriously incomplete as a description of the behavior of prices and quantities at the macroeconomic level. But it does form the basis for an idea at the heart of much macroeconomic policy analysis for at least a half century. This idea is called the "Phillips curve," and it embodies a hypothesis about the relationship between inflation and real economic variables. It is usually stated not in terms of the positive relationship between inflation and growth but in terms of a negative relationship between inflation and unemployment. Since faster growth often means more intensive utilization of an economy's resources, faster growth will be expected to come with falling unemployment. Hence, faster inflation is associated with lower unemployment. In this form, the Phillips curve looks like the expression of a trade-off between two bad economic outcomes—reducing inflation requires accepting higher unemployment.

"This idea is called the 'Phillips curve,' and it embodies a hypothesis about the relationship between inflation and real economic variables. It is usually stated…in terms of a negative relationship between inflation and unemployment."

The first important observation about this relationship is that the simple intuition described at the beginning of this essay is not immediately applicable at the level of the economy-wide price level. That intuition is built on the workings of supply and demand in setting the quantity and price of a specific good. The price of that specific good is best understood as a *relative* price—the price of that good compared to the prices of other goods. By contrast, inflation is the rate of change of the general level of all prices. Recognizing this distinction does not mean that rising demand for all goods—that is, rising aggregate demand—would not make all prices rise. Rather, the important implication of this distinction is that it focuses attention on what, besides people's underlying desire for more goods and services, might drive a general increase in all prices. The other key factor is the supply of money in the economy.

Economic decisions of producers and consumers are driven by relative prices: a rising price of bagels relative to doughnuts might prompt a baker to shift production away from doughnuts and toward bagels. If we could imagine a situation in which all prices of *all* outputs and inputs in the economy, including wages, rise at exactly the same rate, what effect on economic decisions would we expect? A reasonable answer is "none." Nothing will have become more expensive relative to other goods, and labor income will have risen as much as prices, leaving people no poorer or richer.

The thought experiment involving all prices and wages rising in equal proportions demonstrates the principle of *monetary neutrality*. The term refers to the fact that the hypothetical increase in prices and wages could be expected to result from a corresponding increase in the supply of money. Monetary neutrality is a natural starting point for thinking about the relationship between inflation and real economic variables. If money is neutral, then an increase in the supply of money translates directly into inflation and has no necessary relationship with changes in real output, output growth, or unemployment. That is, when money is neutral, the simple supply-and-demand intuition about output growth and inflation does not apply to inflation associated with the growth of the money supply.

The logic of monetary neutrality is indisputable, but is it relevant? The logic arises from thinking about

hypothetical "frictionless" economies in which all market participants at all times have all the information they need to price the goods they sell and to choose among the available goods, and in which sellers can easily change the price they charge. Against this hypothetical benchmark, actual economies are likely to appear imperfect to the naked eye. And under the microscope of econometric evidence, a positive correlation between inflation and real growth does tend to show up. The task of modern macroeconomics has been to understand these empirical relationships. What are the "frictions" that impede monetary neutrality? Since monetary policy is a key determinant of inflation, another important question is how the conduct of policy affects the observed relationships. And finally, what does our understanding of these relationships imply about the proper conduct of policy?

The Phillips curve, viewed as a way of capturing how money might not be neutral, has always been a central part of the way economists have thought about macroeconomics and monetary policy. It also forms the basis, perhaps implicitly, of popular understanding of the basic problem of economic policy: namely, we want the economy to grow and unemployment to be low, but if growth is too robust, inflation becomes a risk. Over time, many debates about economic policy have boiled down to alternative understandings of what the Phillips curve is and what it means. Even today, views that economists express on the effects of macroeconomic policy in general and monetary policy in particular often derive from what they think about the nature, the shape, and the stability of the Phillips curve.

This essay seeks to trace the evolution of our understanding of the Phillips curve, from before its inception to contemporary debates about economic policy. The history presented in the pages that follow is by no means exhaustive. Important parts of economists' understanding of this relationship that we neglect include discussions of how the observed Phillips curve's statistical relationship could emerge even under monetary neutrality.[1] We also neglect the literature on the possibility of real economic costs of inflation that arise even when money is neutral.[2] Instead, we seek to provide the broad outlines of the intellectual development that has led to the role of the Phillips curve in modern macroeconomics, emphasizing the interplay of economic theory and empirical evidence.

After reviewing the history, we will turn to the current debate about the Phillips curve and how it translates into differing views about monetary policy. People commonly talk about a central bank seeking to engineer a slowing of the economy to bring about lower inflation. They think of the Phillips curve as describing how much slowing is required to achieve a given reduction in inflation. We believe that this reading of the Phillips curve as a lever that a policymaker might manipulate mechanically can be misleading. By itself, the Phillips curve is a statistical relationship that has arisen from the complex interaction of policy decisions and the actions of private participants in the economy. Importantly, choices made by policymakers play a large role in determining the nature of the statistical Phillips curve. Understanding *that* relationship—between policymaking and the Phillips curve—is a key ingredient to sound policy decisions. We return to this theme after our historical overview.

Some History

The Phillips curve is named for New Zealand-born economist A. W. Phillips, who published a paper in 1958 showing an inverse relationship between (wage) inflation and unemployment in nearly 100 years of

data from the United Kingdom.[3] Since this is the work from which the curve acquired its name, one might assume that the economics profession's prior consensus on the matter embodied the presumption that money is neutral. But this in fact is not the case. The idea of monetary neutrality has long coexisted with the notion that periods of rising money growth and inflation might be accompanied by increases in output and declines in unemployment. Robert Lucas (1996), in his Nobel lecture on the subject of monetary neutrality, finds both ideas expressed in the work of David Hume in 1752! Thomas Humphrey (1991) traces the notion of a Phillips curve trade-off throughout the writings of the classical economists in the eighteenth and nineteenth centuries. Even Irving Fisher, whose statement of the quantity theory of money embodied a full articulation of the consequences of neutrality, recognized the possible real effects of money and inflation over the course of a business cycle.

In early writings, these two opposing ideas—that money is neutral and that it is associated with rising real growth—were typically reconciled by the distinction between periods of time ambiguously referred to as "short-run" and "long-run." The logic of monetary neutrality is essentially long-run logic. The type of thought experiment the classical writers had in mind was a one-time increase in the quantity of money circulating in an economy. Their logic implied that, ultimately, this would merely amount to a change in units of measurement. Given enough time for the extra money to spread itself throughout the economy, all prices would rise proportionately. So while the number of units of money needed to compensate a day's labor might be higher, the amount of food, shelter, and clothing that a day's pay could purchase would be exactly the same as before the increase in money and prices.

"In early writings, these two opposing ideas—that money is neutral and that it is associated with rising real growth—were typically reconciled by the distinction between periods of time ambiguously referred to as 'short-run' and 'long-run.'"

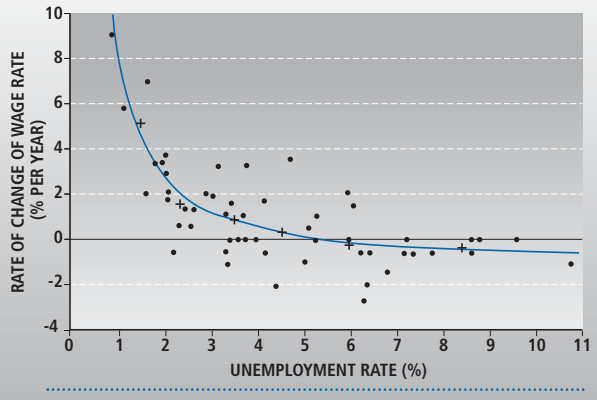
Against this logic stood the classical economists' observations of the world around them in which increases in money and prices appeared to bring increases in industrial and commercial activity. This empirical observation did not employ the kind of formal statistics as that used by modern economists but simply the practice of keen observation. They would typically explain the difference between their theory's predictions (neutrality) and their observations by appealing to what economists today would call "frictions" in the marketplace. Of particular importance in this instance are frictions that get in the way of price adjustment or make it hard for buyers and sellers of goods and services to know when the general level of all prices is rising. If a craftsman sees that he can sell his wares for an increased price but doesn't realize that all prices are rising proportionately, he might think that his goods are rising in value relative to other goods. He might then take action to increase his output so as to benefit from the perceived rise in the worth of his labors.

This example shows how frictions in price adjustment can break the logic of money neutrality. But such a departure is likely to be only temporary. You can't fool everybody forever, and eventually people learn about the general inflation caused by an increase in money. The real effects of inflation should then die out. It was in fact in the context of this distinction

between long-run neutrality and the short-run trade-off between inflation and real growth that John Maynard Keynes made his oft-quoted quip that "in the long run we are all dead."[4]

Phillips' work was among the first formal statistical analyses of the relationship between inflation and real economic activity. The data on the rate of wage increase and the rate of unemployment for Phillips' baseline period of 1861–1913 are reproduced in Figure 1. These data show a clear negative relationship—greater inflation tends to coincide with lower unemployment. To highlight that relationship, Phillips fit the curve in Figure 1 to the data. He then examined a number of episodes, both within the baseline period and in other periods up through 1957. The general tendency of a negative relationship persists throughout.

Figure 1: Inflation-Unemployment Relationship in the United Kingdom, 1861-1913



Source: Phillips (1958)

Crossing the Atlantic

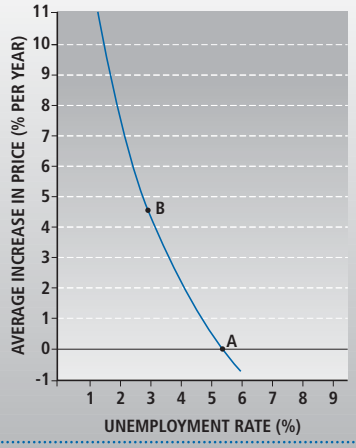
A few years later, Paul Samuelson and Robert Solow, both eventual Nobel Prize winners, took a look at the U.S. data from the beginning of the twentieth century through 1958.[5] A similar scatter-plot to that in Figure 1 was less definitive in showing the negative relationship between wage inflation and unemployment. The authors were able to recover a pattern similar to Phillips' by taking out the years of the World Wars and the Great Depression. They also translated their findings into a relationship between unemployment and *price* inflation. It is this relationship that economists now most commonly think of as the "Phillips curve."

Samuelson and Solow's Phillips curve is reproduced in Figure 2. (See page 10.) They interpret this curve as showing the combinations of unemployment and inflation available to society. The implication is that policymakers must choose from the menu traced out by the curve. An inflation rate of zero, or *price stability*, appears to require an unemployment rate of about 5½ percent. To achieve unemployment of about 3 percent, which the authors viewed as approximately full employment, the curve suggests that inflation would need to be close to 5 percent.

Samuelson and Solow did not propose that their estimated curve described a permanent relationship that would never change. Rather, they presented it as a description of the array of possibilities facing the economy in "the years just ahead."[6] While recognizing that the relationship might change beyond this near horizon, they remained largely agnostic on how and why it might change. As a final note, however, they suggest institutional reforms that *might* produce a more favorable trade-off (shifting the curve in Figure 2 down and to the left). These involve measures to limit the ability of businesses and unions to exercise monopoly control over prices and wages, or even direct wage and price controls. Their closing discussion suggests that they, like many economists at the time, viewed both inflation and the frictions that kept money and inflation from being neutral as at least partly structural—hard-wired into the institutions of modern, corporate capitalism. Indeed, they concluded their paper with speculation about institutional reforms that could move the Phillips curve

down and to the left. This was an interpretation that was compatible with the idea of a more permanent trade-off that derived from the structure of the economy and that could be exploited by policymakers seeking to engineer lasting changes in economic performance.

Figure 2: Inflation-Unemployment Relationship in the United States around 1960



Source: Samuelson and Solow (1960)

By the 1960s, then, the Phillips curve trade-off had become an essential part of the Keynesian approach to macroeconomics that dominated the field in the decades following the Second World War. Guided by this relationship, economists argued that the government could use fiscal policy—government spending or tax cuts—to stimulate the economy toward full employment with a fair amount of certainty about what the cost would be in terms of increased inflation. Alternatively, such a stimulative effect could be achieved by monetary policy. In either case, policymaking would be a conceptually simple matter of cost-benefit analysis, although its implementation was by no means simple. And since the costs of a small amount of inflation to society were thought to be low, it seemed worthwhile to achieve a lower unemployment rate at the cost of tolerating only a little more inflation.

Turning the focus to expectations

This approach to economic policy implicitly either denied the long-run neutrality of money or thought it irrelevant. A distinct minority view within the profession, however, continued to emphasize limitations on the ability of rising inflation to bring down unemployment in a sustained way. The leading proponent of this view was Milton Friedman, whose Nobel Prize award would cite his Phillips curve work. In his presidential address to the American Economics Association, Friedman began his discussion of monetary policy by stipulating what monetary policy cannot do. Chief among these was that it could not "peg the rate of unemployment for more than very limited periods."[7] Attempts to use expansionary monetary policy to keep unemployment persistently below what he referred to as its "natural rate" would inevitably come at the cost of successively higher inflation. Key to his argument was the distinction between anticipated and unanticipated inflation. The short-run trade-off between inflation and unemployment depended on the inflation expectations of the public. If people generally expected price stability (zero inflation), then monetary policy that brought about inflation of 3 percent would stimulate the economy, raising output growth and reducing unemployment. But suppose the economy had been experiencing higher inflation, of say 5 percent, for some time, and that people had come to expect that rate of increase to continue. Then, a policy that brought about 3 percent inflation would actually slow the economy, making unemployment tend to rise.

By emphasizing the public's inflation expectations, Friedman's analysis drew a link that was largely absent in earlier Phillips curve analyses. Specifically, his argument was that not only is monetary policy primarily responsible for determining the rate of inflation that will prevail, but it also ultimately determines the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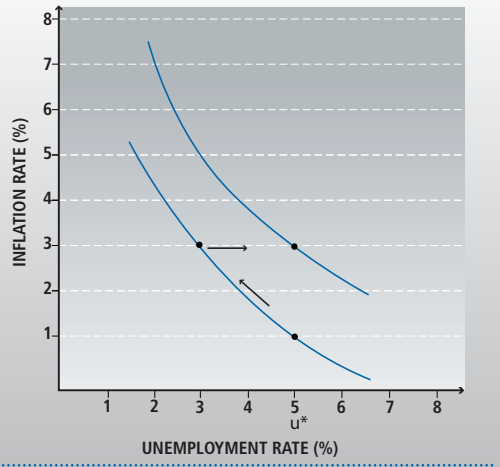
location of the entire Phillips curve. He argued that the economy would be at the natural rate of unemployment in the absence of unanticipated inflation. That is, the ability of a small increase in inflation to stimulate economic output and employment relied on the element of surprise. Both the inflation that people had come to expect and the ability to create a surprise were then consequences of monetary policy decisions.

Friedman's argument involved the idea of a "natural rate" of unemployment. This natural rate was something that was determined by the structure of the economy, its rate of growth, and other real factors independent of monetary policy and the rate of inflation. While this natural rate might change over time, at any point in time, unemployment below the natural rate could only be achieved by policies that created inflation in excess of that anticipated by the public. But if inflation remained at the elevated level, people would come to expect higher inflation, and its stimulative effect would be lost. Unemployment would move back toward its natural rate. That is, the Phillips curve would shift up and to its right, as shown in Figure 3.

The figure shows a hypothetical example in which the natural rate of unemployment is 5 percent and people initially expect inflation of 1 percent. A surprise inflation of 3 percent drives unemployment down to 3 percent. But sustained inflation at the higher rate ultimately changes expectations, and the Phillips curve shifts back so that the natural rate of unemployment is achieved but now at 3 percent inflation. This analysis, which takes account of inflation expectations, is referred to as the *expectations-augmented Phillips curve*. An independent and contemporaneous development of this approach to the Phillips curve was given by Edmund Phelps, winner of the 2006 Nobel Prize in economics.[8] Phelps developed his version of the Phillips curve by working through the implications of frictions in the setting of wages and prices, which anticipated much of the work that followed.

Figure 3: Expectations-Augmented Phillips Curve



Note: When expected inflation is 1 percent, an unanticipated increase in inflation will initially bring unemployment down. But expectations will eventually adjust, bringing unemployment back to its natural rate (u) at the higher rate of inflation.*

The reasoning of Friedman and Phelps implied that attempts to exploit systematically the Phillips curve to bring about lower unemployment would succeed only temporarily at best. To have an effect on real activity, monetary policy needed to bring about inflation in excess of people's expectations. But eventually, people would come to expect higher inflation, and the policy would lose its stimulative effect. This insight comes from an assumption that people base their expectations of inflation on their observation of past inflation. If, instead, people are more forward looking and understand what the policymaker is trying to do, they might adjust their expectations more quickly, causing the rise in inflation to lose much of even its temporary effect on real activity. In a sense, even the short-run relationship relied on people being fooled. One way people might be fooled is if they are simply unable to distinguish general inflation from a change in relative prices. This confusion, sometimes referred to as *money illusion*, could cause people to react to inflation as if it were a change in relative prices. For

instance, workers, seeing their nominal wages rise but not recognizing that a general inflation is in process, might react as if their real income were rising. That is, they might increase their expenditures on goods and services.

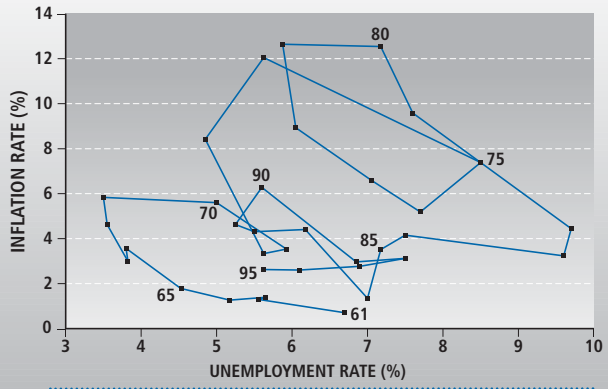
Robert Lucas, another Nobel Laureate, demonstrated how behavior resembling money illusion could result even with firms and consumers who fully understood the difference between relative prices and the general price level.[9] In his analysis, confusion comes not from people's misunderstanding, but from their inability to observe all of the economy's prices at one time. His was the first formal analysis showing how a Phillips curve relationship could emerge in an economy with forward-looking decisionmakers. Like the work of Friedman and Phelps, Lucas' implications for policymakers were cautionary. The relationship between inflation and real activity in his analysis emerged most strongly when policy was conducted in an unpredictable fashion, that is, when policymaking was more a source of volatility than stability.

> ***"The reasoning of Friedman and Phelps implied that attempts to exploit systematically the Phillips curve to bring about lower unemployment would succeed only temporarily at best."***

The Great Inflation

The expectations-augmented Phillips curve had the stark implication that any attempt to utilize the relationship between inflation and real activity to engineer persistently low unemployment at the cost of a little more inflation was doomed to failure. The experience of the 1970s is widely taken to be a confirmation of this hypothesis. The historical relationship identified by Phillips, Samuelson and Solow, and other earlier writers appeared to break down entirely, as shown by the scatter plot of the data for the 1970s in Figure 4. Throughout this decade, both inflation and unemployment tended to grow, leading to the emergence of the term "stagflation" in the popular lexicon.

Figure 4: Inflation-Unemployment Relationship in the United States,1961-1995



Sources: Bureau of Labor Statistics/Haver Analytics
Note: Inflation rate is seasonally-adjusted CPI, Fourth Quarter.

One possible explanation for the experience of the 1970s is that the decade was simply a case of bad luck. The Phillips curve shifted about unpredictably as the economy was battered by various external shocks. The most notable of these shocks were the dramatic increases in energy prices in 1973 and again later in the decade. Such supply shocks worsened the available trade-off, making higher unemployment necessary at any given level of inflation.

By contrast, viewing the decade through the lens of the expectations-augmented Phillips curve suggests that policy shared the blame for the disappointing results. Policymakers attempted to shield the real economy from the effects of aggregate shocks. Guided by the Phillips curve, this effort often implied a choice to tolerate higher inflation rather than allowing unemployment to rise. This type of policy choice follows from viewing the statistical relationship Phillips first found in the data as a menu of policy options, as suggested by Samuelson and Solow. But the

arguments made by Friedman and Phelps imply that such a trade-off is short-lived at best. Unemployment would ultimately return to its natural rate at the higher rate of inflation. So, while the relative importance of luck and policy for the poor macroeconomic performance of the 1970s continues to be debated by economists, we find a powerful lesson in the history of that decade.[10] The macroeconomic performance of the 1970s is largely what the expectations-augmented Phillips curve predicts when policymakers try to exploit a trade-off that they mistakenly believe to be stable.

The insights of Friedman, Phelps, and Lucas pointed to the complicated interaction between policymaking and statistical analysis. Relationships we observe in past data were influenced by past policy. When policy changes, people's behavior may change and so too may statistical relationships. Hence, the history of the 1970s can be read as an illustration of Lucas' critique of what was at the time the consensus approach to policy analysis.[11]

Focusing attention on the role of expectations in the Phillips curve creates a challenge for policymakers seeking to use monetary policy to manage real economic activity. At any point in time, the current state of the economy and the private sector's expectations

"Focusing attention on the role of expectations in the Phillips curve creates a challenge for policymakers seeking to use monetary policy to manage real economic activity."

may imply a particular Phillips curve. Assuming that Phillips curve describes a stable relationship, a policymaker might choose a preferred inflation-unemployment combination. That very choice, however, can alter expectations, causing the trade-off to change. The policymaker's problem is, in effect, a game played against a public that is trying to anticipate policy. What's more, this game is repeated over and over, each time a policy choice must be made. This complicated interdependence of policy choices and private sector actions and expectations was studied by Finn Kydland and Edward C. Prescott.[12] In one of the papers for which they were awarded the 2005 Nobel Prize, they distinguish between rules and discretion as approaches to policymaking. By discretion, they mean period-by-period decisionmaking in which the policymaker takes a fresh look at the costs and benefits of alternative inflation levels at each moment. They contrast this with a setting in which the policymaker makes a one-time decision about the best rule to guide policy. They show that discretionary policy would result in higher inflation and no lower unemployment than the once-and-for-all choice of a policy rule.

Recent work by Thomas Sargent and various coauthors shows how discretionary policy, as studied by Kydland and Prescott, can lead to the type of inflation outcomes experienced in the 1970s.[13] This analysis assumes that the policymaker is uncertain of the position of the Phillips curve. In the face of this uncertainty, the policymaker estimates a Phillips curve from historical data. Seeking to exploit a short-run, expectations-augmented Phillips curve—that is, pursuing discretionary policy—the policymaker chooses among inflation-unemployment combinations described by the estimated Phillips curve. But the policy choices themselves cause people's beliefs about policy to change, which causes the response to policy choices to change. Consequently, when the policymaker uses new data to update the estimated Phillips curve, the curve will have shifted. This process of making policy while also trying to learn about the location of the Phillips curve can lead a policymaker to choices that

result in persistently high inflation outcomes.

In addition to the joint rise in inflation and unemployment during the 1970s, other empirical evidence pointed to the importance of expectations. Sargent studied the experience of countries that had suffered from very high inflation.[14] In countries where monetary reforms brought about sudden and rapid *decelerations* in inflation, he found that the cost in terms of reduced output or increased unemployment tended to be much lower than standard Phillips curve trade-offs would suggest. One interpretation of these findings is that the disinflationary policies undertaken tended to be well-anticipated. Policymakers managed to credibly convince the public that they would pursue these policies. Falling inflation that did not come as a surprise did not have large real economic costs.

On a smaller scale in terms of peak inflation rates, another exercise in dramatic disinflation was conducted by the Federal Reserve under Chairman Paul Volcker.[15] As inflation rose to double-digit levels in the late 1970s, contemporaneous estimates of the cost in unemployment and lost output that would be necessary to bring inflation down substantially were quite large. A common range of estimates was that the 6 percentage-point reduction in inflation that was ultimately brought about would require output from 9 to 27 percent below capacity annually for up to four years.[16] Beginning in October 1979, the Fed took drastic steps, raising the federal funds rate as high as 19 percent in 1980. The result was a steep, but short recession. Overall, the costs of the Volcker disinflation appear to have been smaller than had been expected. A standard estimate, which appears in a popular economics textbook, is one in which the reduction in output during the Volcker disinflation amounted to less than a 4 percent annual shortfall relative to capacity.[17] This amount is a significant cost, but it is substantially less than many had predicted before the fact. Again, one possible reason could be that the Fed's course of action in this episode became well-anticipated once it commenced. While the public might not have known the extent of the actions the Fed would take, the direction of the change in policy may well have become widely understood. By the same token, and as argued by Goodfriend and King, remaining uncertainty about how far and how persistently the Fed would bring inflation down may have resulted in the costs of disinflation being greater than they might otherwise have been.

The experience of the 1970s, together with the insights of economists emphasizing expectations, ultimately brought the *credibility* of monetary policy to the forefront in thinking about the relationship between inflation and the real economy. Credibility refers to the extent to which the central bank can convince the public of its intention with regard to inflation. Kydland and Prescott showed that credibility does not come for free. There is always a short-run gain from allowing inflation to rise a little so as to stimulate the real economy. To establish credibility for a low rate of inflation, the central bank must convince the public that it will not pursue that short-run gain.

"The experience of the 1970s, together with the insights of economists emphasizing expectations, ultimately brought the credibility of monetary policy to the forefront in thinking about . . . inflation and the real economy."

The experience of the 1980s and 1990s can be read as an exercise in building credibility. In several episodes during that period, inflation expectations rose as doubts were raised about the Fed's ability to maintain its commitment to low inflation. These


SLOW
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episodes, labeled *inflation scares* by Marvin Goodfriend, were marked by rapidly rising spreads between long-term and short-term interest rates.[18] Goodfriend identifies inflation scares in 1980, 1983, and 1987. These tended to come during or following episodes in which the Fed responded to real economic weakness with reductions (or delayed increases) in its federal funds rate target. In these instances, Fed policymakers reacted to signs of rising inflation expectations by raising interest rates. These systematic policy responses in the 1980s and 1990s were an important part of the process of building credibility for lower inflation.

The "Modern" Phillips Curve

The history of the Phillips curve shows that the empirical relationship shifts over time, and there is evidence that those movements are linked to the public's inflation expectations. But what does the history say about why this relationship exists? Why is it that there is a statistical relationship between inflation and real economic activity, even in the short run? The earliest writers and those that followed them recognized that the short-run trade-off must arise from frictions that stand in the way of monetary neutrality. There are many possible sources of such frictions. They may arise from the limited nature of the information individuals have about the full array of prices for all products in the economy, as emphasized by Lucas. Frictions might also stem from the fact that not all people participate in all markets, so that different markets might be affected differently by changes in monetary policy. One simple type of friction is a limitation on the flexibility sellers have in adjusting the prices of the goods they sell. If there are no limitations all prices can adjust seamlessly whenever demand or cost conditions change, then a change in monetary policy will, again, affect different markets differently.

Deriving a Phillips curve from price-setting behavior

This price-setting friction has become a popular device for economists seeking to model the behavior of economies with a short-run Phillips curve. To see how such a friction leads to a Phillips curve, think about a business that is setting a price for its product and does not expect to get around to setting the price again for some time. Typically, the business will choose a price based on its own costs of production and the demand that it faces for its goods. But because that business expects its price to be fixed for a while, its price choice will also depend on what it expects to happen to its costs and its demand between when it sets its price this time and when it sets its price the next time.

If the price-setting business thinks that inflation will be high in the interim between its price adjustments, then it will expect its relative price to fall. As average prices continue to rise, a good with a temporarily fixed price gets cheaper. The firm will naturally be interested in its average relative price during the period that its price remains fixed. The higher the inflation expected by the firm up until its next price adjustment, the higher the current price it will set. This reasoning, applied to all the economy's sellers of goods and services, leads directly to a close relationship between current inflation and expected future inflation.

This description of price-setting behavior implies that current inflation depends on the real costs of production and expected future inflation. The real costs of production for businesses will rise when the aggregate use of productive resources rises, for instance because rising demand for labor pushes up real wages.[19] The result is a Phillips curve relationship between inflation and a measure of real economic activity, such as output growth or unemployment.

Current inflation rises with expected future inflation and falls as current unemployment rises relative to its "natural" rate (or as current output falls relative to the trend rate of output growth).

A Phillips curve in a "complete" modern model

The price-setting frictions that are part of many modern macroeconomic models are really not that different from arguments that economists have always made about reasons for the short-run non-neutrality of money. What distinguishes the modern approach is not just the more formal, mathematical derivation of a Phillips curve relationship, but more importantly, the incorporation of this relationship into a complete model of the macroeconomy. The word "complete" here has a very specific meaning, referring to what economists call "general equilibrium." The general equilibrium approach to studying economic activity recognizes the interdependence of disparate parts of the economy and emphasizes that all macroeconomic variables such as GDP, the level of prices, and unemployment are all determined by fundamental economic forces acting at the level of individual households and businesses. The completeness of a general equilibrium model also allows for an analysis of the effects of alternative approaches to macroeconomic policy, as well as an evaluation of the relative merits of alternative policies in terms of their effects on the economic well-being of the people in the economy.

The Phillips curve is only one part of a complete macroeconomic model—one equation in a system of equations. Another key component describes how real economic activity depends on real interest rates. Just as the Phillips curve is derived from a description of the price-setting decisions of businesses, this other relationship, which describes the demand side of the economy, is based on households' and business' decisions about consumption and investment. These decisions involve people's demand for resources now, as compared to their expected demand in the future. Their willingness to trade off between the present and the future depends on the price of that trade-off—the real rate of interest.

One source of interdependence between different parts of the model—different equations—is in the real rate of interest. A real rate is a nominal rate—the interest rates we actually observe in financial markets—adjusted for expected inflation. Real rates are what really matter for households' and firms' decisions. So on the demand side of the economy, people's choices about consumption and investment depend on what they expect for inflation, which comes, in part, from the pricing behavior described by the Phillips curve. Another source of interdependence comes in the way the central bank influences nominal interest rates by setting the rate charged on overnight, interbank loans (the federal funds rate in the United States). A complete model also requires a description of how the central bank changes its nominal interest rate target in response to changing economic conditions (such as inflation, growth, or unemployment).

In a complete general equilibrium analysis of an economy's performance, all three parts—the Phillips curve, the demand side, and central bank behavior—work together to determine the evolution of economic variables. But many of the economic choices people make on a day-to-day basis depend not only on conditions today, but also on how conditions are expected to change in the future. Such expectations in modern macroeconomic models are commonly described through the assumption of *rational expectations*. This assumption simply means that the public—households and firms whose decisions drive real economic activity—fully understands how the economy evolves

over time and how monetary policy shapes that evolution. It also means that people's decisions will depend on well-informed expectations not only of the evolution of future fundamental conditions, but of future policy as well. While discussions of a central bank's credibility typically assume that there are things related to policymaking about which the public is not fully certain, these discussions retain the presumption that people are forward looking in trying to understand policy and its impact on their decisions.

Implications and uses of the modern approach

A Phillips curve that is derived as part of a model that includes price-setting frictions is often referred to as the *New Keynesian Phillips curve* (NKPC).[20] A complete general equilibrium model that incorporates this version of the Phillips curve has been referred to as the *New Neoclassical Synthesis model*.[21] These models, like any economic model, are parsimonious descriptions of reality. We do not take them as exact descriptions of how a modern economy functions. Rather, we look to them to capture the most important forces at work in determining macroeconomic outcomes. The key equations in new neoclassical or new Keynesian models all involve assumptions or approximations that simplify the analysis without altering the fundamental economic forces at work. Such simplifications allow the models to be a useful guide to our thinking about the economy and the effects of policy.

The modern Phillips curve is similar to the expectations-augmented Phillips curve in that inflation expectations are important to the relationship between current inflation and unemployment. But its derivation from forward-looking price-setting behavior shifts the emphasis to expectations of future inflation. It has implications similar to the long-run neutrality of money, because if inflation is constant over time, then current inflation is equal to expected inflation. Then, whatever that constant rate of inflation, unemployment must return to the rate implied by the underlying structure of the economy, that is, to a rate that might be considered the "natural" unemployment. Money is not truly neutral in these models, however. Rather, the pricing frictions underlying the models imply that there are real economic costs to inflation. Because sellers of goods adjust their prices at different times, inflation makes the relative prices of different goods vary, and this distorts sellers' and buyers' decisions. This distortion is greater, the greater the rate of inflation.

The expectational nature of the Phillips curve also means that policies that have a short-run effect on inflation will induce real movements in output or unemployment mainly if the short-run movement in inflation is not expected to persist. In this sense, the modern Phillips curve also embodies the importance of monetary policy credibility, since it is credibility that would allow expected inflation to remain stable, even as inflation fluctuated in the near term.

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A more general way of emphasizing the importance of credibility is to say that the modern Phillips curve implies that the behavior of inflation will depend crucially on people's understanding of how the central bank is conducting monetary policy. What people think about the central bank's objectives and strategy will determine expectations of inflation, especially over the long run. Uncertainty about these aspects of policy will cause people to try to make inferences

about future policy from the actual policy they observe. Even if the central bank makes statements about its long-run objectives and strategy, people will still try to make inferences from the policy actions they see. But in this case, the inference that people will try to make is slightly simpler: people must determine if actual policy is consistent with the stated objectives.

Does this newest incarnation of the Phillips curve present a central bank with the opportunity to actively manage real economic activity through choosing more or less inflationary policies? The assumption that people are forward looking in forming expectations about future policy and inflation limits the scope for managing real growth or unemployment through Phillips curve trade-offs. An attempt to manage such growth or unemployment persistently would translate into the public's expectations of inflation causing the Phillips curve to shift. This is another characteristic that the modern approach shares with the older expectations-augmented Phillips curve.

What this modern framework does allow is the analysis of alternative monetary policy rules—that is, how the central bank sets its nominal interest rate in response to such economic variables as inflation, relative to the central bank's target, and the unemployment rate or the rate of output growth relative to the central bank's understanding of trend growth.[22] A typical rule that roughly captures the actual behavior of most central banks would state, for instance, that the central bank raises the interest rate when inflation is higher than its target and lowers the interest rate when unemployment rises. Alternative rules might make different assumptions, for instance, about *how much* the central bank moves the interest rate in response to changes in the macroeconomic variables that it is concerned about. The complete model can then be used to evaluate how different rules perform in terms of the long-run levels of inflation and unemployment they produce, or more generally in terms of the economic well-being generated for people in the economy. A typical result is that rules that deliver lower and less variable inflation are better both because low and stable inflation is a good thing and because such rules can also deliver less variability in real economic activity. Further, lower inflation has the benefit of reducing the costs from distorted relative prices.

While low inflation is a preferred outcome, it is typically not possible, in models or in reality, to engineer a policy that delivers the same low target rate of inflation every month or quarter. The economy is hit by any number of shocks that can move both real output and inflation around from month to month—large energy price movements, for example. In the presence of such shocks, a good policy might be one that, while not hitting its inflation target each month, always tends to move back toward its target and never stray too far.

Complete models incorporating a modern Phillips curve also allow economists to formalize the notion of monetary policy credibility. Remember that credibility refers to what people believe about the way the central bank intends to conduct policy. If people are uncertain about what rule best describes the behavior of the central bank, then they will try to learn from what they see the central bank doing. This learning can make people's expectations about future policy evolve in a complicated way. In general, uncertainty about the central bank's policy, or doubts about its commitment to low inflation, can raise the cost (in terms of output or employment) of reducing inflation. That is, the short-run relationship between inflation and unemployment depends on the public's long-run expectations about monetary policy and inflation.

The modern approach embodies many features of the earlier thinking about the Phillips curve. The characterization of policy as a systematic pattern of behavior employed by the central bank, providing the framework within which people form systematic expectations about future policy, follows the work of Kydland and Prescott. And the focus on expectations itself, of course, originated with Friedman. Within this modern framework, however, some important debates remain unsettled. While our characterization of the framework has emphasized the forward-looking nature of people's expectations, some economists believe that deviations from this benchmark are important for understanding the dynamic behavior of inflation. We turn to this question in the next section.

> ***"The short-run relationship between inflation and unemployment depends on the public's long-run expectations about monetary policy and inflation."***

We have described here an approach that has been adopted by many contemporary economists for applied central bank policy analysis. But we should note that this approach is not without its critics. Many economists view the price-setting frictions that are at the core of this approach as ad hoc and unpersuasive. This critique points to the value of a deeper theory of firms' price-setting behavior. Moreover, there are alternative frictions that can also rationalize monetary non-neutrality. Alternatives include frictions that limit the information available to decisionmakers or that limit some people's participation in some markets. So while the approach we've described does not represent the only possible modern model, it has become a popular workhorse in policy research.

How Well Does the Modern Phillips Curve Fit the Data?

The Phillips curve began as a relationship drawn to fit the data. Over time, it has evolved as economists' understanding of the forces driving those data has developed. The interplay between theory—the application of economic logic—and empirical facts has been an important part of this process of discovery. The recognition of the importance of expectations developed together with the evidence of the apparent instability of the short-run trade-off. The modern Phillips curve represents an attempt to study the behavior of both inflation and real variables using models that incorporate the lessons of Friedman, Phelps, and Lucas and that are rich enough to produce results that can be compared to real world data.

Attempts to fit the modern, or New Keynesian, Phillips curve to the data have come up against a challenging finding. The theory behind the short-run relationship implies that current inflation should depend on current real activity, as measured by unemployment or some other real variable, and expected future inflation. When estimating such an equation, economists have often found that an additional variable is necessary to explain the behavior of inflation over time. In particular, these studies find that past inflation is also important.[23]

Inflation persistence

The finding that past inflation is important for the behavior of current and future inflation—that is, the finding of inflation *persistence*—implies that movements in inflation have persistent effects on future inflation, apart from any effects on unemployment or expected inflation. Such persistence, if it were an inherent part of the structure and dynamics of the economy, would create a challenge for policymakers

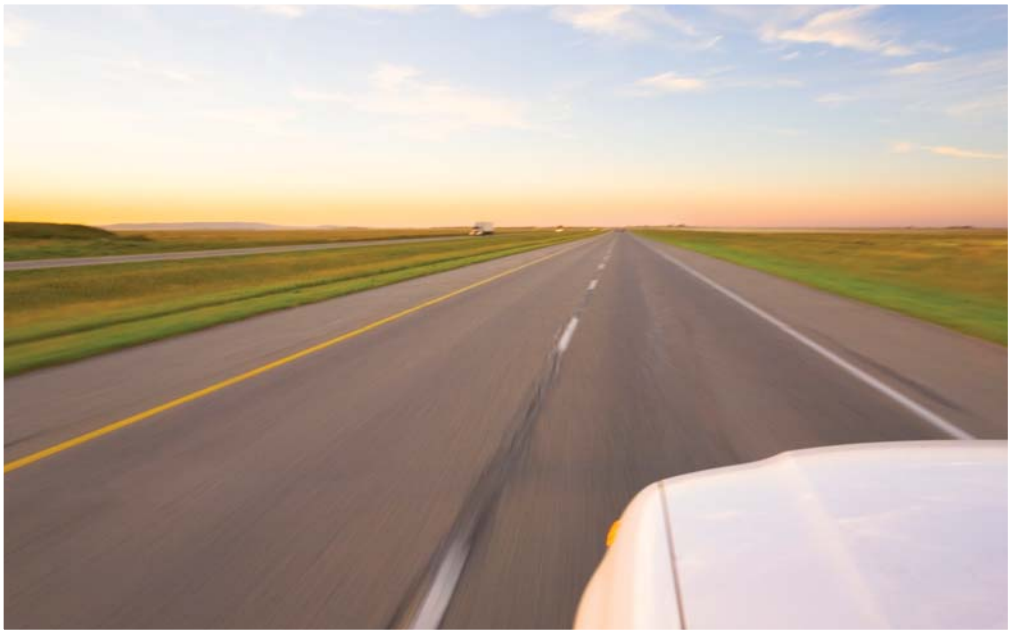
to reduce inflation by reducing people's expectations. Remember that we stated earlier the possibility that if the central bank could convince the public that it was going to bring inflation down, then the desired reduction might be achieved with little cost in unemployment or output. Inherent inflation persistence would make such a strategy problematic. Inherent persistence makes the set of choices faced by the policymaker closer to that originally envisioned by Samuelson and Solow. The faster one tries to bring down inflation, the greater the real economic costs.

Inherent persistence in inflation might be thought to arise if not all price-setters in the economy were as forward looking as in the description given earlier. If, instead of basing their price decisions on their best forecast of future inflation behavior, some firms simply based current price choices on the past behavior of inflation, this backward-looking pricing would impart persistence to inflation. Jordi Galí and Mark Gertler, who took into account the possibility that the economy is populated by a combination of forward-looking and backward-looking participants, introduced a *hybrid* Phillips curve in which current inflation depends on both expected future inflation and past inflation.[24]

An alternative explanation for inflation persistence is that it is a result primarily of the conduct of monetary policy. The evolution of people's inflation expectations depends on the evolution of the conduct of policy. If there are significant and persistent shifts in policy conduct, expectations will evolve as people learn about the changes. In this explanation, inflation persistence is not the result of backward-looking decisionmakers in the economy but is instead the result of the interaction of changing policy behavior and forward-looking private decisions by households and businesses.[25]

Another possibility is that inflation persistence is the result of the nature of the shocks hitting the economy. If these shocks are themselves persistent—that is, bad shocks tend to be followed by more bad shocks—then that persistence can lead to persistence in inflation. The way to assess the relative importance of alternative possible sources of persistence is to estimate the multiple equations that make up a more complete model of the economy. This approach, in contrast with the estimation of a single Phillips curve equation, allows for explicitly considering the roles of changing monetary policy, backward-looking pricing behavior, and shocks in generating inflation persistence. A typical finding is that the backward-looking terms in the hybrid Phillips curve appear considerably less important for explaining the dynamics of inflation than in single equation estimation.[26]

The scientific debate on the short-run relationship between inflation and real economic activity has not yet been fully resolved. On the central question of the importance of backward-looking behavior, common sense suggests that there are certainly people in the real-world economy who behave that way. Not everyone stays up-to-date enough on economic conditions to make sophisticated, forward-looking decisions. People who do not may well resort to rules of thumb that resemble the backward-looking behavior in some economic models. On the other hand, people's behavior is bound to be affected by what they believe to be the prevailing rate of inflation. Market participants have ample incentive and ability to anticipate the likely direction of change in the economy. So both backward- and forward-looking behavior are grounded in common sense. However the more important scientific questions involve the extent to which either type of behavior drives the dynamics of inflation and is therefore important for thinking about the consequences of alternative policy choices.



The importance of inflation persistence for policymakers

Related to the question of whether forward- or backward-looking behavior drives inflation dynamics is the question of how stable people's inflation expectations are. The backward-looking characterization suggests a stickiness in beliefs, implying that it would be hard to induce people to change their expectations. If relatively high inflation expectations become ingrained, then it would be difficult to get people to expect a decline in inflation. This describes a situation in which disinflation could be very costly, since only persistent evidence of changes in actual inflation would move future expectations. Evidence discussed earlier from episodes of dramatic changes in the conduct of policy, however, suggests that people can be convinced that policy has changed. In a sense, the trade-offs faced by a policymaker could depend on the extent to which people's expectations are subject to change. If people are uncertain and actively seeking to learn about the central bank's approach to policy, then expectations might move around in a way that departs from the very persistent, backward-looking characterization. But this movement in expectations would depend on the central bank's actions and statements about its conduct of policy.

The periods that Goodfriend (1993) described as inflation scares can be seen as periods when people's assessment of likely future policy was changing rather fluidly. Even very recently, we have seen episodes that could be described as "mini scares." For instance, in the wake of Hurricane Katrina in late 2005, markets' immediate response to rising energy prices suggested expectations of persistently rising inflation. Market participants, it seems, were uncertain as to how much of a run-up in general inflation the Fed would allow. Inflation expectations moved back down after a number of FOMC members made speeches emphasizing their focus on preserving low inflation. This episode illustrates both the potential for the Fed to influence inflation expectations and the extent to which market participants are at times uncertain as to how the Fed will respond to new developments.

Making Policy

While the scientific dialogue continues, policymakers must make judgments based on their understanding of the state of the debate. At the Federal Reserve Bank of Richmond, policy opinions and recommendations have long been guided by a view that the short-term costs of reducing inflation depend on expectations. This view implies that central bank credibility—that is, the public's level of confidence about the central bank's future patterns of behavior—is an important aspect of policymaking. Central bank credibility makes it less costly to return inflation to a desirable level after it has been pushed up (or down) by energy prices or other shocks to the economy. This view of policy is consistent with a view of the Phillips curve in which inflation persistence is primarily a consequence of the conduct of policy.

The evidence is perhaps not yet definitive. As outlined in our argument, however, we do find support for our view in the broad contours of the history of U.S. inflation over the last several decades. At a time when a consensus developed in the economics profession that the Phillips curve trade-off could be exploited by policymakers, apparent attempts to do so led to or contributed to the decidedly unsatisfactory economic performance of the 1970s. And the improved performance that followed coincided with the solidification of the profession's understanding of the role of expectations. We also see the initial costs

of bringing down inflation in the early 1980s as consistent with our emphasis on expectations and credibility. After the experience of the 1970s, credibility was low, and expectations responded slowly to the Fed's disinflationary policy actions. Still, the response of expectations was faster than might be implied by a backward-looking Phillips curve.

We also view policymaking on the basis of a forward-looking understanding of the Phillips curve as a prudent approach. A hybrid Phillips curve with a backward-looking component presents greater opportunities for exploiting the short-run trade-off. In a sense, it assumes that the monetary policymaker has more influence over real economic activity than is assumed by the purely forward-looking specification. Basing policy on a backward-looking formulation would also risk underestimating the extent to which movements in inflation can generate shifts in inflation expectations, which could work against the policymaker's intentions. Again, the experience of past decades suggests the risks associated with policymaking under the assumption that policy can persistently influence real activity more than it really can. In our view, these risks point to the importance of a policy that makes expectational stability its centerpiece.

Conclusion

One key lesson from the history of the relationship between inflation and real activity is that any short-run trade-off depends on people's expectations for inflation. Ultimately, monetary policy has its greatest impact on real activity when it deviates from people's expectations. But if a central bank tries to deviate from people's expectations repeatedly, so as to systematically increase real output growth, people's expectations will adjust.

There are also, we think, important lessons in the observation that overall economic performance, in terms of both real economic activity and inflation, was much improved beginning in the 1980s as compared to that in the preceding decade. While this improvement could have some external sources related to the kinds of shocks that affect the economy, it is also likely that improved conduct of monetary policy played a role. In particular, monetary policy was able to persistently lower inflation by responding more to signs of rising inflation or inflation expectations than had been the case in the past. At the same time, the variability of inflation fell, while fluctuations in output and unemployment were also moderating.

> ***"An approach to policy that is able to stabilize expectations will be most able to maintain low and stable inflation with minimal effects on real activity."***

We think the observed behavior of policy and economic performance is directly linked to the lessons from the history of the Phillips curve. Both point to the importance of the expectational consequences of monetary policy choices. An approach to policy that is able to stabilize expectations will be most able to maintain low and stable inflation with minimal effects on real activity. It is the credible maintenance of price stability that will in turn allow real economic performance to achieve its potential over the long run. This will not eliminate the business cycle since the economy will still be subject to shocks that quicken or slow growth. We believe the history of the Phillips curve shows that monetary policy's ability to add to economic variability by overreacting to shocks is greater than its ability to reduce real variability, once it has achieved credibility for low inflation.

Endnotes

1. King and Plosser (1984).
2. Cooley and Hansen (1989), for instance.
3. Phillips (1958).
4. Keynes (1923).
5. Samuelson and Solow (1960).
6. Ibid., p. 193.
7. Friedman (1968), p. 5.
8. Phelps (1967).
9. Lucas (1972).
10. Velde (2004) provides an excellent overview of this debate. A nontechnical description of the major arguments can be found in Sumo (2007).
11. Lucas (1976).
12. Kydland and Prescott (1977).
13. Sargent (1999), Cogley and Sargent (2005), and Sargent, Williams, and Zha (2006).
14. Sargent (1986).
15. Goodfriend and King (2005).
16. Ibid.
17. Mankiw (2007).
18. Goodfriend (1993).
19. There are a number of technical assumptions needed to make this intuitive connection precisely correct.
20. Clarida, Galí, and Gertler (1999).
21. Goodfriend and King (1997).
22. We use the term "monetary policy rule" in the very general sense of any systematic pattern of choice for the policy instrument—the funds rate—based on the state of the economy.
23. Fuhrer (1997).
24. Galí and Gertler (1999).
25. Dotsey (2002) and Sbordone (2006).
26. Lubik and Schorfheide (2004).

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Fifth District Economic Report

After three years of robust growth, the Fifth District economy moderated in 2006, much like the national economy that it closely tracks. The well-documented slowdown in housing contributed to this deceleration. But the housing market's retreat was not enough to significantly dampen regional activity. Moreover, residential investment accounts for only a small portion of total U.S. output—just 6 percent. It would take a much larger contraction than we saw in 2006 to weaken consumer spending.

Most economic measures during 2006 pointed upward in the District, just not as sharply as in recent years. Persistent growth in services-related businesses—such as health care and financial services—and solid employment gains across most of the District indicate underlying strength that so far has counterbalanced softer portions of the economy, including the long-struggling manufacturing sectors.

Employment

It was an up-and-down year in the Fifth District labor market. The region added about 203,000 jobs during 2006, a 1.5 percent increase. Unemployment dropped 0.3 percentage points compared with the close of 2005 to 4.4 percent, beating the national average of 4.5 percent. Though the overall story was of a strong performance, it really was one of a fast start followed by a loss of steam. January 2006 began with joblessness at 4.1 percent, and the rate crept up over the course of the year as the market cooled.

Job prospects differed across the region, with manufacturing-heavy South Carolina posting the highest unemployment rate at 6.6 percent, and Virginia, abundant in stable government and growing services jobs, reporting the lowest at 2.9 percent.

Total Payroll Employment

	December 2006 (thousands of jobs)	% Change from December 2005
Fifth District	13,729	1.5
United States	137,147	1.7
District of Columbia	695	1.2
Maryland	2,612	1.7
North Carolina	4,000	1.4
South Carolina	1,907	1.7
Virginia	3,755	1.5
West Virginia	760	1.0

Sources: Bureau of Economic Analysis/Haver Analytics
Note: All data are seasonally adjusted.

West Virginia and Washington, D.C., were alone among District jurisdictions in seeing their jobless rates worsen compared with the previous year. Across the District, the healthiest advances were seen in services-oriented urban areas, with rural parts weaker.

The overall expansion of employment in the District masked considerable variation among specific industries. Manufacturing employment declined by 1.8 percent over the course of the year, as the sector shed 23,300 jobs. This hit was felt strongest in North Carolina, which accounted for more than half that loss with 13,600 jobs eliminated. Yet North Carolina ended up gaining more than 56,000 jobs on the year, with a large share of those in its thriving health and professional services sectors. Likewise, Maryland's addition of roughly 44,000 jobs came despite losses in manufacturing and a sluggish financial sector. The state's gains were powered mostly by the education and health care, leisure and hospitality, and professional and business services sectors. Competition for skilled workers was strong, especially in large metropolitan areas like Washington, D.C., and Charlotte, and there were some reports of employers having difficulty with recruiting.

Households

The District's fair performance in the labor market can be seen in household financial conditions. While national real personal income climbed 3.6 percent in 2006, our region's rate of income growth trailed slightly at 3.5 percent. Three of the Fifth District's jurisdictions topped the national average: North Carolina at 4 percent; West Virginia at 3.8 percent; and Washington, D.C., at 3.7 percent. In 2005, all of the District's jurisdictions except North Carolina beat the national pace.

Real Personal Income

	Fourth Quarter 2006 (billions of chained 2000 dollars)	% Change from Fourth Quarter 2005
Fifth District	922	3.5
United States	9,604	3.6
District of Columbia	29	3.7
Maryland	219	3.1
North Carolina	253	4.0
South Carolina	113	3.6
Virginia	264	3.4
West Virginia	45	3.8

Sources: Bureau of Economic Analysis/Haver Analytics
Note: All data are seasonally adjusted.

The number of personal bankruptcies plunged across the District and nation in 2006 with sweeping reforms to federal bankruptcy laws. But after the initial dip, filings began to grow, with each jurisdiction in the District reporting personal bankruptcies at least 25 percent higher in the fourth quarter than in the first. The ability of households to keep up with mortgage payments worsened nationwide and in the District. At the end of the year, 3.3 percent of U.S. mortgages were past due 30 days or more, with 49 out of 51 states seeing overall rates increase. By comparison, 3.4 percent of mortgages were late in the Fifth District, up 0.3 percentage points from 2005. West Virginia reported the toughest conditions on this front, with a 0.6 percentage point increase in delinquencies to 4.8 percent.

Business

The financial health of Fifth District businesses was mixed in 2006. Our monthly surveys of business conditions pointed to contraction in retail establishments. Sales were brisk at the start but as the year drew to a close, retailers generally reported weakening revenues as well as declines in employment. Managers with non-retail service establishments, however, indicated decent growth in both revenue and employment throughout the year.

As reflected in labor market measures, manufacturers in the District saw continued pullback, with new orders trending downward over the course of the year. Our composite index of manufacturing activity says it all: 2006 began with gains, followed by pointed retreats. This pattern repeated itself throughout the year, but with each gain smaller than the last.

This trend of moderation as 2006 progressed was also reflected in business bankruptcy filings. Though, as with personal filings, business bankruptcies dropped off significantly from the year before because of stricter new filing rules, they inched up steadily through the seasons. The number of firms seeking protection from creditors rose 7.7 percent from the first quarter to the second; 13.3 percent from the second to the third; and 7.8 percent from the third quarter to the last. From the first quarter to the last, Fifth District business filings grew a sizable 31.6 percent. Still, this was lower than the national pace of 36.7 percent.

Venture capital—money typically provided to new businesses with strong growth prospects—flowed into the District. The 2006 total was $1.6 billion, a 10 percent increase over 2005. As would be expected, more than 90 percent of those funds were invested into firms in three states: Maryland, North Carolina, and Virginia, in that order.

Housing and Commercial Real Estate

No report on annual economic activity in 2006 would be complete without mention of the housing market. What's important to note is that, at least for our region, the run-up in housing prices over the past five years appears to have been based by and large on fundamentals, not speculation. But the slowdown is affecting District conditions. Existing home sales in our region fell 14.6 percent over the year. The biggest drop was the 26.2 percent decline registered in Virginia, followed by the District of Columbia, and Maryland. North Carolina's decrease of 1.5 percent was by far the smallest.

Yet home prices were resilient: Fifth District home prices were actually 7.8 percent higher than the year before, though the increase was well off the 17 percent annual increases that were the norm in the early part of 2005. Housing starts were down toward the end of the year. The biggest declines, however, were mostly confined to large metro areas. And the decline in housing permits was still less pronounced than the national trend. In the world of commercial real estate, office vacancy rates fell across the largest metro areas in the District. The most significant tightening occurred in Baltimore, where office vacancies dropped from 15 percent to 11.4 percent.

Outlook

2007 is shaping up much like the latter months of 2006. Economic performance more than ever is tied to location and industry. Growth is centered in the services sector, particularly health care, tourism, and professional services. Demand for skilled workers in those industries is fierce and some labor shortages have been reported. Still, through the first few months of 2007, the District is adding jobs at a slower pace than the national economy. Both retail and manufacturing activity have been softer. Not surprisingly, manufacturing-dependent states like West Virginia and South Carolina continue to experience weaker employment than Maryland and Virginia. Metro areas are seeing the strongest job markets, but their housing markets are also seeing some of the biggest retreats. The weakness in housing has been generally persistent throughout the first half of 2007, but many analysts expect the market to strengthen toward the end of the year. How the rest of the story of the Fifth District economy unfolds remains to be seen.

Note: The data presented and discussed above are accurate as of April 25, 2007, but subject to later revision.

Richmond Fed Economic Resources

5E Indicators
Published monthly by the regional economics section of the Federal Reserve Bank of Richmond, after the release of the monthly state employment and unemployment data.
www.richmondfed.org/research/regional_conditions/5e_indicators

Manufacturing Survey
Monthly survey of manufacturing managers in the Fifth District on economic conditions.
www.richmondfed.org/research/regional_conditions/manufacturing_conditions

Services Sector Survey
Monthly survey of managers at retail and services firms in the Fifth District on economic conditions.
www.richmondfed.org/research/regional_conditions/service_sector

Beige Book
Summary of commentary on current economic conditions by Federal Reserve District.
www.federalreserve.gov/FOMC/BeigeBook/2007

Region Focus
Quarterly magazine of the Richmond Fed providing information and analysis about the economy of the Fifth Federal Reserve District.
www.richmondfed.org/publications/economic_research/region_focus

SARAH G. GREEN

Message from Management

In 2006, the Federal Reserve Bank of Richmond took significant steps toward achieving the organization's vision of excelling in all we do and making important contributions to our key constituents: financial institutions, the U.S. Treasury, the public, and our employees. Our attention and energy are concentrated in several areas—strengthening our voice on policy issues, sustaining strong overall performance in our financial services and fiscal agency responsibilities, strengthening our connection to the region, and fully engaging our people.

We pursued a number of initiatives during the year to broaden our influence on policy issues. We augmented our monetary policy preparations with research on emerging findings related to inflation dynamics. Our Research Department is also finding new ways to share insights with audiences outside the Bank on specialized economic subjects, starting with consumer finance. In supervision and regulation, we made contributions to key System efforts, assuming leadership positions in quality management, credit risk management, and asset securitization, as well as

in capital markets training. Our examination staff continues to provide effective and efficient supervision of our community, regional, and large banking organizations and through various forums is expanding its efforts to share information with the industry about emerging risks and best risk-management practices.

This policy work is among the Bank's more public roles. Our leadership also has been evident in our payments system role. The Currency Technology Office, which is responsible for the System's automated currency-handling processes, developed important enhancements that will drive productivity gains and also contributed to counterfeit detection and currency recirculation initiatives. We worked closely with our financial institution customers to accelerate the adoption of Check 21 and electronic payments services. And in our role as fiscal agent, we enhanced a number of the U.S. Treasury's critical electronic payments and collection systems.

The Richmond Reserve Bank performs a number of important administrative functions on behalf of the entire Federal Reserve System. The Bank now processes the paychecks for all 19,000 employees of the 12 Federal Reserve Banks. The National Procurement Office, also located in Richmond, achieved significant System-wide procurement cost savings and expanded its use of e-business tools.

In the region, we worked to build teaching and learning relationships that expand the Bank's contributions to and the public's understanding of the financial system and the economy. Our outreach in 2006 focused both on improving relationships with depository institutions and on improving economic and financial education in the Fifth District. We developed new strategies to meet more frequently with depository institutions throughout the region. As an example, we held forums with bankers to talk about impending cash policy changes. Our economic and financial education initiatives grew out of a District-wide effort to find ways to strengthen contributions to our communities. We completed research on the unbanked population and are working with organizations throughout the District to build awareness about financial education issues. Bank management and staff have increased outside speaking events and service on organization boards, and have built new partnerships.

As we define what we as a Bank mean to our region, we also recognize that our people define who we are as a Bank. To attract and retain the best people, we created a talent management framework in 2006 that addresses recruitment, development, performance, compensation, and Bank culture. We have implemented a more comprehensive recruiting process and a new approach to performance management for all employees. Development opportunities now focus on both leadership skills and helping all members of our staff grow in their jobs.

Over the past year, the Richmond Fed has expanded the influence we have on financial matters and in monetary policy, increased the contributions we make to important Federal Reserve services, deepened the connections we have throughout our region with financial institutions and community organizations, and implemented new practices that will strengthen the people whose work is critical to our mission. We are proud of our policy contributions, of our leadership of critical Federal Reserve System initiatives, of the services we provide to our customers and the U.S. Treasury, and of our people.

Sarah G. Green
First Vice President

The Bank in the Community

The Federal Reserve Bank of Richmond values its connections with Fifth District communities and works to strengthen those relationships through our contact with constituents across all of our functions and through the charitable activities of our employees. The Bank conducts annual United Way campaigns at its Richmond, Baltimore, and Charlotte Offices, and our employees participate in numerous community service projects through our FedCorps volunteer program.

In addition, by reaching out to and talking with people in the Fifth District, the Bank's staff learns a great deal about economic conditions in the region and uses that information to help in the formulation of monetary policy. This interaction is also invaluable in learning about, and sharing insights regarding, community development issues facing our many constituents.

In 2006, for instance, the Bank's President, senior officers, and economists gave more than 100 talks throughout the District on a wide range of topics related to the economy, banking, and policy. Our economic education division conducted programs for teachers and students from the elementary school level through college. A number of departments within the Bank partnered with local organizations to hold a forum addressing regional economic issues in southwest Virginia and southern West Virginia. And the Community Affairs Office organized housing and economic development seminars in Maryland and South Carolina. Moving forward, providing resources to increase public understanding of the financial system and the broader economy will remain a high priority for the Bank, as will our efforts to deepen our own understanding of the economic successes and challenges facing communities in our region.

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We express our sincere appreciation to all of our directors for their guidance and support in 2006 and to members of our advisory groups for their service throughout the year. The insights of all of these individuals help us to better serve the communities and institutions within the Fifth District and to make greater contributions to the Federal Reserve System.

We especially thank those members of our boards of directors whose terms ended in 2006:

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Listing as of December 31, 2006

Financial Statements

The firm engaged by the Board of Governors for the audits of the individual and combined financial statements of the Reserve Banks for 2006 was PricewaterhouseCoopers LLP (PwC). Fees for these services totaled $4.2 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 2006, the Bank did not engage PwC for any material advisory services.

Management Assertion

March 5, 2007

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, 2006 (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 management judgments and estimates. 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 establishing and maintaining effective internal control over financial reporting as it relates to the Financial Statements. Such internal control is designed to provide reasonable assurance to management and to the Board of Directors regarding the preparation of the Financial Statements in accordance with the Manual. Internal control contains self-monitoring mechanisms, including, but not limited to, divisions of responsibility and a code of conduct. Once identified, any material deficiencies in internal control are reported to management and appropriate corrective measures are implemented.

Even effective internal control, 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. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

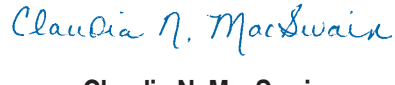
The management of the FRB Richmond assessed its internal control over financial reporting reflected in the Financial Statements, based upon the criteria established in the "Internal Control—Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, we believe that the FRB Richmond maintained effective internal control over financial reporting as it relates to the Financial Statements.

Management's assessment of the effectiveness of the FRB Richmond's internal control over financial reporting as of December 31, 2006, is being audited by PricewaterhouseCoopers LLP, the independent registered public accounting firm which also is auditing the FRB Richmond's Financial Statements.

Federal Reserve Bank of Richmond

Jeffrey M. Lacker
President

Sarah G. Green
First Vice President



Claudia N. MacSwain
Senior Vice President and Chief Financial Officer

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 completed an integrated audit of the Federal Reserve Bank of Richmond's 2006 financial statements, and of its internal control over financial reporting as of December 31, 2006 and an audit of its 2005 financial statements in accordance with the generally accepted auditing standards as established by the Auditing Standards Board (United States) and in accordance with the auditing standards of the Public Company Accounting Oversight Board (United States). Our opinions, based on our audits, are presented below.

Financial statements

We have audited the accompanying statements of condition of the Federal Reserve Bank of Richmond (the "Bank") as of December 31, 2006 and 2005, 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 generally accepted auditing standards as established by the Auditing Standards Board (United States) and in accordance with the auditing standards of the Public Company Accounting Oversight Board (United States). 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, assessing the accounting principles used and significant estimates made by management, and 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* which is 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, 2006 and 2005, and results of its operations for the years then ended, on the basis of accounting described in Note 3.

Internal control over financial reporting

Also, in our opinion, management's assessment, included in the accompanying Management's Report on Internal Control Over Financial Reporting, that the Bank maintained effective internal control over financial reporting as of December 31, 2006 based on criteria established in *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), is fairly stated, in all material

respects, based on those criteria. Furthermore, in our opinion, the Bank maintained, in all material respects, effective internal control over financial reporting as of December 31, 2006, based on criteria established in *Internal Control—Integrated Framework* issued by the COSO. The Bank's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting. Our responsibility is to express opinions on management's assessment and on the effectiveness of the Bank's internal control over financial reporting based on our audit. We conducted our audit of internal control over financial reporting in accordance with generally accepted auditing standards as established by the Auditing Standards Board (United States) and in accordance with the auditing standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. An audit of internal control over financial reporting includes obtaining an understanding of internal control over financial reporting, evaluating management's assessment, testing and evaluating the design and operating effectiveness of internal control, and performing such other procedures as we consider necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PricewaterhouseCoopers LLP
March 12, 2007

Statements of Condition (in millions)

As of December 31,	2006	2005
Assets		
Gold certificates	$ 853	$ 836
Special drawing rights certificates	147	147
Coin	78	66
Items in process of collection	237	225
Loans to depository institutions	—	1
U.S. government securities, net	65,095	57,253
Investments denominated in foreign currencies	5,625	3,454
Accrued interest receivable	558	445
Interdistrict settlement account	4,858	8,521
Bank premises and equipment, net	272	252
Interest on Federal Reserve notes due from U.S. Treasury	—	35
Other assets	102	90
Total assets	**$ 77,825**	**$ 71,325**
Liabilities and Capital		
Liabilities:		
Federal Reserve notes outstanding, net	$ 63,695	$ 57,760
Securities sold under agreements to repurchase	2,460	2,328
Deposits:		
Depository institutions	2,748	3,182
Other deposits	76	153
Deferred credit items	384	509
Interest on Federal Reserve notes due U.S. Treasury	39	—
Accrued benefit costs	192	107
Other liabilities	45	36
Total liabilities	**69,639**	**64,075**
Capital:		
Capital paid-in	4,093	3,942
Surplus (including accumulated other comprehensive loss of $73 million at December 31, 2006)	4,093	3,308
Total capital	**8,186**	**7,250**
Total liabilities and capital	**$ 77,825**	**$ 71,325**

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

Statements of Income (in millions)

For the year ended December 31,	2006	2005
Interest Income		
Interest on U.S. government securities	$ 2,862	$ 2,143
Interest on investments denominated in foreign currencies	98	53
Total interest income	**2,960**	**2,196**
Interest Expense		
Interest expense on securities sold under agreements to repurchase	109	62
Net interest income	**2,851**	**2,134**
Other Operating Income (Loss)		
Compensation received for services provided	44	40
Reimbursable services to government agencies	28	28
Foreign currency gains (losses), net	322	(519)
Other income	11	8
Total other operating income (loss)	**405**	**(443)**
Operating Expenses		
Salaries and other benefits	253	241
Occupancy expense	32	33
Equipment expense	62	59
Assessments by the Board of Governors	121	99
Other credits	(75)	(99)
Total operating expenses	**393**	**333**
Net income prior to distribution	**$ 2,863**	**$ 1,358**
Distribution of Net Income		
Dividends paid to member banks	$ 241	$ 198
Transferred to surplus	858	1,160
Payments to U.S. Treasury as interest on Federal Reserve notes	1,764	—
Total distribution	**$ 2,863**	**$ 1,358**

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

Statements of Changes in Capital (in millions)

For the years ended December 31, 2006 and December 31, 2005	Capital Paid-In	Surplus: Net Income Retained	Surplus: Accumulated Other Comprehensive Loss	Surplus: Total Surplus	Total Capital
Balance at January 1, 2005 (43.0 million shares)	$ 2,148	$ 2,148	$ —	$ 2,148	$ 4,296
Net change in capital stock issued (35.8 million shares)	1,794	—	—	—	1,794
Transferred to surplus	—	1,160	—	1,160	1,160
Balance at December 31, 2005 (78.8 million shares)	$ 3,942	$ 3,308	$ —	$ 3,308	$ 7,250
Net change in capital stock issued (3.0 million shares)	151	—	—	—	151
Transferred to surplus	—	858	—	858	858
Adjustment to initially apply FASB Statement No. 158	—	—	(73)	(73)	(73)
Balance at December 31, 2006 (81.8 million shares)	**$ 4,093**	**$ 4,166**	**$ (73)**	**$ 4,093**	**$ 8,186**

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") and one of the twelve Reserve Banks ("Reserve Banks") created by Congress under the Federal Reserve Act of 1913 ("Federal Reserve Act"), which established the central bank of the United States. 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, District of Columbia, and portions of West Virginia.

In accordance with the Federal Reserve Act, supervision and control of the Bank is 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 of the Federal Reserve System ("Board of Governors") to represent the public, and six directors are elected by member banks. Banks that are members of the System include all national banks and any state-chartered banks that apply and are approved for membership in the System. 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.

The System also consists, in part, of the Board of Governors and the Federal Open Market Committee ("FOMC"). The Board of Governors, an independent federal agency, is charged by the Federal Reserve Act with a number of specific duties, including general supervision over the Reserve Banks. 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.

2. Operations and Services

The Reserve Banks perform a variety of services and operations. Functions include participation in formulating and conducting monetary policy; participation in the payments system, including large-dollar transfers of funds, automated clearinghouse ("ACH") operations, and check collection; distribution of coin and currency; performance of fiscal agency functions for the U.S. Treasury, certain federal agencies, and other entities; serving as the federal government's bank; provision of short-term loans to depository institutions; service to the consumer and the community by providing educational materials and information regarding consumer laws; and supervision of bank holding companies, state member banks, and U.S. offices of foreign banking organizations. The Reserve Banks also provide certain services to foreign central banks, governments, and international official institutions.

The FOMC, in the conduct of monetary policy, establishes policy regarding domestic open market operations, oversees these operations, and annually issues authorizations and directives to the FRBNY for its execution of transactions. The FRBNY is authorized and directed by the FOMC to conduct operations in domestic markets, including the direct purchase and sale of U.S. government securities, 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 executes these open market transactions at the direction of the FOMC and holds the resulting securities, with the exception of securities purchased under agreements to resell, 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. The FRBNY is authorized by the FOMC to hold balances of, and to execute spot and forward foreign exchange ("FX") and securities contracts for, nine foreign currencies and to invest such foreign currency holdings ensuring adequate

liquidity is maintained. The FRBNY is authorized and directed by the FOMC to maintain reciprocal currency arrangements ("FX swaps") with two central banks and "warehouse" foreign currencies for the U.S. Treasury and Exchange Stabilization Fund ("ESF") through the Reserve Banks. In connection with its foreign currency activities, the FRBNY may enter into transactions that contain varying degrees of off-balance-sheet market risk that results from their future settlement and counterparty credit risk. The FRBNY controls credit risk by obtaining credit approvals, establishing transaction limits, and performing daily monitoring procedures.

Although the Reserve Banks are separate legal entities, in the interests of greater efficiency and effectiveness they collaborate in the delivery of certain operations and services. The collaboration takes the form of centralized operations and product or service offices that have responsibility for the delivery of certain services on behalf of the Reserve Banks. Various operational and management models are used and are supported by service agreements between the Reserve Bank providing the service and the other eleven Reserve Banks. In some cases, costs incurred by a Reserve Bank for services provided to other Reserve Banks are not shared; in other cases, the Reserve Banks are billed for services provided to them by another Reserve Bank.

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, Currency Technology Office, National Procurement Office, Daylight Overdraft Reporting and Pricing, and the Payroll Central Business Administration Function. Costs are, however, redistributed to the other Reserve Banks for computing and support services the Bank provides for the System. The Bank's total reimbursement for these services was $269 million and $263 million for the years ended December 31, 2006 and 2005, respectively, and is included in "Other credits" on the Statements of Income.

During 2005, the Federal Reserve Bank of Atlanta ("FRBA") was assigned the overall responsibility for managing the Reserve Banks' provision of check services to depository institutions, and, as a result, recognizes total System check revenue on its Statements of Income. Because the other eleven Reserve Banks incur costs to provide check services, a policy was adopted by the Reserve Banks in 2005 that required that the FRBA compensate the other Reserve Banks for costs incurred to provide check services. In 2006 this policy was extended to the ACH services, which are managed by the FRBA, as well as to Fedwire funds transfer and securities transfer services, which are managed by the FRBNY. The FRBA and the FRBNY compensate the other Reserve Banks for the costs incurred to provide these services. This compensation is reported as a component of "Compensation received for services provided", and the Bank would have reported $42 million as compensation received for services provided had this policy been in place in 2005 for ACH, Fedwire funds transfer, and securities transfer services.

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 accounting standard-setting bodies. The Board of Governors has developed specialized accounting principles and practices that it considers to be appropriate for the nature and function of a central bank, which differ significantly from those of 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 of the Reserve Banks are required to adopt and apply accounting policies and practices that are consistent with the Financial Accounting Manual and the financial statements have been prepared in accordance with the Financial Accounting Manual.

Differences exist between the accounting principles and practices in the Financial Accounting Manual and generally accepted accounting principles in the United States ("GAAP"), primarily due to the unique nature of the Bank's powers and responsibilities as part of the nation's central bank. The primary difference is the presentation of all securities holdings at amortized cost, rather than using the fair value presentation required by GAAP. Amortized cost more appropriately reflects the Bank's securities holdings given its unique responsibility to conduct monetary policy. While the application of current market prices to the securities holdings 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 Bank earnings or capital. Both the domestic and foreign

components of the SOMA portfolio may involve transactions that result in gains or losses when holdings are sold prior to maturity. Decisions regarding securities and foreign currency 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 securities and currencies are incidental to the open market operations and do not motivate decisions related to policy or open market activities.

In addition, the Bank has elected not to present a Statement of Cash Flows because the liquidity and cash position of the Bank are not a primary concern given the Bank's unique powers and responsibilities. A Statement of Cash Flows, therefore, would not provide any additional meaningful information. Other information regarding the Bank's activities is provided in, or may be derived from, the Statements of Condition, Income, and Changes in Capital. There are no other significant differences between the policies outlined in the Financial Accounting Manual and GAAP.

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, the 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 and Special Drawing Rights Certificates

The Secretary of the U.S. Treasury is authorized to issue gold and special drawing rights ("SDR") certificates to the Reserve Banks.

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. The 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 reduced. 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 the average Federal Reserve notes outstanding in each Reserve Bank.

SDR certificates 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. SDR certificates 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. When SDR certificates are issued to the Reserve Banks, 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 each Reserve Bank's Federal Reserve notes outstanding at the end of the preceding year. There were no SDR transactions in 2006 or 2005.

b. Loans to Depository Institutions

Depository institutions that maintain reservable transaction accounts or nonpersonal time deposits, as defined in regulations issued by the Board of Governors, have borrowing privileges at the discretion of the Reserve Bank. Borrowers execute certain lending agreements and deposit sufficient collateral before credit is extended. Outstanding loans are evaluated for collectibility, and currently all are considered collectible and fully collateralized. 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 Board of Directors of the Reserve Bank, subject to review and determination by the Board of Governors.

c. U.S. Government Securities and Investments Denominated in Foreign Currencies

U.S. government 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. Gains and losses resulting from sales of securities are determined by specific issues based on average cost. 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 (losses), net" in the Statements of Income.

Activity related to U.S. government securities, including the premiums, discounts, and realized and unrealized gains and losses, is allocated to each Reserve Bank on a percentage basis derived from an annual settlement of interdistrict clearings that occurs in April of each year. The settlement also equalizes Reserve Bank gold certificate holdings to Federal Reserve notes outstanding in each District. Activity related to investments denominated in foreign currencies is allocated to each Reserve Bank based on the ratio of each Reserve Bank's capital and surplus to aggregate capital and surplus at the preceding December 31.

d. Securities Sold Under Agreements to Repurchase and Securities Lending

Securities sold under agreements to repurchase are accounted for as financing transactions and the associated interest expense is recognized over the life of the transaction. These transactions are reported in the Statements of Condition at their contractual amounts and the related accrued interest payable is reported as a component of "Other liabilities."

U.S. government securities held in the SOMA are lent to U.S. government securities dealers in order to facilitate the effective functioning of the domestic securities market. Securities-lending transactions are fully collateralized by other U.S. government securities and the collateral taken is in excess of the market value of the securities loaned. The FRBNY charges the dealer a fee for borrowing securities and the fees are reported as a component of "Other income."

Activity related to securities sold under agreements to repurchase and securities lending is allocated to each of the Reserve Banks on a percentage basis derived from the annual settlement of interdistrict clearings. Securities purchased under agreements to resell are allocated to FRBNY and not allocated to the other Reserve Banks.

e. FX Swap Arrangements and Warehousing Agreements

FX swap arrangements are contractual agreements between two parties, the FRBNY and an authorized foreign central bank, to exchange specified currencies, at a specified price, on a specified date. The parties agree to exchange their currencies up to a prearranged 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 the foreign currencies it may need to intervene to support the dollar and give the authorized foreign central bank temporary access to dollars it may need to support its own currency. Drawings under the FX swap arrangements can be initiated by either party acting as drawer, and must be agreed to by the drawee party. The FX swap arrangements are structured so that the party initiating the transaction bears the exchange rate risk upon maturity. The FRBNY will generally invest the foreign currency received under an FX swap arrangement in interest-bearing instruments.

Warehousing is an arrangement under which the FOMC agrees to exchange, at the request of the U.S. Treasury, U.S. dollars for foreign currencies held by the U.S. 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 U.S. Treasury and ESF for financing purchases of foreign currencies and related international operations.

FX swap arrangements and warehousing agreements are revalued daily at current market exchange rates. Activity related to these agreements, with the exception of the unrealized gains and losses resulting from the daily revaluation, is allocated to each Reserve Bank based on the ratio of each Reserve Bank's capital and surplus to aggregate capital and surplus at the preceding December 31. Unrealized gains and losses resulting from the daily revaluation are allocated to FRBNY and not allocated to the other Reserve Banks.

f. 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 the estimated useful lives of the assets, which range from two to fifty years. Major alterations, renovations, and improvements are capitalized at cost as additions to the asset accounts and are depreciated over the remaining useful life of the asset or, if appropriate, over the unique useful life of the alteration, renovation, or improvement. Maintenance, repairs, and minor replacements are charged to operating expense in the year incurred.

Costs incurred for software during the application development stage, either developed internally or acquired for internal use, 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. Maintenance costs related to software are charged to expense in the year incurred.

Capitalized assets including software, buildings, leasehold improvements, furniture, and equipment are impaired when events or changes in circumstances indicate that the carrying amount of assets or asset groups is not recoverable and significantly exceeds their fair value.

g. Interdistrict Settlement Account

At the close of business each day, each Reserve Bank assembles the payments due to or from other Reserve Banks. These payments result from transactions between Reserve Banks and transactions that involve depository institution accounts held by other Reserve Banks, such as Fedwire funds transfer, check collection, security transfer, and ACH operations. The cumulative net amount due to or from the other Reserve Banks is reflected in the "Interdistrict settlement account" in the Statements of Condition.

h. 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 and their designees) to the Reserve Banks upon deposit with such agents of specified 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 at least equal to the sum of the notes applied for by such Reserve Bank.

Assets eligible to be pledged as collateral security include all of the Bank's assets. The collateral value is equal to the book value of the collateral tendered, with the exception of securities, for which the 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 deducted.

The Board of Governors may, at any time, call upon a Reserve Bank for additional security to adequately collateralize the Federal Reserve notes. To satisfy the obligation to provide sufficient collateral for outstanding 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 issued to all Reserve Banks. 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, Federal Reserve notes are obligations of the United States and are backed by the full faith and credit of the United States government.

"Federal Reserve notes outstanding, net" in the Statements of Condition represents the Bank's Federal Reserve notes outstanding, reduced by the currency issued to the Bank but not in circulation, of $11,394 million and $11,887 million at December 31, 2006 and 2005, respectively.

i. Items in Process of Collection and Deferred Credit Items

"Items in process of collection" in the Statements of Condition primarily represents amounts attributable to checks that have been deposited for collection and that, as of the balance sheet date, have not yet been presented to the paying bank. "Deferred credit items" are the counterpart liability to items in process of collection, and the amounts in this account arise from deferring credit for deposited items until the amounts are collected. The balances in both accounts can vary significantly.

j. 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. These shares are nonvoting with a par value of $100 and may not be transferred or hypothecated. As a member bank's capital and surplus changes, its holdings of Reserve Bank stock must be adjusted. Currently, only one-half of the subscription is paid-in and the remainder is subject to call. By law, each Reserve Bank is required to pay each member bank 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.

k. Surplus

The Board of Governors requires the Reserve Banks to maintain a surplus equal to the amount of capital paid-in as of December 31 of each year. 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.

Accumulated other comprehensive income is reported as a component of surplus in the Statements of Condition and the Statements of Changes in Capital. The balance of accumulated other comprehensive income is comprised of expenses, gains, and losses related to defined benefit pension plans and other postretirement benefit plans that, under accounting principles, are included in comprehensive income but excluded from net income. Additional information regarding the classifications of accumulated other comprehensive income is provided in Notes 9 and 10.

l. Interest on Federal Reserve Notes

The Board of Governors requires the Reserve Banks to transfer excess earnings to the U.S. Treasury as interest on Federal Reserve notes, after providing for the costs of operations, payment of dividends, and reservation of an amount necessary to equate surplus with capital paid-in. This amount is reported as a component of "Payments to U.S. Treasury as interest on Federal Reserve notes" in the Statements of Income and is reported as a liability in the Statements of Condition. Weekly payments to the U.S. Treasury may vary significantly.

In the event of losses or an increase in capital paid-in at a Reserve Bank, payments to the U.S. Treasury are suspended and earnings are retained until the surplus is equal to the capital paid-in.

In the event of a decrease in capital paid-in, the excess surplus, after equating capital paid-in and surplus at December 31, is distributed to the U.S. Treasury in the following year.

Due to the substantial increase in capital paid-in, surplus was not equated to capital at December 31, 2005. The amount of additional surplus required due to these events exceeded the Bank's earnings in 2005.

m. Income and Costs Related to U.S. 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.

n. Assessments by the Board of Governors

The Board of Governors assesses the Reserve Banks to fund its operations based on each Reserve Bank's capital and surplus balances as of December 31 of the previous year. The Board of Governors also assesses each Reserve Bank for the expenses incurred for the U.S. Treasury to issue and retire Federal Reserve notes based on each Reserve Bank's share of the number of notes comprising the System's net liability for Federal Reserve notes on December 31 of the previous year.

o. 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 million for each of the years ended December 31, 2006 and 2005, respectively, and are reported as a component of "Occupancy expense."

p. Restructuring Charges

In 2003, the Reserve Banks began the restructuring of several operations, primarily check, cash, and U.S. Treasury services. The restructuring included streamlining the management and support structures, reducing staff, decreasing the number of processing locations, and increasing processing capacity in some locations. These restructuring activities continued in 2004 through 2006.

Note 11 describes the restructuring and provides information about the Bank's costs and liabilities associated with employee separations and contract termina-

tions. The costs associated with the impairment of certain of the Bank's assets are discussed in Note 6. Costs and liabilities associated with enhanced pension benefits in connection with the restructuring activities for all of the Reserve Banks are recorded on the books of the FRBNY. Costs and liabilities associated with enhanced postretirement benefits are discussed in Note 9.

q. Implementation of FASB Statement No. 158, Employers' Accounting for Defined Benefit Pension and Other Postretirement Plans

The Bank initially applied the provisions of FASB Statement No. 158, Employers' Accounting for Defined Benefit Pension and Other Postretirement Plans, at December 31, 2006. This accounting standard requires recognition of the overfunded or underfunded status of a defined benefit postretirement plan in the Statements of Condition, and recognition of changes in the funded status in the years in which the changes occur through comprehensive income. The transition rules for implementing the standard require applying the provisions as of the end of the year of initial implementation with no retrospective application. The incremental effects on the line items in the Statement of Condition at December 31, 2006, were as follows (in millions):

	Before Applicaton of Statement 158	Adjustments	After Application of Statement 158
Accrued benefit costs	119	73	192
Total liabilities	**$ 69,566**	**$ 73**	**$ 69,639**
Surplus	4,166	(73)	4,093
Total capital	**$ 8,259**	**$ (73)**	**$ 8,186**

4. U.S. Government Securities, Securities Sold Under Agreements to Repurchase, and Securities Lending

The FRBNY, on behalf of the Reserve Banks, holds securities bought outright in the SOMA. The Bank's allocated share of SOMA balances was approximately 8.307 percent and 7.632 percent at December 31, 2006 and 2005, respectively.

The Bank's allocated share of U.S. government securities, net, held in the SOMA at December 31, was as follows (in millions):

	2006	2005
Par value:		
U.S. government:		
Bills	$ 23,012	$ 20,703
Notes	33,425	29,009
Bonds	8,268	7,084
Total par value	**64,705**	**56,796**
Unamortized premiums	723	673
Unaccreted discounts	(333)	(216)
Total allocated to the Bank	**$ 65,095**	**$ 57,253**

At December 31, 2006 and 2005, the fair value of the U.S. government securities allocated to the Bank, excluding accrued interest, was $66,116 million and $58,571 million, respectively, as determined by reference to quoted prices for identical securities.

The total of the U.S. government securities, net, held in the SOMA was $783,619 million and $750,202 million at December 31, 2006 and 2005, respectively. At December 31, 2006 and 2005, the fair value of the U.S. government securities held in the SOMA, excluding accrued interest, was $795,900 million and $767,472 million, respectively, as determined by reference to quoted prices for identical securities.

Although the fair value of security holdings can be substantially greater or less than the carrying value at any point in time, these unrealized gains or losses have no effect on the ability of a Reserve Bank, as a central bank, to meet its financial obligations and responsibilities, and should not be misunderstood as representing a risk to the Reserve Banks, their shareholders, or the public. The fair value is presented solely for informational purposes.

At December 31, 2006 and 2005, the total contract amount of securities sold under agreements to repurchase was $29,615 million and $30,505 million, respectively, of which $2,460 million and $2,328 million were allocated to the Bank. The total par value of the SOMA securities that were pledged for securities sold under agreements to repurchase at December 31, 2006 and 2005 was $29,676 million and $30,559 million, respectively, of which $2,465 million and $2,332 million was allocated to the Bank. The contract amount for

securities sold under agreements to repurchase approximates fair value.

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, 2006, 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	$ 3,372	$ 2,460
16 days to 90 days	15,027	—
91 days to 1 year	15,379	—
Over 1 year to 5 years	18,623	—
Over 5 years to 10 years	5,619	—
Over 10 years	6,685	—
Total allocated to the Bank	**$ 64,705**	**$ 2,460**

At December 31, 2006 and 2005, U.S. government securities with par values of $6,855 million and $3,776 million, respectively, were loaned from the SOMA, of which $569 million and $288 million, respectively, 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 with 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 issuing foreign governments.

The Bank's allocated share of investments denominated in foreign currencies was approximately 27.462 percent and 18.248 percent at December 31, 2006 and 2005, respectively.

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

	2006	2005
European Union Euro:		
Foreign currency deposits	$ 1,714	$ 990
Securities purchased under agreements to resell	608	352
Government debt instruments	1,119	650
Japanese Yen:		
Foreign currency deposits	715	477
Government debt instruments	1,469	985
Total allocated to the Bank	**$ 5,625**	**$ 3,454**

At December 31, 2006 and 2005, the fair value of investments denominated in foreign currencies, including accrued interest, allocated to the Bank was $5,612 million and $3,461 million, respectively. The fair value of government debt instruments was determined by reference to quoted prices for identical securities. The cost basis of foreign currency deposits and securities purchased under agreements to resell, adjusted for accrued interest, approximates fair value. Similar to the U.S. government securities discussed in Note 4, unrealized gains or losses have no effect on the ability of a Reserve Bank, as a central bank, to meet its financial obligations and responsibilities.

Total System investments denominated in foreign currencies were $20,482 million and $18,928 million at December 31, 2006 and 2005, respectively. At December 31, 2006 and 2005, the fair value of the total System investments denominated in foreign currencies, including accrued interest, was $20,434 million and $18,965 million, respectively.

The maturity distribution of investments denominated in foreign currencies that were allocated to the Bank at December 31, 2006, was as follows (in millions):

Maturities of Investments Denominated in Foreign Currencies	European Euro	Japanese Yen	Total
Within 15 days	$ 1,197	$ 714	$ 1,911
16 days to 90 days	653	332	985
91 days to 1 year	671	608	1,279
Over 1 year to 5 years	920	530	1,450
Over 5 years to 10 years	—	—	—
Over 10 years	—	—	—
Total allocated to the Bank	**$ 3,441**	**$ 2,184**	**$ 5,625**

At December 31, 2006 and 2005, there were no material open foreign exchange contracts.

At December 31, 2006 and 2005, 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):

	2006	2005
Bank premises and equipment:		
Land	$ 32	$ 32
Buildings	143	142
Building machinery and equipment	51	51
Construction in progress	26	4
Furniture and equipment	292	288
Subtotal	**544**	**517**
Accumulated depreciation	(272)	(265)
Bank premises and equipment, net	**$ 272**	**$ 252**
Depreciation expense, for the year ended December 31	**$ 45**	**$ 43**

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

	2006	2005
Leased premises and equipment under capital leases	$ 11	$ 9
Accumulated depreciation	(5)	(5)
Leased premises and equipment under capital leases, net	**$ 6**	**$ 4**

The Bank leases space to outside tenants with remaining lease terms of five years. Rental income from such leases was $1.5 million for each of the years ended December 31, 2006 and 2005, respectively, and is reported as a component of "Other income." Future minimum lease payments that the Bank will receive under noncancelable lease agreements in existence at December 31, 2006, are as follows (in thousands):

	Future Minimum Lease Payments
2007	$ 257
2008	358
2009	394
2010	431
2011	433
Thereafter	78
Total	**$ 1,951**

The Bank has capitalized software assets, net of amortization, of $36 million and $41 million at December 31, 2006 and 2005, respectively. Amortization expense was $19 million for each of the years ended December 31, 2006 and 2005, respectively. Capitalized software assets are reported as a component of "Other assets" and the related amortization is reported as a component of "Other expenses."

Assets impaired as a result of the Bank's restructuring plan, as discussed in Note 11, include furniture and equipment. There were no asset impairment losses in 2006 and 2005.

7. Commitments and Contingencies

At December 31, 2006, the Bank was obligated under noncancelable leases for premises and equipment with remaining terms ranging from one to approximately seven months. These leases provide for increased rental payments based upon increases in real estate taxes, operating costs, or selected price indices.

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 and rental charges to other entities within the Federal Reserve System, was approximately $1 million for each of the years ended December 31, 2006 and 2005, respectively. Certain of the Bank's leases have options to renew.

Future minimum rental payments under noncancelable operating leases and capital leases, net of sublease rentals, with terms of one year or more, at December 31, 2006 were not material.

At December 31, 2006, there were no other material commitments or long-term obligations in excess of one year.

Under the Insurance Agreement of the Federal Reserve Banks, 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 the agreement at December 31, 2006 or 2005.

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 three 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"). Employees at certain compensation levels participate in the Benefit Equalization Retirement Plan ("BEP") and certain Reserve Bank officers participate in the Supplemental Employee Retirement Plan ("SERP").

The System Plan is a multi-employer plan with contributions funded by the participating employers. Participating employers are the Federal Reserve Banks, the Board of Governors, 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 System Plan and the costs associated with the Plan are not redistributed to other participating employers.

The Bank's projected benefit obligation, funded status, and net pension expenses for the BEP and the SERP at December 31, 2006 and 2005, and for the years then ended, were 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 $9 million and $8 million for the years ended December 31, 2006 and 2005, respectively, and are reported as a component of "Salaries and other benefits" in the Statements of Income. The Bank matches employee contributions based on a specified formula. For the years ended December 31, 2006 and 2005, the Bank matched 80 percent on the first 6 percent of employee contributions for employees with less than five years of service and 100 percent on the first 6 percent of employee contributions for employees with five or more years of service.

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.

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

	2006	2005
Accumulated postretirement benefit obligation at January 1	$ 135.3	$ 93.7
Service cost-benefits earned during the period	4.8	14.0
Interest cost of accumulated benefit obligation	8.0	7.0
Actuarial loss	33.2	27.1
Contributions by plan participants	1.4	1.1
Benefits paid	(7.6)	(7.6)
Accumulated postretirement benefit obligation at December 31	**$ 175.1**	**$135.3**

At December 31, 2006 and 2005, the weighted-average discount rate assumptions used in developing the postretirement benefit obligation were 5.75 percent and 5.50 percent, respectively.

Discount rates reflect yields available on high-quality corporate bonds that would generate the cash flows necessary to pay the plan's benefits when due.

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):

	2006	2005
Fair value of plan assets at January 1	$ —	$ —
Contributions by the employer	6.2	6.5
Contributions by plan participants	1.4	1.1
Benefits paid	(7.6)	(7.6)
Fair value of plan assets at December 31	**$ —**	**$ —**
Unfunded postretirement benefit obligation	$175.1	$ 135.3
Unrecognized prior service cost		7.7
Unrecognized net actuarial loss		(50.0)
Accrued postretirement benefit cost		**$ 93.0**
Amounts included in accumulated other comprehensive loss are shown below (in millions):		
Prior service cost	$ 6.2	
Net actuarial loss	(79.0)	
Total accumulated other comprehensive loss	**$ (72.8)**	

Accrued postretirement benefit costs are reported as a component of "Accrued benefit costs" in the Statements of Condition.

For measurement purposes, the assumed health care cost trend rates at December 31 are as follows:

	2006	2005
Health care cost trend rate assumed for next year	9.00 %	9.00 %
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	5.00 %	5.00 %
Year that the rate reaches the ultimate trend rate	2012	2011

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, 2006 (in millions):

	1% Point Increase	1% Point Decrease
Effect on aggregate of service and interest cost components of net periodic postretirement benefit costs	$ 2.3	$ (1.8)
Effect on accumulated postretirement benefit obligation	23.1	(19.1)

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

	2006	2005
Service cost-benefits earned during the period	$ 4.8	$ 14.0
Interest cost on accumulated benefit obligation	8.0	7.0
Amortization of prior service cost	(1.4)	(1.4)
Recognized net actuarial loss	4.2	3.0
Net periodic postretirement benefit expense	**$ 15.6**	**$ 22.6**
Estimated amounts that will be amortized from accumulated other comprehensive loss into net periodic postretirement benefit expense in 2007 are shown below (in millions):		
Prior service cost	$ (1.4)	
Actuarial loss	7.8	
Total	**$ 6.4**	

Net postretirement benefit costs are actuarially determined using a January 1 measurement date. At January 1, 2006 and 2005, the weighted-average discount rate assumptions used to determine net periodic postretirement benefit costs were 5.50 percent and 5.75 percent, respectively.

Net periodic postretirement benefit expense is reported as a component of "Salaries and other benefits" in the Statements of Income.

The Medicare Prescription Drug, Improvement and Modernization Act of 2003 established a prescription drug benefit under Medicare ("Medicare Part D") and a federal subsidy to sponsors of retiree health care benefit plans that provide benefits that are at least actuarially equivalent to Medicare Part D. The benefits provided under the Bank's plan to certain participants are at least actuarially

equivalent to the Medicare Part D prescription drug benefit. The estimated effects of the subsidy, retroactive to January 1, 2004, are reflected in actuarial loss in the accumulated postretirement benefit obligation.

There were no receipts of federal Medicare subsidies in the year ended December 31, 2006. Expected receipts in the year ending December 31, 2007, related to payments made in the year ended December 31, 2006, are $.5 million.

Following is a summary of expected postretirement benefit payments (in millions):

	Without Subsidy	With Subsidy
2007	$ 8.3	$ 7.8
2008	9.2	8.6
2009	10.1	9.4
2010	11.1	10.4
2011	11.9	11.1
2012-2016	68.7	63.1
Total	**$119.3**	**$110.4**

Postemployment Benefits

The Bank offers benefits to former or inactive employees. Postemployment benefit costs are actuarially determined using a December 31 measurement date and include the cost of medical and dental insurance, survivor income, and disability benefits. The accrued postemployment benefit costs recognized by the Bank at December 31, 2006 and 2005 were $15 million and $13 million, respectively. This cost is included as a component of "Accrued benefit costs" in the Statements of Condition. Net periodic postemployment benefit expense included in 2006 and 2005 operating expenses were $4 million and $1 million, respectively, and are recorded as a component of "Salaries and other benefits" in the Statements of Income.

10. Accumulated Other Comprehensive Income

Following is a reconciliation of beginning and ending balances of accumulated other comprehensive income (loss) (in millions):

	Amount Related to Postretirement Benefits other than Pensions
Balance at December 31, 2005	$ —
Adjustment to initially apply FASB Statement No. 158	(73)
Balance at December 31, 2006	**$ (73)**

Additional detail regarding the classification of accumulated other comprehensive income is included in Note 9.

11. Business 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. In 2004, additional consolidation and restructuring initiatives were announced in the savings bonds operations. These actions resulted in the following business restructuring charges (in millions):

		Year-Ended 12/31/2006			
	Total Estimated Costs	Accrued Liability 12/31/2005	Total Charges and Adjustments	Total Paid	Accrued Liability 12/31/2006
Employee separation	$ 4.0	$ 0.5	$ (0.2)	$ 0.2	$ 0.1
Contract termination	0.3	—	—	—	—
Total	**$ 4.3**	**$ 0.5**	**$ (0.2)**	**$ 0.2**	**$ 0.1**

Employee separation costs are primarily severance costs related to identified staff reductions of approximately 178 related to restructuring announced in 2003 and 2004. Costs related to staff reductions for the years ended December 31, 2006 and 2005 are reported as a component of "Salaries and other benefits" in the Statements of Income. Contract termination costs include the charges resulting from terminating existing lease and other contracts.

Restructuring costs associated with the impairment of certain Bank assets, including software, buildings, leasehold improvements, furniture, and equipment, are discussed in Note 6. Costs associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY as discussed in Note 8. Costs associated with enhanced postretirement benefits are disclosed in Note 9.

The Bank substantially completed its announced plans in June 2005.

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